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Mack Shelley
Ozkan Akman
Sabri Turgut

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Good Times as Seventies Television Milestone

Angela Nelson

Bowling Green State University, USA, https://orcid.org/0000-0001-8666-5860

Abstract: February 8, 2024, marked the fiftieth anniversary of the American television situation comedy *Good Times*, which aired on the CBS network until August 1, 1979. *Good Times* was truly remarkable for its time because the series featured the first recurring, intact Black nuclear family, the Evanses, on primetime television. This paper argues that *Good Times* is a seventies television milestone because it depicted groundbreaking representations of family, class, race, and gender. I show that groundbreaking representations included *Good Times* presenting a pseudo-monolithic American family-protagonist; chronicling the ups-and-downs of an urban Black working-class nuclear family; normalizing Blackness and unveiling Whiteness; and depicting a wife with equal power and authority. After a brief overview of Black television sitcoms that aired before 1974, I perform a discursive, historical, and ideological approach to a close textual analysis of the February 1974 debut episode, "Too Old Blues." I close the paper with a brief overview of the dialogue between *Good Times* and contemporary depictions of the twenty-first-century urban Black working-class nuclear families after 1979 in series such as *Everybody Hates Chris* and *The Upshaws*.

Keywords: *Good Times*, African Americans, Television, Situation Comedy, 1970s

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Introduction: The Evanses

"Let's face it, James. This family ain't *Ozzie and Harriet*." Such are the words spoken by Florida to her husband James after he scolds their children, J.J., Thelma, and Michael, for their disrespect of each other in the debut episode of the American television situation comedy *Good Times*. These words were to be so telling—immediately indicating the departure of the series from its precedents.

February 8, 2024, marked the fiftieth anniversary of the first episode of *Good Times*, which aired on the CBS network until August 1, 1979. It was truly remarkable for its time because the series featured the first recurring, intact Black nuclear family, the Evanses, on primetime television (Merritt and Stroman 493). In this paper, I argue that *Good Times* was a seventies television milestone because it also depicted groundbreaking representations of family, class, race, and gender. In other words, *Good Times*, through the vision and imagination of its white executive producer Norman Lear, pushed and reimagined the boundaries of television, and rendered different and expanded what television was capable of after the series went off the air (Jermyn 5).

"Reimagined boundaries" included *Good Times* promoting the patriarchal nuclear family for the first time in a Black context; making visible its challenging social issues; showing the conflict between white middle-class family depictions and Black middle-class attitudes and values; celebrating Blackness and illuminating—making visible—Whiteness; and shifting depictions of women's roles within the family.

To understand the originality and impact of *Good Times*, it is important for me first to present a brief overview of Black television sitcoms that aired before February 1974. I then perform a close reading of Florida's statement, "this family ain't *Ozzie and Harriet*," as a discursive, historical, and ideological reference point to explore the pioneering portrayals of gender, race, class, and family in *Good Times*. I close the presentation with a brief overview of the dialogue between *Good Times* and contemporary depictions of twenty-first-century urban Black working-class nuclear families from 1979 onwards, using the example of *The Upshaws.*

Black-Oriented TV Sitcoms Before *Good Times*

Between 1948 and the winter of 1974, eight sitcoms with African Americans in recurring, starring roles appeared on the ABC, CBS, DuMont, and NBC networks. In the late 1940s, *The Laytons* (DuMont, 1948); in the 1950s, *The Beulah Show* (ABC, 1950-1953) and *Amos 'n' Andy* (CBS, 1951-1953); in the late 1960s, *Julia* (NBC, 1968-1971) and *The Bill Cosby Show* (NBC, 1969-1971); and in the early 1970s, *Barefoot in the Park* (ABC, 1970), *Sanford and Son* (NBC, 1972-1977), and *Roll Out!* (CBS, 1973-1974). *Good Times* was the midseason replacement for *Roll Out*!

Each sitcom was unique, but three characteristics were shared. All featured a lead star who was African American (predominantly male), featured a type of Black "television" family, and were criticized for their failure to reflect "real black culture and identity" (Sutherland 59). Yet except for *Amos 'n' Andy* and *Sanford and Son*, none of the series consisted of entire Black-casts who appeared each week. Four families, like the Evanses, were working class, but only the Evanses were a nuclear family.

Family

The predominant nuclear sitcom families in fifties television were white, middle class, and suburban such as the Nelsons in *The Adventures of Ozzie and Harriet*, the Andersons in *Father Knows Best*, the Cleavers in *Leave It to Beaver*, and the Stones in *The Donna Reed Show*.

The Evans family were like the Nelsons of *The Adventures of Ozzie and Harriet* in terms of their nuclear structure. In the conventions of 1970s "TV World," a nuclear family consisted of a heterosexual married two-parent couple with at least one child born to them, all living and eating in the same home. The Evans family consisted of the married couple and parents Florida and James Evans Senior, and their three children, James Junior, or J.J., the oldest son and a talented painter; Thelma, the middle child, and their only daughter; and Michael, the militant

youngest son.

Like the Nelsons, Andersons, Cleavers, and Stones, the Evans family participated in educating Black characters in the appropriate functioning of the patriarchal nuclear family, to send a message about the model example of the Evans family and the enduring strength and value of the nuclear family structure. However, *unlike* the Nelsons, Andersons, Cleavers, and Stones, the Evans family faced difficulties such as limited employment opportunities, poorly maintained public housing, gun violence, bussing Black children to schools in white neighborhoods, and preachers who exploit the poor.

The Evans family was groundbreaking in positively rejecting previous sitcom representations of Black families. For three seasons, Florida and James were a Black, happily married couple with three children, displaying love and mutual respect. While parenthood, motherhood, fatherhood, Black adolescence, and sibling relationships in *Good Times* represented a Black perspective, the Evans' parenting norms and the children's dilemmas aligned with the dozens of white-cast nuclear family sitcoms featured before *Good Times.* For example, Betty Anderson, the oldest child in *Father Knows Best* contemplated marrying her boyfriend in the episode "Vine Covered Cottage," as did Thelma in "Thelma's Young Man."

Class

The Evans family were not like the Andersons of *Father Knows Best*. They were working class, in fact lower working class. The depictions of the Evans family thus conflicted with sitcom portrayals of the attitudes and values of both white middle-class and Black middle-class families. The Evans family may have presented a loving intact family but its financial precarity did not align with the financial security of the white-cast sitcom families before it.

Through its unstable economic base, through the husband's internal self-reliance to find job after job, and through the family's home and property, behaviors, attitudes, and episodes' narrative problems, the urban working-class status of the Evans family was illustrated (Leibman 225-36). The Evanses' home was a cramped two-bedroom urban high-rise apartment in a public housing project in Chicago, Illinois. Their sons J.J. and Michael shared the pull-out sofa bed in the living room. The parents shared a bedroom and Thelma had her own bedroom. There was one bathroom, a small kitchen, and a small dining area. The community laundry room was in the basement of the building which was a 17-floor walk downstairs and back upstairs when the elevator was not working. The Evanses relied on public transportation or walking to move around the city for their work, school, church, and daily needs such as groceries. The family dressed resourcefully; Florida was a proficient seamstress, making dresses for Thelma and doing other sewing tasks for the family.

Although Florida was at first depicted as a stay-at-home wife and mother, by season two, she held a part-time job. While James was the patriarchal family breadwinner, he often dealt with job insecurity due to the larger context

of his inadequate education and had to work multiple low paying jobs to pay their rent and utilities. Any medical care the family needed, including surgeries and dental work, were highlighted as serious issues in episodes about making ends meet and strategies for paying for these needs.

The middle class was the favored socioeconomic identity of white-cast sitcom nuclear families before *Good Times*. However, when Black middle-class families and Black middle-class workers were featured in *Good Times,* they were presented as non-exemplary, problematic, or oppositional to the loving, empathetic, and caring Black working-class Evans family. The episode "Thelma's African Romance: Part 1" illustrates the Evans' conflict with Black middle-class attitudes and values through the representation of the Assistant Dean, an African American male who represented Black middle-class workers in higher education. As a type of middle manager, the Assistant Dean was unsympathetic and insensitive to the concerns of the college students. Such depictions, in this case of an uncaring Black American university administrator, served—as a contrast—to uplift the Evans family as a model working class family to be emulated.

Race

The Evans family were also not like the Stones of *The Donna Reed Show* in terms of their African American race and culture. *Good Times* centered on a *Black* nuclear family thereby making race an important premise of the series and illuminated Whiteness revealing for the first time in a Black sitcom its function in relationship to power and privilege. *Good Times* celebrated Blackness through its interpretation of Black repertoire, and Black community relationships (Hall 109; Nelson 1). Black repertoire encompasses the specific devices, techniques, expressive art forms, or products of people of Africana descent that form part of their culture (see Soitos 37) and includes such artifacts and practices as orature and auriture.

Blackness was defined by the Evans' language, dress, dance, music, religion, and interpersonal communication styles and patterns. As one example of the Black repertoire in *Good Times*—religion—the show broached the subject through both character and narrative. Its lead character and mother of the Evans family, Florida, was a devout Christian. Often, Florida filtered her reactions and solutions to her family's challenges, opportunities, problems, and breakthroughs through her belief in God such as in the episodes "Black Jesus" and "Getting Up the Rent."

Aspects of Black community and its distinctive experiences was represented in *Good Times* through the family's neighbor and Florida's best friend Willona Woods, neighbors Wanda Williams and Ned the Wino, building superintendent Nathan Bookman, politician Alderman Fred C. Davis, policy racket boss Marion "Sweet Daddy" Williams, and hustler-peddler Lootin' Lenny. In addition, *Good Times* expressed the Black community through ritual. The episode "The Rent Party," highlighted the role and importance of the rituals of music and meal-gatherings in Black cultures as it displayed Black community in 'the projects.'

Even as *Good Times* celebrated Blackness, it made strides towards what Richard Dyer calls "making whiteness strange" (Dyer 4, 10). This is of significance because, as Dyer explains, Whiteness exists as 'nothing at all,' while people of color are distinctly marked as visibly and excessively racially identified (see Coleman and Lawrence). The Black characters in *Good Times* saw white people and certain practices and objects as white. The program illuminated Whiteness by framing it as "other" and as "oppressor." As "other," Whiteness was illuminated as wholly different from the Blackness of the African American Evans family. As "oppressor," Whiteness was illuminated as an oppressive force endured by poor Black urban families.

Whiteness was illuminated as an oppressive force with which the Evans family encountered in the episode, "Thelma's Scholarship." Whiteness is oppressive in this episode because Thelma and other African American teenaged females were being set up to be used for what they could do *for* white organizations such as sororities and private schools rather than what these organizations could do for them—a common trope in white organizations then.

Gender

The Evans family were not like the Cleavers of *Leave It to Beaver* in terms of their marital dynamics. *Good Times* depicted a wife with equal authority in key aspects of family life. Florida Evans challenged the traditional dominance of the sitcom father by presenting an image of a mother who had equal authority in some situations. Evidence of her equal status was interwoven throughout episodes, but it was intermittent because of James Evans' role as husband and father that at times remained solidly patriarchal such as when in the episode "Florida Goes to School," James told Florida that she could not attend night school to earn her G.E.D.

While James exerted authority and dominance over his children and wife, Florida only exerted authority and dominance over her children. Thus, while there were moments when Florida spoke and made decisions as an equal to James and straightforwardly told him what was on her mind, there were other moments when she acquiesced to James's authority. Florida exhibited egalitarian authority in the episode, "Black Jesus," where she scolded James for talking "pure blasphemy." In fifties and sixties sitcoms the husbands in white-cast patriarchal nuclear families would typically be the only characters permitted to scold or direct their wives. *Good Times* shifted such depictions of women's roles within the family.

Legacy: *Good Times* and *The Upshaws*

Good Times opened a dialogue with the Black-cast sitcoms that came after it. In the years following *Good Times*, the few Black working-class sitcom nuclear families included *You Take the Kids*, *Barbershop*, *Everybody Hates Chris*, and, most recently, *The Upshaws*. Of these, *The Upshaws* is of particular interest when compared to *Good Times* because the series implicitly and explicitly "talks back" to *Good Times*. It features a Black working-class nuclear family living in Indianapolis, Indiana, and demonstrates both the progress and the regression regarding

family, class, race, and gender that Black-cast sitcoms and working-class African Americans have made since *Good Times*.

The Upshaws are Bernard "Bennie" Upshaw, Sr.; Regina Upshaw, and their three children, Bernard Jr., or Bernard, Aaliyah, and Maya. Another important recurring character and member of the family is Lucretia, Regina's older sister. In two narrative twists to the typical televisual nuclear family, Bernard, who lives on his own, is gay and was born before Bennie and Regina, high school sweethearts, married. Another twist is that Bennie Senior has a son born outside of his marriage to Regina. Kelvin, Bennie's son from his sexual relationship with Tasha Lewis while he and Regina were on a "break" from their marriage, is the same age as Bennie's daughter Aaliyah.

Whereas the Evans family in *Good Times* portrayed a family-protagonist to be revered, the Upshaw family was not positioned to be a role model. Regina and Bennie argued often, mouthed profanities at each other, and separated maritally during the first season of the series. *The Upshaws* challenges family stereotypes of the "70s TV World" responding to criticisms that questioned earlier sitcom expectations that the Black family complies with white conceptions of family life.

Though the Evans and Upshaw families are both working class and live in the Midwest, they encountered significantly different circumstances regarding education, housing, transportation, medical insurance, and daily norms. For example, the Upshaws live in a single-family detached house in an urban neighborhood. Bennie is an automotive mechanic who runs his own business, Bennie's Garage. Regina is a chief administrator at a clinic in an underserved community. The Upshaws' socioeconomic class is hybrid or transitional because there is a modest level of upward mobility available to Regina.

A Brief Conclusion

In closing, *Good Times* was a seventies television milestone; it depicted groundbreaking representations of family, class, race, and gender. "Reimagined boundaries" included *Good Times* promoting the patriarchal nuclear family in a Black context; making visible challenging social issues for Black Americans; showing the conflict between white middle-class depictions and Black middle-class attitudes and values; celebrating Blackness and illuminating Whiteness; and shifting depictions of women's roles within the family. After 1979 *Good Times* has had an afterlife in the contemporary depictions of twenty-first-century urban Black working-class nuclear families.

A Netflix reboot of the series, *Good Times: Black Again*, was released on April 12, 2024. Initial impressions regarding its artistic and political engagement have been negative. Since *Good Times* came on the scene, television for African Americans on and off the screen has never been the same—it blew up important social and cultural preconceptions. I have one word to best describe my delight in this fact— "Dy-No-Mite"!

References

Coleman, R. R. M. & Lawrence, N. (2019). "Fix it Black Jesus: The iconography of Christ in *Good Times*." *Religions*, 10. Retrieved from https://www.mdpi.com/2077-1444/10/7/410.

Dyer, R. (2017). *White* (2nd ed.). New York, NY: Routledge.

Jermyn, D. (2009). *Sex and the city*. Detroit, MI: Wayne State University Press.

Lear, N. (2014). *Even* this *I get to experience*. New York, NY: The Penguin Press.

Leibman, N. C. (1995). *Living room lectures: The fifties family in film and television*. Austin, TX: University of Texas Press.

Merritt, B. D. & Stroman, C. A. (1993). Black family ımagery and ınteractions on television. *Journal of Black Studies*, *23(4*), 492-99.

Nelson, A. M. (2009). The repertoire of Black popular culture. *Americana: The Journal of American Popular Culture (1900 to Present*), *8*(1). Retrieved from http://www.americanpopularculture.com/journal/articles/spring_2009/nelson.htm.

Soitos, S. F. (1996). *The blues detective: A study of African American detective fiction*. Amherst, MA: University of Massachusetts Press.

Sutherland, M. (2008). *The Flip Wilson show*. Detroit, MI: Wayne State University Press.

Applied Research Using ICT

Adriana Castro Camelo
Corporación Universitario Minuto de Dios - UNIMINUTO, Colombia
https://orcid.org/0000-0002-0779-7740

Marisol Esperanza Cipagauta Moyano
Corporación universitaria Minuto de Dios - UNIMINUTO, Colombia
https://orcid.org/0000-0002-1378-8824

Abstract: The incursion of Information and Communications Technologies (ICT) into learning environments is becoming increasingly important, since they have become allies in the teaching, learning and evaluation process. Its possibilities of contributing to more dynamic, flexible, and innovative learning allow the academy to strengthen both: teachers and students in the digital skills demanded by the educational context in the 21st century. From the Innovation Study Group in Information and Communications Technologies - belonging to the Master's in Education of the Virtual program at UNIMINUTO Bogotá-, an investigation into the topic was initiated with applied research projects that incorporate technology in various formal learning environments and non-formal that seeks to explore the advantages of the use and exploitation of ICT from a techno-pedagogical perspective with proposals for all educational levels: primary, secondary and university, as well as in the different modalities of study: in-person, remote and virtual. In this way, successful projects that have generated a significant impact on the academic communities under study are presented.

Keywords: Applied research, educational projects, knowledge management, educational leadership.

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Introduction

With the use of technology in education, research project initiatives arise towards the digital tools that currently exist and that contribute to strengthening the teaching and learning process. Particularly, the subline belonging to the master's program in education, named: Use of technology in learning environments, hosts those projects in which the use of different digital tools in the classroom is analyzed. These are works that students carry out individually or in groups for 18 months where they complete a series of phases and prepare the final document.

Each work is supervised by a research professor who accompanies the development of the study from beginning to end and monitors each progress or deliverable of the document. In this sense, during each academic period

(three in total) the open classes are taught where each exercise that adds to the research work is reviewed. Additionally, in the spaces called academic advisory services, extra attention is offered to review progress or resolve doubts that arise during the development of the research project. In this sense, the teacher is a guide in the process as Camacho (2022) stated “"he is the one who accompanies and follows the students during their school career with the purpose of enhancing their academic and personal development" (p. 541), essential for the implementation of each project.

It is important to note that the master's degree in education in virtual modality offered by Minuto de Dios University has six other research sublines, each one led by an expert teacher who socializes them each academic period with the first semester students who course the educational research subject. After listening carefully to the leader's presentation of each subline, students select the subline and the project line they want to start their research according to their interests, field of action, and work contexts. After this, a format is released in which two options are selected, considering that the first one will be its priority.

Currently, the number of students carrying out research projects in the subline of technology applied to learning environments amounts to 162, distributed in groups made up of 15 or 20 students, each team with a topic that responds to the objective of the subline: examine the mediation of ICT in education with regard to the academic and/or didactic management of various learning environments in order to generate new knowledge and learning that contribute to improving education in the Colombian national context.

All the works in the subline contribute to examining the mediation of ICT in education about the academic and/or didactic management of various learning environments to generate new knowledge and learning that contribute to improving education to National level. According to Barrón (2020) “generating a strategy supported by digital technologies goes beyond practical operation; It constitutes an intellectual exercise that allows teaching practice to be carried out in a blended or completely remote model” (p. 71).

The Sustainable Development Goal to which the study group contributes is the goal number 4: Quality education. It is essential to take advantage of the incorporation of ICT for a more dynamic, flexible and innovative teaching and learning process that generates significant learning throughout life. According to Arango et al. (2020) “pedagogical guidelines must be based on the budget of a teaching subject who, through reflection on his or her practice, is a dynamic agent of transformative processes in the educational context and the implementation of ICT in education” (p. 1014).

Although the path to closing the digital divide is long, the proposals that the group leads commit, on the one hand, teachers to making effective use of information and communication technologies and, on the other hand, the institutions to invest in technology and training of teachers and students so that they take advantage of the possibilities that these tools offer in education, also betting on innovation. In this sense, Pila et al. (2020) state “teachers must be involved and be predisposed to change, they play an important role in any innovation process since they are the ones who put it into practice in their teaching management” (p. 214)

With the pandemic caused by COVID 19, it became evident that institutions need to bet on technology and invest in it with training and updating processes where teachers can get the most out of it to return it to their educational contexts and in this way generate real impact that contribute to the improvement of quality in educational institutions.

Research on these topics is increasingly gaining strength as the evolution and application of information and communication technologies in education advance rapidly, a new technology is created, another is transformed, or an existing one is improved. As Pérez (2022) explains, "since educational technology is recurrently used in an instrumental or administrative manner to make school activities more effective and efficient, it is important to strengthen its educational use" (p. 128).

Technology and education

In the field of education, there is no doubt about the rapid and significant advance of technology in recent years. Educational institutions, especially universities, incorporate technology in the design of their study plans. Even the organizations in charge of approving the operation of academic programs, such as *Ministerio de Educación Nacional* in the case of Colombia, consider technological infrastructure as a contribution to the teaching and learning process. It is necessary that a percentage of the use of this technology be reflected in the study plans and that it be used in accordance with the curricular designs. because as Fabro et al. (2020) say "no technological innovation is, by itself, a magical talisman that ensures significant results for teaching and learning" (p. 76).

Using technology in the classroom requires that several actors in the educational context get involved, so that the main protagonists - teachers and students - get the most out of it. As Gros (2020) says, "the virtual classroom is not only a support resource for face-to-face teaching, but also a space in which the teacher generates and develops various actions so that their students learn" (p. 73). In relation to the above, ongoing training is necessary in which the digital skills of its actors are strengthened; working with technological tools must have a clear objective, which is why the projects that are developed within the research subline that are has mentioned: technology applied to learning environments, first require knowing the current state of this topic, which constitutes the starting point of each study developed.

Similarly, it is crucial to acknowledge the significance of student development, the teaching and learning methods employed by each institution, as well as the tools and infrastructure used for this purpose. That is why the research group questions the study of Information and Communication Technology (ICT) in educational contexts. The focus lies in comprehending aspects such as the implementation of ICT in educational institutions, its utilization and integration. Additionally, research is conducted on topics including virtual learning environments, digital literacy, learning processes facilitated by Web 2.0, teacher training in ICT usage, the creation and assessment of educational materials mediated by ICT, as well as the design of Electronic Virtual Assistants (EVA), Augmented Virtual Assistants (AVA), and Open Virtual Assistants (OVA) within various educational levels and study formats.

Collaborative learning

In carrying out the node projects, the main teaching technique used is collaborative learning, guided from start to finish by a research teacher who serves as director and supported by technology, which becomes, as Caiza et al. state. (2020) "in a great opportunity to use these tools to help the transformation and transportation of knowledge, based on the global use of information" (p. 253).

The monitoring, control and support must be continuous, and the teacher is the one who ensures the quality of the document. It is important to clarify that since it is collaborative work, within each team groups are formed that assume a specific task assigned by the director, but all students can respond to the particularities of the research. This role of the director is summarized in leadership of a project that seeks to analyze the impact of the use of technology in different learning environments. In this regard, Hernández et al. (2023) refer to seven key roles that a university teacher should develop when implementing an online collaborative work methodology: pedagogical, evaluator, social, technological, counselor/mediator, organizer/manager and personal.

Working collaboratively as is done with the research projects subscribed in the subline brings several advantages for students, among which the following stand out: improvement in social skills, promotion of diversity, greater commitment, creation of a trust, optimization of time, promotion of interdisciplinarity in the areas of knowledge and better development of critical thinking. In this regard, Vásquez et al. (2023) maintain that "the interaction between students, the content, and the teachers are recognized as a dynamic element of the actions that must be produced, to allow the continuous and dynamic reorganization of the pedagogical work, capable of favoring the protagonism of the subjects" (p. 358).

Method

Each research project developed in the subline is carried out in three phases, which are described in Figure 1. It is important to note that from the beginning of each project, the type of publication with which it ends is defined, it can be a book, book chapter, research article, or presentation of a paper at a national or international event that includes memoirs. or minutes with ISBN.

Regarding the methodological approach, it varies between qualitative, quantitative and mixed, the latter being the most used by researchers due to the nature and scope of the topics addressed in each research project developed.

Results

It is known that social networks, for example, were born for leisure; However, their use in the educational field brings benefits such as collaborative learning, strengthening communication skills, and the development of digital skills. The use of social networks in educational environments also requires changes or adjustments in the

curriculum that facilitate the carrying out of activities that generate authentic learning in students.

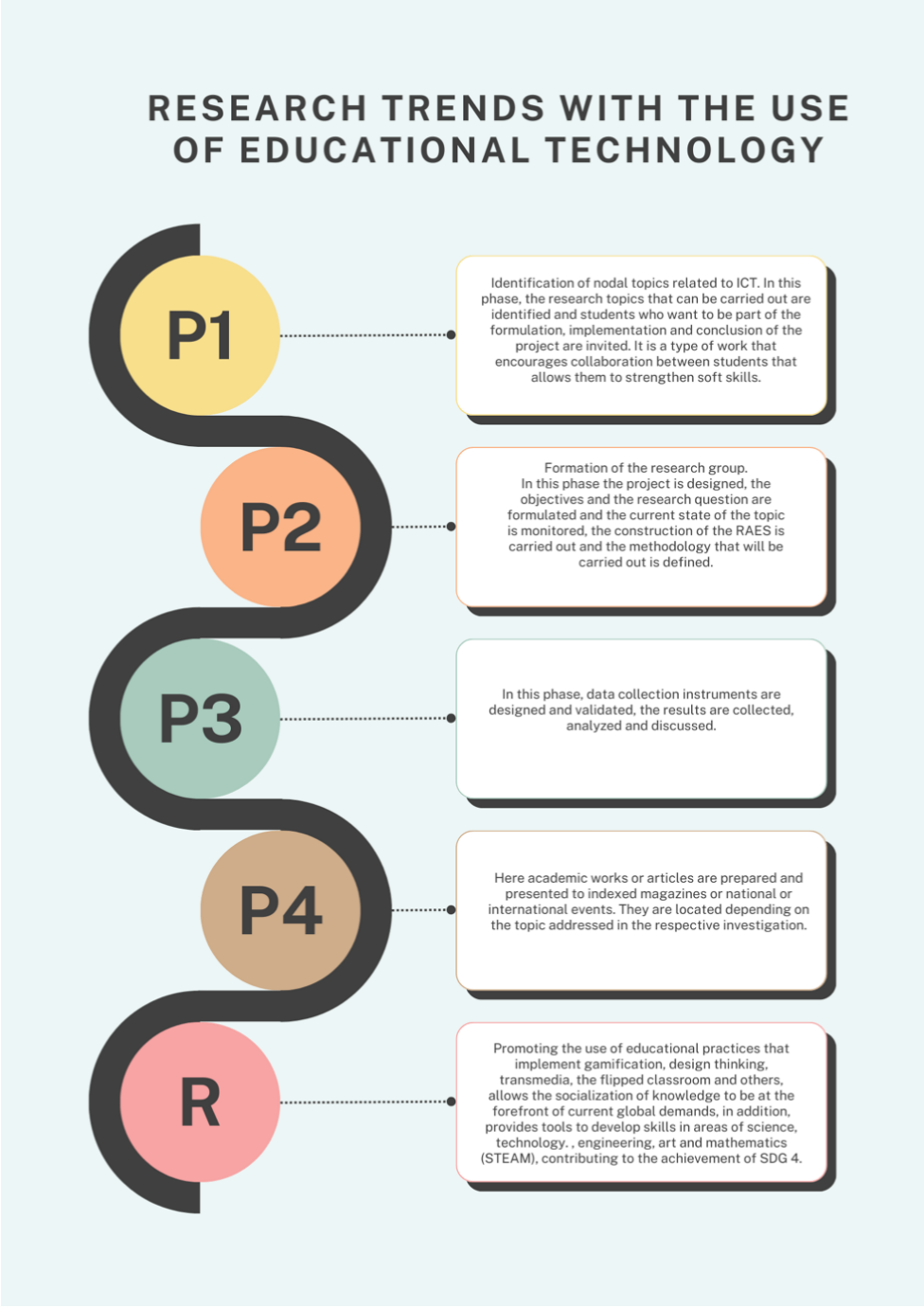

Figure 1. *Node Projects Phases.*

Identifying trends in the use of ICT through the different research that is carried out allows us to formulate actions or strategies so that the pedagogical use of technology contributes to the teaching and learning process, where the student is the protagonist and the teacher fulfills a role of mediator that facilitates the appropriation of technology for the benefit of learning and the educational quality of the educational process.

Table 1. Subline use of technology in learning environments

Total projects developed	9
Teachers acting as directors	6
Student co-researchers	128
Year of analysis	2023

Researching the various educational levels and study modalities on information and communication technology issues facilitates the identification of the digital tools that are most frequently used and their effectiveness in learning, comparing, contrasting and formulating new uses for them. can be achieved by seeking continuous improvement of the process and optimizing computer resources.

Promoting the use of educational practices that implement gamification, design thinking, transmedia, the flipped classroom and others, allows the socialization of knowledge to be at the forefront of current global demands, in addition, provides tools to develop skills in areas of science, technology, engineering, art and mathematics (STEAM), contributing to the achievement of SDG 4.

The myth has been created mobile devices, used in children and adolescents, only serve as a means of distraction, apathy for family gatherings, and an isolation mechanism, which is why it is necessary to include them to change the perspective on the matter in parents, students. and teachers, since in education they are currently an important tool that can promote academic processes, therefore research in this field is pertinent.

Discussion

The study group is relevant to the master's program in education since it seeks to investigate the emergence of new pedagogical strategies and innovations that promote the improvement of academic quality and that also generate an impact in the community where these are carried out. research.

The incorporation of students in the study group contributes to the development of the research skills of both teachers and students of the master's degree and establishes its relevance in the incursion that ICT and its innovation have in society and in education. ICTs are not alien to education, they have been entering pedagogical work from various sides inside and outside the classrooms, these technologies gain value every day and are shown to be ideal for achieving access to the information required by students. That is why the importance of digital literacy of the teaching staff, in this sense, as Cipagauta (2023) says, “a relevant aspect in the use of digital content is the continuous training of teachers, whether led by educational institutions or by own initiative which contributes to the self-regulation of learning and the self-learning of the teachers themselves” (p. 98).

Each evolution of technology goes even further beyond the doors of education and intervenes with greater vigor in pedagogical mediation, but as stated by Hernández et al. (2020) “it is important to use appropriate pedagogical mediation strategies so that the intervention process is successful and supports the student whenever they are in contact with the AVA” (p. 133) Taking into account that the Master's Degree in Education is in depth , a study group dedicated to researching ICT contributes to increasing the use of technology applied to various learning environments and taking advantage of its multiple advantages in education that, with appropriate pedagogy, manages to impact the learning of teachers and students.

Conclusion

It is evident that today's society is pervaded by technology, studying and innovating in educational spaces, respecting the individuality and learning time of students, responds to the needs of this era.

It is also important to mention that the development of research skills is required in terms of project formulation, construction of instruments, data collection, and analysis of information that allow the generation and management of new knowledge. Currently, the country needs competent and diligent professionals to research and innovate in the field of technology and education in such a way as to contribute to the social, cultural and economic development of the nation.

Researching the use of ICT in the classroom makes it easier to identify educational trends to formulate action plans and programs both in teacher training and in the acquisition of technologies that are used efficiently in the continuous improvement of the educational process.

References

Arango, D. A. G., Fernández, J. E. V., Carrillo, J. A. O., Rojas, Ó. A. C., & Villa, C. (2020). Estilos de aprendizaje y uso de TIC en docentes universitarios: Análisis relacional basado en componentes 1. *Revista Ibérica de Sistemas e Tecnologias De Informação*, 1001-1016. https://www.proquest.com/scholarly-journals/estilos-de-aprendizaje-y-uso-tic-en-docentes/docview/2388305265/se-2

Barrón, M. C. (2020). La educación en línea. Transiciones y disrupciones. En H. Casanova (Ed.), Educación y pandemia. Una visión académica. Instituto de Investigaciones sobre la Universidad y la Educación de la UNAM. https://www.iisue.unam.mx/investigacion/textos/educacion_pandemia.pdf

Caiza, G., Ibarra-Torres, F., Ortiz, A., Garcia, M. V., & Barona-Pico, V. (2020). Herramientas web 3.0 aplicado a la mejora del aprendizaje colaborativo en la educación universitaria. *Revista Ibérica de Sistemas e Tecnologias De Informação*, 252-265. https://www.proquest.com/scholarly-journals/herramientas-web-3-0-aplicado-la-mejora-del/docview/2394537830/se-2

Camacho, J. (2022). Funciones, roles y competencias de los(as) tutores(as) en la educación a distancia en el Instituto Politécnico Nacional. *Revista Mexicana de Investigación Educativa*, 27(93), 537-556.

Cipagauta, M.E. (2023). Las TIC en el aula: estudio de caso Colombia. *Revista Internacional de Tecnología, Ciencia y Sociedad*, 13 (1), 27–47. https://doi.org/10.37467/revtechno.v13.4808

Fabro, A. P., Aró, C., Villafañe, N., & Degrave, V. (2020). Integración de las TIC para la enseñanza de las ciencias morfológicas en el nivel universitario. Uni-Pluriversidad, 20(1), e2020103. doi: 10.17533/udea.unipluri.20.1.04

Gros, G. (2020). La evolución del e-learning: del aula virtual a la red. RIED. Revista Iberoamericana de Educación a Distancia (2018), 21(2), 69-82. http://dx.doi.org/10.5944/ried.21.2.20577

Hernández, M. R., Palma, E. C., & Alva, A. D. (2020). Estrategias de mediación tecnopedagógicas en los ambientes virtuales de aprendizaje. *Apertura : Revista de Innovación Educative*, 12(2), 132-149. https://doi.org/10.32870/ap.v12n2.1875

Hernández, N., Muñoz, P., & González, M. (2023). Roles del docente universitario en procesos de aprendizaje colaborativo en entornos virtuales. *Revista Iberoamericana de Educación a Distancia*, 26(1), 39-58. doi:https://doi.org/10.5944/ried.26.1.34031

Pérez, L. R. (2022). Tecnología Educativa en América Latina. Revisión de definiciones y artefactos. Edutec. *Revista Electrónica de Tecnología Educativa,* (81), 122-136. https://doi.org/10.21556/edutec.2022.81.2539

Pila, J. C, Andagoya, W. G. y Fuertes, M. I. (2020). El profesorado: un factor clave en la innovación educativa. Revista EDUCARE - UPEL-IPB - Segunda Nueva Etapa 2.0,24(2), 212–232. https://doi.org/10.46498/reduipb.v24i2.1327

Vásquez, M., Vargas, D., & Hollweg, A. (2023). Aprendizaje colaborativo en educación superior: Laboratorio de cambio. *Aula, 29,* 341–360. https://doi.org/10.14201/aula202329341360

Ethical and Pedagogical Challenges in the Integration of Artificial Intelligence into Lifelong Learning

Amjad Almusaed
Jönköping University, Sweden, https://orcid.org/0000-0001-5814-2667

Asaad Almssad
Karlstad University, Sweden, https://orcid.org/ 0000-0002-4536-9747

Ammar K. Albaaj
Basrah University for Oil and Gas, Iraq

Abstract: The impact of artificial intelligence (AI) on education and lifelong learning is a topic of significant importance as AI continues to change numerous sectors. This paper aims to critically examine AI's profound effect in these domains. The present research explores the ethical dilemmas and pedagogical approaches relevant to incorporating artificial intelligence (AI) in lifelong learning. This study examines a range of ethical concerns, such as data privacy, security, and the potential biases in algorithms. It emphasizes the difficulties these problems provide in ensuring fair access to educational resources driven by artificial intelligence. The research also delves into learner autonomy issues and the potential dangers associated with excessive dependence on artificial intelligence systems in education. From an educational perspective, this initiative presents novel methodologies that use artificial intelligence (AI) capabilities while prioritizing learner-centered instruction. The strategies above cover the use of blended learning models, the cultivation of meta-cognitive abilities, and the adoption of collaborative and multidisciplinary approaches. This research highlights the significance of these components in integrating artificial intelligence (AI) into lifelong learning frameworks, particularly for educators, policymakers, and technologists. This thorough research provides a well-rounded perspective on the role of artificial intelligence (AI) in education, emphasizing the need to maintain ethical awareness and adaptability in teaching approaches, considering the fast-paced technological advancements.

Keywords: AI Integration, Ethical Challenges, Pedagogical Methods, Learner Autonomy, Continuous improvement

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Introduction to the thematic research area

Background

AI has advanced dramatically in several areas in recent years. Being excellent at learning new things is difficult throughout life. In contrast to the ever-changing human mind, AI systems can only learn from minimal inputs during training (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). Once training is complete, these algorithms' knowledge bases cease developing, restricting their capacity to adapt to new data or assignments. This fundamental limitation of AI's learning paradigm contrasts with human cognition's dynamic and ever-changing nature. This paradigm worries about catastrophic forgetting, in which artificial intelligence systems regress or delete previously learned knowledge when exposed to new input. Modern AI relies on neural networks, yet their core operations cause this issue. To get fresh insights, neural networks alter artificial neuron synaptic connections (Alshahrani, R., Yenugula, M., Algethami, H., Alharbi, F., Goswami, S. S., Naveed, Q. N., ... & Zahmatkesh, S. (2024). These adjustments are necessary for the network to accept new information but may degrade or erase its knowledge if not done carefully. This study examines lifetime learning in artificial intelligence. It emphasizes that AI systems must replicate biological systems' continuous and adaptive learning (Chen, Z. (2023). This session discusses catastrophic forgetting, neural network-based learning issues, and innovative techniques to train AI systems without losing their current knowledge. This study explores this subject to enable AI systems to adopt adaptive and continuous learning. These advances may enable better AI entities to adapt to a changing informational environment. Several ethical and pedagogical issues must be addressed to integrate AI into lifelong learning. Since AI systems access personal data, data security and privacy are ethical concerns when employing AI in education. Because of this, protecting rights requires strict measures. AI algorithms must be checked for biases and fixed to guarantee fairness and equality. AI may inadvertently perpetuate societal preconceptions. From a pedagogical perspective, AI can transform teaching. However, considerable barriers prevent this transition. To improve education rather than replace human judgment and interaction, AI solutions must be personalized to meet varied learning styles and needs (Kabudi, T., Pappas, I., & Olsen, D. H. (2021). This pedagogical investigation is needed to apply AI to promote lifelong learning. This integration encourages accessibility and inclusivity. AI educational tools must be designed for a broad range of learners, including poor and disabled students, to create an inclusive and equitable education system. AI in the classroom requires instructors to rethink their roles. This involves comforting and helping teachers cope with this paradigm shift and giving them the knowledge and skills to employ AI technology in the classroom. Legislation and policies that govern AI in schools are also vital. Such frameworks should handle data governance, ethical compliance, and AI applications contradicting societal and educational aims (Kamalov, F.,et al (2023). The far-reaching consequences of AI on ongoing education must also be understood. To achieve this, we must ensure the long-term sustainability of these AI solutions in education and study their effects on employment, social structures, and learning. Implement solid methods to measure the effectiveness of AI technology in the classroom and hold providers accountable quickly. This requires monitoring AI's social and ethical effects on education and student success throughout their lifetimes (Khogali, H. O., & Mekid, S. (2023). Finally, since AI evolves quickly, instructional content and methods must be constantly refined, adapted, and upgraded. This development must continue to make AI effective in lifelong learning. A

comprehensive and coordinated strategy is needed to maximize the benefits of AI integration into lifelong learning while minimizing its risks and limits. Educators, technologists, politicians, and students must collaborate for balanced and successful implementation.

The study aims

This research aims to thoroughly examine the ethical and pedagogical difficulties linked to incorporating artificial intelligence (AI) into lifelong learning. The system tackles ethical considerations such as safeguarding data privacy, ensuring security, and mitigating algorithmic biases. It also handles pedagogical problems, including promoting learner autonomy and managing the potential dangers of over-dependence on AI in education. The study also suggests novel, student-focused instructional techniques using AI, such as blended learning, meta-cognitive skill enhancement, and collaborative strategies. The objective is to provide a thorough comprehension of the role of AI in education, with a focus on ethical issues and adaptable teaching approaches amid fast technological advancement.

Literature review

Artificial intelligence (AI) has witnessed substantial advancement in recent years, significantly influencing various sectors. Alshahrani R. et al. (2024) highlight that this development encompasses identifying and addressing critical challenges in establishing enduring AI cloud systems within the information technology (IT) industry (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). The impacts of the industrial and digital revolutions are indisputably extensive, effecting transformative changes across numerous facets of society, encompassing daily life, corporate structures, and employment patterns. Because of these changes, Makridakis, S. (2017) says we need to think about whether the coming AI revolution will bring about similar-sized and-scoped changes, which could potentially upend the fundamental structures of our social, economic, and technological worlds (Alshahrani, R., Yenugula, M., Algethami, H., Alharbi, F., Goswami, S. S., Naveed, Q. N., ... & Zahmatkesh, S. (2024). After the first training data, AI systems no longer acquire knowledge. In his 2023 publication, Chen, Z. explains the benefits of AI-focused training for improving corporate performance (Chen, Z. (2023). A comprehensive examination of the theoretical literature explores the progression from traditional training approaches to training methods enhanced by artificial intelligence. This analysis encompasses the use of artificial intelligence (AI) in educational procedures and the corresponding responses from managers, as outlined by Miao, Q. et al. (2023). It is crucial to thoroughly examine, compare, and integrate these advancements at the fundamental level to promote future AI discoveries (Kabudi, T., Pappas, I., & Olsen, D. H. (2021). However, this issue has not been sufficiently explored in current research. AI systems struggle with catastrophic forgetting, which refers to the situation where incorporating new data sets might lead to the erasure of previously learned information. Ashley, D. R. (2020) supports this idea by explaining the characteristics of memory loss in artificial neural networks (ANNs). Artificial Neural Networks (ANNs), which mimic the functioning of the human brain, have played a crucial role in the recent progress of artificial intelligence (Kamalov, F.,et al (2023). However, these systems are particularly susceptible to the problem of memory loss, as shown by various research in the

area. This paper concentrates on lifelong learning within Artificial Intelligence (AI), specifically targeting the imperative of continuous and adaptive learning mechanisms. Kabudi, T., Pappas, I., & Olsen, D. H. (2021) acknowledge the advent and the increasing prominence of sophisticated AI-enabled learning systems. These systems are distinguished by their capacity to not only disseminate educational content but also to tailor their instructional approach to the unique requirements of individual learners (Khogali, H. O., & Mekid, S. (2023). In this regard, a systematic survey and mapping of scholarly literature about AI-enabled adaptive learning systems have been undertaken in this research. The study highlights the need for artificial intelligence systems to imitate biological systems' ongoing and adaptable learning characteristics. Ouyang, F., Xu, W., & Cukurova, M. (2023) argue that there is a lack of empirical research examining the adaptive and temporal characteristics of collaborative problem solving (CPS) (Zhai, X., et al. (2021). The lack of study on this topic may have led to a simplified depiction of the complex nature of the CPS process. Integrating Artificial Intelligence (AI) into lifelong learning involves several tricky obstacles and significant potential. According to Rawas (2023), AI technologies can potentially transform teaching and learning methods in higher education altogether. An exemplary instance of this is ChatGPT, a sophisticated linguistic model created by OpenAI. This specific AI application showcases the capacity to provide customized educational suggestions to learners, significantly strengthen collaborative and communicative interactions, and eventually improve the effectiveness of student learning results (Rahiman, H. U., & Kodikal, R. (2024). Many moral questions arise when using AI in educational institutes, especially around data privacy and security. Thus, there have to be strong safeguards to preserve people's rights. An increased emphasis on protecting sensitive data from abuse and illegal access is required under this paradigm. In their investigation of the matter, Saikia, S., Athilingam, V. P., and Ahmed, F. (2024) draw attention to the widespread use of ransomware and other advanced cyberattacks that deliberately cripple vital educational databases and operating workstations (Alier, M., et al. (2021). Not only do these assaults compromise the security and integrity of data, but they also impede instructional processes. The return of access to the hacked systems is sometimes exchanged for financial compensation by the attackers. Many educational institutions have caved to this type of digital extortion, raising concerns about the long-term viability of cybersecurity measures and the moral weight of bargaining with cybercriminals. AI presents intricate pedagogical issues, particularly in adapting AI technologies to suit various learning modalities while maintaining the crucial human connection aspect. Adiguzel, T., Kaya, M. H., & Cansu, F. K. (2023) comprehensively examine AI technologies, including their potential uses in education and the complexities involved (Habbal, A., Ali, M. K., & Abuzaraida, M. A. (2024). They discuss chatbots and similar algorithms that may imitate human interactions. These advanced systems are created to provide replies that imitate human conversation, using inputs obtained via natural language processing. This assessment highlights the changing nature of artificial intelligence in education and its impact on instructional methods and student involvement. Tools for artificial intelligence (AI) must be designed with accessibility and inclusivity in mind to cater to a wide range of learners with different backgrounds and specific learning needs. Anis, M. (2023) provides further information on how artificial intelligence (AI) might be used to make English language teaching (ELT) more inclusive. This research focuses on the methods and effects of using AI technologies in ELT classes. This integration aims to create a welcoming space for all students by addressing their needs and backgrounds [17]. Using AI to personalize lessons according to each student's strengths, weaknesses, interests, and learning styles can level the playing field in English language teaching (ELT). Educators' roles and

duties are about to undergo a radical change with the introduction of AI into educational frameworks. As a result, new skill sets will be required, and there will need to be a collective effort to address growing challenges in this cutting-edge educational setting. The recent outstanding results of ChatGPT on several standardized academic assessments have thrust the subject of artificial intelligence (AI) into the forefront of modern educational debate, according to Kamalov F. et al. (2023). A thorough grasp of how deep learning algorithms will affect the current educational system is crucial since these algorithms rapidly become capable of shaking up the conventional teaching environment. This crucial understanding is necessary to ensure the responsible growth and strategic use of AI-driven technologies in K-12 and higher education [18]. To be effective, this strategy must balance capitalizing on AI's promise to improve educational results, meeting the obstacles, and adjusting to the complex dynamics of this new paradigm in education. Comprehensive legislative and regulatory frameworks designed to address and minimize issues are necessary to integrate AI in educational settings effectively. According to Chan, C. K. Y. (2023), a dedicated artificial intelligence education strategy should focus on universities. A comprehensive analysis of the perceptions and consequences linked to text-generative AI technology is the foundation of our advice [19]. The goal of the suggested approach is a thorough understanding of the many consequences resulting from the use of AI in educational settings. This structure ensures that everyone involved (teachers, principals, and students) knows what they should do. With this understanding, they can adapt to the changing educational scene brought forth by AI's introduction and widespread use. This long-term view highlights the need for regulations considering technology developments' wider social, ethical, and educational effects and their technical aspects. To ensure the sustainable integration of Artificial Intelligence (AI), it is crucial to comprehend its long-term effects on jobs, social structures, and the core of learning processes. Given the rapid advancement of AI and machine learning during the fourth industrial revolution, its potential effects on society dynamics are closely examined (Khogali, H. O., & Mekid, S., 2023). If we want to know what these technologies will do and how far they will go, we must pay more attention [20]. Ensure that the integration of AI and ML into society is responsible, sustainable, and aligns with broader socio-economic objectives and ethical standards by critically analyzing how these technologies are transforming human life in areas such as labor markets, social interactions, and educational methodologies. It is crucial to set up thorough and rigorous evaluation procedures to ensure that providers are held responsible for the effects of Artificial Intelligence (AI) products in educational settings. So, according to Vincent-Lancrin, S., & Van der Vlies, R. (2020), there are two main problems with AI in the classroom and with education as a whole. The first is making the most of AI's ability to improve education on a micro and macro level; the second is preparing students for success in an increasingly automated world. Although AI applications in education are still in their early phases, several promising uses already show how AI might revolutionize educational practices [21]. These new uses highlight the need for solid criteria to assess AI systems, guaranteeing they improve learning outcomes and fit in with larger social and economic objectives. To ensure that AI tools are being used responsibly and for the benefit of students, it is essential to conduct assessments like this to track their effectiveness and determine any ethical concerns. Both instructional material and pedagogical approaches must constantly be refined and adjusted to keep up with the rapid progress of Artificial Intelligence (AI) technology. The educational sector faces several issues due to AI, according to Zhai X. et al. (2021). These include various social and ethical concerns, the possibility of misusing AI technology, and the changing responsibilities of students and instructors. This ever-changing environment necessitates a flexible

education strategy that can swiftly adapt to the complexity brought forth by new technologies while also critically addressing them [22]. An all-encompassing strategy for AI in education would go beyond the technological details to think about how this technology would change classroom dynamics, the relationship between teachers and students, and the moral and legal considerations surrounding AI in the classroom. It is essential to take this holistic view to ensure that AI is effectively integrated into education in a way that promotes an inclusive, egalitarian, and morally sound learning environment. Integrating AI into educational institutions successfully requires a collaborative effort by educators, technologists, lawmakers, and learners. Research on how artificial intelligence (AI) enhances learning experiences and affects faculty involvement in higher education should be prioritized by Rahman, H. U., and Kodikal, R. (2024). Perceived risk, performance expectation, and awareness are key characteristics that they identify as influencing job engagement and the adoption of AI in the higher education ecosystem. Mediating variables like attitudes and actions towards AI allow these components to exercise their impact [23]. A thorough comprehension of the several factors that lead to the successful incorporation of AI in educational settings is essential, and this nuanced investigation emphasizes the need for a multifaceted strategy in the use of AI technology. Deploying AI technologies should not only improve educational results but also be in line with the expectations and capabilities of all stakeholders involved. Thus, it's important to consider how educators and learners perceive and are prepared for the process.

Table 1: Summary of Key Aspects and Challenges in Integrating AI into Lifelong Learning

Aspect	Summary	Reference
AI in Various Industries	AI has made tremendous strides in many industries over recent years.	[7, 8]
AI's Learning Limitations	AI algorithms are limited to learning from initial training inputs, and their knowledge base stops growing after training ends.	[9, 10]
Catastrophic Forgetting in AI	AI systems face the issue of catastrophic forgetting, where exposure to new data sets can erase previously learned information.	[11]
The objective of the Research	The research focuses on lifelong learning in AI, addressing the challenge of continuous and adaptive learning.	[12]
Adapting Biological Learning in AI	The study emphasizes the need for AI systems to mimic biological systems' continual and adaptive learning capabilities.	[13]
AI in Lifelong Learning	The integration of AI into lifelong learning involves several challenges and opportunities.	[14]

Ethical Considerations	Major ethical issues in using AI in education include data protection and privacy, requiring safeguarding individual rights.	[15]
Pedagogical Challenges	AI presents educational challenges, including tailoring AI tools to various learning styles without replacing human interaction.	[16]
Accessibility and Inclusivity	AI tools must be accessible and inclusive, catering to learners from diverse backgrounds and with different needs.	[17]
Role of Teachers and Educators	AI integration changes teachers' roles, necessitating new skills and addressing their concerns in this new paradigm.	[18]
Policy and Regulation	Effective AI integration in education requires appropriate policy and regulatory frameworks to address various challenges.	[19]
Long-Term Impact and Sustainability	It's important to understand AI's long-term impacts on employment, society, and the nature of learning and ensure sustainability.	[20]
Evaluation and Accountability	Robust mechanisms are needed to evaluate AI tools in education and hold providers accountable for their impact.	[21]
Need for Continuous Improvement	The rapid evolution of AI technologies requires ongoing refinement and adaptation in educational content and methods.	[22]
Collaborative Effort Required	A collaborative effort from educators, technologists, policymakers, and learners is essential for effective AI integration.	[23]

Method

A rigorous literature review underpinned the study's methodology. This academic method is appropriate given the study's goal to properly analyze AI's varied and fast-expanding consequences on lifelong learning. This study is based on a thorough literature examination of academic papers, industry reports, policy documents, and relevant

case studies. The sources in this array were carefully selected for relevance and educational quality. Each article was assessed for contributing to AI's incorporation into lifelong learning. Publishing credibility and authority were also important, ensuring the research was based on academic sources. Recency of material was also important, enabling the research to reflect the newest breakthroughs and theoretical advances in this dynamic field. The analytical framework of this study was built around five essential topic areas for comprehending AI integration in lifelong learning. Data privacy, biases in AI algorithms, the effects of AI on pedagogical methods, learner autonomy, and the sustainability and adaptability of AI in education were examined in detail. This conceptual structure allowed for a deep and nuanced discussion. Critical and analytical analysis synthesized material from many sources and generated conclusions on AI's ethical and pedagogical implications for lifelong learning. This included examining literature convergences and divergences, emerging practices, and theoretical contributions. This study was based on applicable educational ideas and ethical frameworks. These theoretical viewpoints critiqued and contextualized the results within academic discourse, increasing the research's scholarly contribution. Literature-based approaches have drawbacks, such as source selection biases and the need for actual data from primary research procedures. The study addressed these limitations, suggesting future research using empirical methods to expand its conclusions. This paper uses a comprehensive literature survey and thorough theoretical analysis to explore AI's complex and dynamic environment in lifelong learning. This method guarantees a solid academic basis for the research and emphasizes the need for continuing scholarly investigation into this crucial and emotional topic.

Ethical consideration

Data Privacy and Security Considerations in AI-Enhanced Education

In the modern educational environment, which extensively relies on Artificial Intelligence (AI) and digital technology, the careful handling of student data involves complex and significant concerns related to data privacy and security. The widespread use of Internet of Things (IoT) systems in educational environments, especially for training centralized AI models, has increased the vulnerability to privacy violations. A novel distributed learning framework, federated learning, has been created to address these dangers. This sophisticated framework enables the cooperative training of AI models on many platforms while guaranteeing the preservation of private datasets in their original local contexts. Federated learning is an innovative and resilient approach that effectively addresses the critical problems of data privacy and security in AI-integrated educational systems (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). This technique is a solid and effective solution to privacy issues arising from traditional data handling methods. It guarantees a safe and responsible use of technology in education. Collecting data in educational environments may sometimes be a laborious and time-consuming procedure. Sophisticated systems not only acquire personal information but also include the collection of physiological data, in addition to monitoring learning patterns and academic success measures. Perrotta (2024) states that Natural Language Generation (NLG) is a rapidly evolving field in AI research with considerable commercial potential. The ability of robots to understand and imitate human language is commonly considered to be a significant milestone in the pursuit of Artificial General Intelligence (AGI), frequently referred to as the goal in this science

(Alshahrani, R., Yenugula, M., Algethami, H., Alharbi, F., Goswami, S. S., Naveed, Q. N., ... & Zahmatkesh, S. (2024). The primary issue lies in the possibility of an excessive gathering of data, which poses a danger to students' privacy. Data gathering must be carried out with a distinct and precise intention, by educational goals, while rigorously adhering to the limits of student privacy. Alier, M. et al. observe that many educational software programs now gather personal data and information about students. Moreover, there has been a substantial change since 2020, when the responsibility for running these educational programs has progressively been given to external suppliers rather than being handled internally by educational institutions (Chen, Z. (2023). Ethical considerations exist with diversifying educational data for targeted advertising or profiling (Kabudi, T., Pappas, I., & Olsen, D. H. (2021). Express consent for non-educational usage is a moral need, and data processing openness is essential. Compliance with regulations like the EU's General Data Protection Regulation complicates matters. These laws require tight data management and user approval from educational institutions and AI technology vendors. Respect for learner autonomy, confidentiality, and non-discrimination in data-driven decisions are ethical considerations beyond legal compliance. Equal treatment and ethical data management for all students are the goals. Most significantly, this data ecosystem should focus on learners. They should know the data's kind, storage, and usage. Give students access, review, and delete options for their data to empower them and respect their data rights (Kamalov, F.,et al (2023). Data security is essential in instructional technology design. Privacy-by-design, where safety protections are built into every technology project, is needed to provide safe learning places. AI-enhanced education requires a multifaceted approach to data protection and privacy. This method must balance legal and ethical standards, learner empowerment in data management, and technology's inventiveness. It's crucial for student safety and instructional technology efficacy.

Combating Algorithmic Prejudices in AI-Driven Educational Tools

The research published by Habbal, A., Ali, M. K., & Abuzaraida, M. A. (2024) highlights the crucial need to establish fairness in AI-powered technologies, particularly as they become more widespread in education. The focal point of this discussion is to analyze biases inherent in AI algorithms, which often contribute to the perpetuation of cultural and historical prejudices. This inquiry is of utmost importance due to the extensive use of AI in educational applications. The authors emphasize that Artificial Intelligence has become an omnipresent and influential power, instigating profound transformations in several industries such as smart cities, healthcare, manufacturing, virtual worlds, and the Metaverse. Alongside the extensive use of AI, there is a rising apprehension over danger, trust, and security (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). The research promotes continual adaptation and stakeholder cooperation as crucial techniques to reduce developing hazards. Implementing this technique is essential for cultivating a moral structure and improving the overall security environment of AI systems. The study published by Habbal, A., Ali, M. K., & Abuzaraida, M. A. (2024) highlights the crucial need to establish fairness in AI-powered technologies, particularly as they become more widespread in education. The focal point of this discussion is to analyze biases inherent in AI algorithms, which often contribute to the perpetuation of cultural and historical prejudices. This inquiry is of utmost importance due to the extensive use of AI in educational applications. The authors emphasize that Artificial Intelligence has become an omnipresent and influential power, instigating profound transformations in several industries such as smart cities,

healthcare, manufacturing, virtual worlds, and the Metaverse (Alshahrani, R., Yenugula, M., Algethami, H., Alharbi, F., Goswami, S. S., Naveed, Q. N., ... & Zahmatkesh, S. (2024). Alongside the extensive use of AI, there is a rising apprehension over danger, trust, and security. The research promotes continual adaptation and stakeholder cooperation as crucial techniques to reduce developing hazards. Implementing this technique is essential for cultivating a moral structure and improving the overall security environment of AI systems. This conversation shows how narrow AI has hurt students and teachers, emphasizing the need for justice in educational technology. The discussion switches to AI-driven educational tool bias mitigation solutions to address these concerns. Diversifying training datasets to represent learner diversity, using transparent AI models, and monitoring and changing algorithms to maintain impartiality are required. Cross-disciplinary teams of educators, data scientists, ethicists, and students are crucial in developing and preserving fair AI systems in education. This conversation must include ethical and regulatory issues. Ethics must drive AI research and application in education, concentrating on learner autonomy, privacy, and damage avoidance. It also emphasizes how regulatory frameworks prohibit prejudice and promote fairness in education. Finally, he anticipates this quickly changing field's difficulties and opportunities. Bias mitigation solutions must develop as AI technology improves. The last portion speculates on future AI and education advancements, highlighting the need for awareness and agility to utilize AI technologies responsibly and benefit all learners. It comprehensively examines algorithmic biases in AI-driven educational tools and emphasizes the need for multiple ways to make these tools egalitarian and prosperous for all learners (Chen, Z. (2023).

Ensuring Transparency and Accountability in AI Decision-Making

Hassija, V. et al. emphasize the urgent need to comprehend and manage AI as it becomes more prevalent in healthcare, banking, and government, as outlined in their 2023 research. They highlight the need for openness in AI, acknowledging the difficulty that intricate, deep learning systems sometimes function as 'black boxes' with obscure decision-making processes (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). The absence of transparency, which goes beyond technical aspects and includes ethical concerns, emphasizes the need for clearness in incorporating AI into many domains. The paper examines the fast advancement of AI approaches in machine learning and deep learning. It emphasizes clarifying these fundamentally intricate models for ethical and efficient use. It aids consumers and stakeholders in understanding AI decisions in sensitive fields such as medical diagnostics and criminal justice. Transparency and accountability are vital. It ensures clear responsibility for AI systems' decisions to handle negative consequences and errors. Accountability must be assigned to the developers, users, or the AI system when a patient is misdiagnosed or an AI system wrongfully denies a loan. Accountability necessitates the presence of legal and regulatory frameworks to address and resolve such difficulties effectively. Advancing AI technology while effectively managing its ethical implications is a challenging task. Transparency enables stakeholders to evaluate the fairness and safety of AI systems. Nevertheless, accountability promotes public confidence and allows redress of harm or error. To achieve transparency and accountability in AI, it is necessary to have AI models that can be easily understood and decision methods that can be understandable to non-experts. Additionally, it encompasses the development of AI norms and standards, allocating responsibilities to developers and users, and implementing oversight systems. The issues of transparency and accountability are

constantly changing as AI advances. Collaboration among technologists, ethicists, legislators, and end-users is necessary to develop robust, equitable, understandable, and accountable AI systems. The focus of "Ensuring Transparency and Accountability in AI Decision-Making" is to highlight the need for AI systems to be coherent and responsible for guaranteeing ethical use and instilling public trust (Alshahrani, R., Yenugula, M., Algethami, H., Alharbi, F., Goswami, S. S., Naveed, Q. N., ... & Zahmatkesh, S. (2024).

Navigating Pedagogical Challenges in AI Integration: Curriculum, Teaching Methods, and Learner Engagement

The paper analyzed the intricate difficulties of integrating artificial intelligence (AI) technology into educational frameworks. The process of assimilation requires a thorough reassessment of pedagogical frameworks, including the design of academic programs, teaching methods, and the promotion of student involvement and motivation in learning settings that include AI. The effort to incorporate AI into the school curriculum goes beyond just adopting technology breakthroughs. According to Chen, L., Chen, P., & Lin, Z. (2020), the machine learning and adaptability properties of AI systems need the customization and personalization of curriculum and material to cater to the specific needs of each student. This method is expected to improve involvement and memory, increasing the student's experience and the overall effectiveness of the learning process (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). It is crucial to thoroughly evaluate educational material and goals to ensure they align with the capabilities and limits of AI technology. The integration process also requires educators to undergo professional development, enabling them to acquire the essential skills to use AI technologies properly in teaching methods. This need presents a notable obstacle, especially in educational institutions with limited finances or technical infrastructure. Moreover, the influence of AI on conventional teaching approaches represents a fundamental change in academic procedures. AI enhances individualized learning trajectories, streamlines repetitive administrative duties, and provides prompt feedback systems. Nevertheless, this change also requires an alteration in the educator's position from being the leading provider of information to being a facilitator of a learning experience that is improved by artificial intelligence. Educators must embrace creative pedagogical practices that effectively use AI technology while maintaining the fundamental humanistic aspects of teaching and learning.

Furthermore, the impact of AI on student engagement and motivation poses a complex situation. Although AI's personalization ability may enhance student engagement, there is a potential danger of promoting excessive dependence on technology, which might reduce learners' critical thinking skills and intrinsic motivation. The academic issue is using AI effectively to enhance the learning process instead of treating learners as passive information consumers. It is crucial to guarantee that AI technologies actively encourage and maintain student enthusiasm, fostering an engaged and interactive learning atmosphere. Incorporating AI into educational environments requires careful examination and balance across many pedagogical aspects, recognizing the intricacy and subtlety of the undertaking. Woolf B. P. et al. (2013) identified five specific issues in this setting. The difficulties include (1) assigning mentors to each student, (2) aiding the development of skills relevant to the modern day, (3) using interaction data to improve learning outcomes, (4) ensuring that everyone has access to

global classrooms, and (5) encouraging learning that spans throughout a person's whole life and many aspects of their existence. To effectively harness the potential advantages of AI in educational settings, it is imperative to tackle these obstacles (Alshahrani, R., Yenugula, M., Algethami, H., Alharbi, F., Goswami, S. S., Naveed, Q. N., ... & Zahmatkesh, S. (2024). This entails a comprehensive incorporation of artificial intelligence into educational frameworks, adaptation of teaching methods, and students' ongoing involvement and motivation.

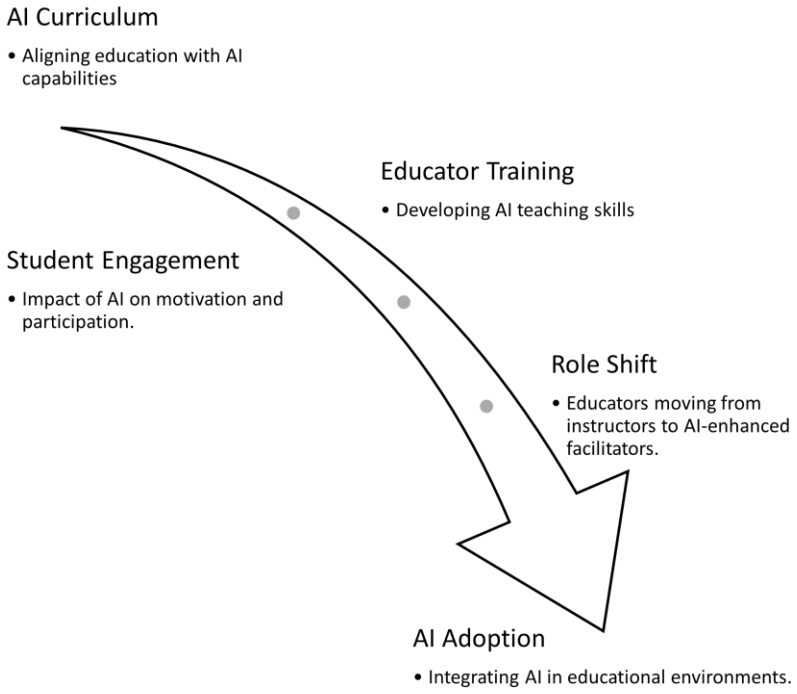

Figure 1 Downward Trajectory Arrow

Exploring the Scope of AI in Lifelong Learning: Opportunities, Challenges, and Future Prospects

The academic inquiry into the impact of artificial intelligence (AI) on lifelong learning requires a comprehensive comprehension of how AI transforms the ongoing acquisition of information and skills over an individual's life. This entails thoroughly examining AI's many advantages, particularly in enabling tailored learning experiences. These experiences are defined by AI's capacity to evaluate individual learning habits and then customize educational material to fulfill the distinct requirements of each student. Chakrabarti S. et al. (2021) argued for the significance of fostering a learner mentality among engineers, which involves being easily adaptable to change and transformation. The mentality should focus on consistently acquiring and upgrading essential information and skills to maintain competence in the ever-changing and developing technology environments (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). Additionally, it entails looking at how AI enhances the accessibility and inclusivity of learning, particularly for those with impairments, and how it optimizes learning procedures for improved efficiency.

Opportunities of AI in Lifelong Learning	Customizing education Evaluating learning Adaptive content
	Improving disability learning Equal chances Overcoming geographical hurdles.
	Focusing on essential learning areas Streamlining instruction Time management.
Challenges in AI Integration	Reducing biases in AI systems Assuring ethical decision-making, Protecting data privacy
	Bridge access gaps Provide resources in poor communities Distribute technology fairly.
	Balance technology Human engagement Critical thinking.
Future Prospects and Innovations	Discovering new AI tools Predicting educational technology Combining AI with cutting-edge advancements.
	Gamification experiential learning, AI enhances conventional teaching approaches.
	Creating supporting legislative frameworks strong educational infrastructure Fair AI use in education.

Figure 2 Tripartite Framework of AI in Lifelong Learning: Assessing Opportunities, Challenges, and Future Directions

Nevertheless, incorporating artificial intelligence into lifelong learning is not devoid of obstacles. Ethical concerns are significant, such as the possibility of biases in AI algorithms and the consequences of AI-powered decision-making in education. The digital gap is another problem that arises because of unequal access to AI technology, which is especially concerning for learners in disadvantaged communities. Moreover, there is a potential danger of over-dependence on technology, which might result in less interpersonal contact and a deterioration of critical thinking abilities. The potential of artificial intelligence (AI) in lifelong learning is immense, considering the ability of developing technologies to create revolutionary advancements. The future trajectory of innovations involves combining technology with other evolving educational paradigms, such as experiential learning and gamification. However, to make the most of this potential, it is crucial to carefully create regulatory frameworks and infrastructures that promote AI's ethical and fair use in educational settings. Although AI has great potential to improve lifelong learning, its implementation requires a deep understanding of the intricacies and ethical challenges. The progress of education in the digital era depends on effectively using the possibilities of artificial intelligence while simultaneously solving the obstacles that come with it. Rawas, S. (2023) emphasizes the crucial

contribution of AI, namely ChatGPT, in enhancing the quality and availability of higher education. Nevertheless, using these technologies requires careful consideration and a thorough comprehension of their advantages and difficulties (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023).

There is a delicate waltz between the potential benefits and risks of artificial intelligence (AI) in the context of lifelong learning. AI in this field can significantly improve learning experiences by catering to each person's specific requirements based on their distinct preferences and learning speed. This customization might make learning more exciting and successful, completely transforming the educational process. On top of that, AI may remove long-standing obstacles to learning. Thanks to it, educational materials previously inaccessible to persons in rural locations or with impairments are now within reach. Additionally, it automates mundane activities and provides immediate feedback, simplifying the learning process and letting students concentrate on what they need to improve upon. However, there are also considerable difficulties that accompany these advantages. To prevent the spread of biases and to ensure privacy, designers, and implementers of AI in education must have a strong sense of ethics. Equally concerning is the widening digital gap; all the AI in the world won't matter if only the well-off can access it. It is critical to ensure that disadvantaged populations have fair access to technology. Making sure AI doesn't replace the indispensable—the human aspect in learning—is one of the trickiest but most important tasks. An all-encompassing education requires attention to detail in both teacher-student interactions and student-to-student conversations (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). Hence, AI shouldn't replace humans in the learning process but rather complement it. In the future, how we overcome these obstacles will determine the course of AI in lifelong learning. Comprehending the function of new AI technologies in the classroom requires constant assessment of these developments. To enhance the learning experience, AI should be carefully combined with conventional and new education forms. Furthermore, working together to create rules and infrastructures that facilitate AI's ethical, fair, and efficient incorporation into continuous education is of utmost importance. AI can significantly improve learning throughout life, but a well-rounded strategy must realize this promise. Artificial intelligence (AI) has the potential to be a potent tool in the fight for lifelong learning and improvement if it considers human needs and carefully addresses obstacles.

Results and Discussion

Throughout our inquiry, we have shed light on the dualistic character of artificial intelligence (AI) in lifelong learning. Ours has revealed a landscape filled with extraordinary prospects and nontrivial obstacles. Based on the empirical information that has been acquired, it has been determined that artificial intelligence has the potential to transform educational approaches by providing highly individualized learning patterns. It is possible to do this via advanced pattern recognition algorithms designed to accommodate individual student's unique learning styles and paces (Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). It is anticipated that these individualized educational experiences will increase the student's level of involvement and make it easier for them to achieve their academic goals more effectively. At the same time, our research has shed light on the significant difficulties often associated with using AI in educational settings. One of the most critical aspects is the ethical

component, defined by the dangers of algorithmic biases and the consequent need for ethical stewardship in deploying AI-driven educational systems (Alshahrani, R., Yenugula, M., Algethami, H., Alharbi, F., Goswami, S. S., Naveed, Q. N., ... & Zahmatkesh, S. (2024). In addition, the harmful digital divide provides a difficult obstacle to the widespread use of artificial intelligence in education. This difference creates a stark contrast between those with convenient access to such technology and those who are relegated to the margins of society. The possibility of an excessive dependence on technology solutions, which may unwittingly induce a decline in human-to-human pedagogical connections, is another critical debate that should be discussed. Interactions of this kind have historically been considered the foundation of educational processes since they are essential for developing analytical and critical thinking skills. The trajectory of artificial intelligence in the field of lifelong learning looks to be intrinsically related to our collective capacity to negotiate these ethical and practical issues (Chen, Z. (2023). This is something that cannot be separated from the future. To achieve a harmonic integration of artificial intelligence with conventional pedagogical techniques and cutting-edge educational trends, it will be essential to build a harmonious integration. The creation of comprehensive legislative frameworks and infrastructure support systems meant to allow the inclusion of artificial intelligence into lifelong learning settings in an ethical, egalitarian, and effective manner will be required to accomplish this synthesis. Despite the undeniable fact that the potential for artificial intelligence as a driver of the educational revolution is quite promising, it is essential to note that a strategic and nuanced approach will be necessary to realize these prospects. The incorporation of artificial intelligence into lifelong learning must be controlled by carefully evaluating the possible limits of this technology and a persistent commitment to preserving the essential human components of education. The only way that artificial intelligence can be used to its most significant potential is by using a balanced and reflective paradigm. This paradigm may be a strong catalyst for educational growth and personal development.

Conclusions

In the ongoing discussion over AI's role in lifelong learning, this research has painstakingly mapped out the complex terrain where AI's potential advantages and disadvantages constantly shift. Our investigation has shown evidence that AI can revolutionize education by making it more personalized and better. Its expert personalization of the learning experience enables a hitherto unseen degree of involvement and educational effectiveness. Furthermore, a more inclusive academic future is heralded by AI's role in democratizing access to education, especially for persons suffering from physical or geographic barriers. Amidst these achievements, the study has highlighted the seriousness of the accompanying difficulties. Ethics problems in AI-mediated education need a methodical and ethical response, mainly concerning algorithmic bias and the integrity of decision-making. There is an urgent need for systemic inclusion since the widening digital divide threatens the fair distribution of AI's educational benefits. Skillfully navigating these ethical and practical dilemmas is crucial to ensuring that AI is useful for lifelong learning. The introduction of AI must not overshadow the core of education, defined by the humanistic sharing of ideas and critical discussion. Therefore, AI should be seen as complementary to human teachers rather than a replacement for them so that the human touch remains an integral part of education. Our

tendency to foster a synergistic combination of AI with existing and emerging educational techniques is intrinsically tied to our futurity in this sector. Promoting regulatory frameworks and infrastructure paradigms that are strong, fair, and based on ethics will be crucial in guiding the integration of AI into pathways for lifelong learning. This paper's investigation suggests that artificial intelligence (AI) is a promising tool for educational innovation. Still, its full potential can only be realized with careful calibration, considering its limits and ethical concerns. By taking this tack, artificial intelligence may be recognized as a powerful tool to enhance lifelong learning, complementing human efforts to learn and develop rather than replacing them.

References

Adiguzel, T., Kaya, M. H., & Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of ChatGPT. Contemporary Educational Technology, 15(3), ep429.

Aleixo, E. L., Colonna, J. G., Cristo, M., & Fernandes, E. (2023). Catastrophic Forgetting in Deep Learning: A Comprehensive Taxonomy. arXiv preprint arXiv:2312.10549

Alier, M., et al. (2021). Privacy and e-learning: A pending task. Sustainability, 13(16), 9206.

Alshahrani, R., Yenugula, M., Algethami, H., Alharbi, F., Goswami, S. S., Naveed, Q. N., ... & Zahmatkesh, S. (2024). Establishing the fuzzy integrated hybrid MCDM framework to identify the key barriers to implementing artificial intelligence-enabled sustainable cloud systems in an IT industry. Expert Systems with Applications, 238, 121732.

Anis, M. (2023). Leveraging Artificial Intelligence for Inclusive English Language Teaching: Strategies and Implications for Learner Diversity. Journal of Multidisciplinary Educational Research, 12(6).

Ashley, D. R. (2020). Understanding Forgetting in Artificial Neural Networks

Boegershausen, J., Datta, H., Borah, A., & Stephen, A. T. (2022). Fields of gold: Scraping web data for marketing insights. Journal of Marketing, 86(5), 1-20.

Chakrabarti, S., et al, (2021). Preparing engineers for lifelong learning in the era of Industry 4.0. In 2021 World Engineering Education Forum/Global Engineering Deans Council (WEEF/GEDC) (pp. 518-523). IEEE.

Chan, C. K. Y. (2023). A comprehensive AI policy education framework for university teaching and learning. International journal of educational technology in higher education, 20(1), 38.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. Ieee Access, 8, 75264-75278

Chen, Z. (2023). Artificial intelligence-virtual trainer: Innovative didactics aimed at personalized training needs. Journal of the Knowledge Economy, 14(2), 2007-2025.

Cityalov, F., Santandreu Calonge, D., & Gurrib, I. (2023). A new era of artificial intelligence in education: towards a sustainable multifaceted revolution. Sustainability, 15(16), 12451

George, B., & Wooden, O. (2023). Managing the strategic transformation of higher education through artificial intelligence. Administrative Sciences, 13(9), 196.

Gualdi, F., & Cordella, A. (2024). Theorizing the regulation of generative AI: lessons learned from Italy's ban on ChatGPT

Gutierrez Jr, R. (2024). Guiding the Next Technological Revolution: Principles for Responsible AI and Nanotech

Progress. In Artificial Intelligence in the Age of Nanotechnology (pp. 210-232). IGI Global

Habbal, A., Ali, M. K., & Abuzaraida, M. A. (2024). Artificial Intelligence Trust, Risk and Security Management (AI TRiSM): Frameworks, applications, challenges, and future research directions. Expert Systems with Applications, 240, 122442.

Hassija, V., et al. (2023). Interpreting black-box models: a review on explainable artificial intelligence. Cognitive Computation, 1-30.

Jones, K. M., Asher, A., Goben, A., Perry, M. R., Salo, D., Briney, K. A., & Robertshaw, M. B. (2020). "We're being tracked at all times": Student perspectives of their privacy about learning analytics in higher education. Journal of the Association for Information Science and Technology, 71(9), 1044-1059

Kabudi, T., Pappas, I., & Olsen, D. H. (2021). AI-enabled adaptive learning systems: A systematic mapping of the literature. Computers and Education: Artificial Intelligence, 2, 100017.

Kamalov, F.,et al (2023). A new era of artificial intelligence in education: towards a sustainable multifaceted revolution. Sustainability, 15(16), 12451.

Khogali, H. O., & Mekid, S. (2023). The blended future of automation and AI: Examining some long-term societal and ethical impact features. Technology in Society, 73, 102232.

Lainjo, b. The global social dynamics and inequalities of artificial intelligence.

Le-Nguyen, H. T., & Tran, T. T. (2024). Generative AI in Terms of Its Ethical Problems for Teachers and Learners: Striking a Balance. In Generative AI in Teaching and Learning (pp. 144-173). IGI Global

Lim, T., Gottipati, S., & Cheong, M. (2023). Artificial Intelligence in Today's Education Landscape: Understanding and Managing Ethical Issues for Educational Assessment.

Makridakis, S. (2017). The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms. Futures,critical, 46-60.

Maultsaid, D., & Harrison, M. (2023). Can Open Pedagogy Encourage Care? Student Perspectives. International Review of Research in Open and Distributed Learning, 24(3), 77-98.

Miao, Q.,et al . (2023). DAO to HANOI via DeSci: AI paradigm shifts from AlphaGo to ChatGPT. IEEE/CAA Journal of Automatica Sinica, 10(4), 877-897.

Nevanperä, M. (2021). Aspects to Responsible Artificial Intelligence: ethics of Artificial Intelligence and Ethical Guidelines in SHAPES Project.

Ouyang, F., Xu, W., & Cukurova, M. (2023). An artificial intelligence-driven learning analytics method to examine the collaborative problem-solving process from the complex adaptive systems perspective. International Journal of Computer-Supported Collaborative Learning, 18(1), 39-66.

Perrotta, C. (2024). Natural language generation and the automation of pedagogical communication. In World Yearbook of Education 2024 (pp. 54-69). Routledge.

Rahiman, H. U., & Kodikal, R. (2024). Revolutionizing education: Artificial intelligence empowered learning in higher education. Cogent Education, 11(1), 2293431.

Rawas, S. (2023). ChatGPT: Empowering lifelong learning in the digital age of higher education. Education and Information Technologies, 1-14.

Rawas, S. (2023). ChatGPT: Empowering lifelong learning in the digital age of higher education. Education and Information Technologies, 1-14.

Richey Jr, R. G., Chowdhury, S., Davis-Sramek, B., Giannakis, M., & Dwivedi, Y. K. (2023). Artificial intelligence in logistics and supply chain management: A primer and roadmap for research. Journal of Business Logistics, 44(4), 532-549.

Saikia, S., Athilingam, V. P., & Ahmed, F. (2024). Cybersecurity and Intraoperative Artificial Intelligence Decision Support: Challenges and Solutions Related to Ethical Issues. In Ethical Issues in AI for Bioinformatics and Chemoinformatics (pp. 107-118). CRC Press.

Shakeer, S. M., & Babu, M. R. (2024). A Study of Federated Learning with Internet of Things for Data Privacy and Security using Privacy Preserving Techniques. Recent Patents on Engineering, 18(1), 1-17.

Vincent-Lancrin, S., & Van der Vlies, R. (2020). Trustworthy artificial intelligence (AI) in education: Promises and challenges.

Woolf, B. P., et al . (2013). AI grand challenges for education. AI magazine, 34(4), 66-84.

Xu, Y., et al. (2021). Artificial intelligence: A powerful paradigm for scientific research. The Innovation, 2(4).

Zhai, X., et al. (2021). A Review of Artificial Intelligence (AI) in Education from 2010 to 2020. Complexity, 2021, 1-18.

Zhang, J., & Li, D. (2024). Role of artificial intelligence in tackling the metabolic syndrome pandemic. In Metabolic Syndrome (pp. 575-584). Academic Press

Anti-Christ Journeys to the Promised Land

Prof. Dr. Harvey Strum
Russell Sage College, USA

Abstract: The paper will look at the visit of William Jennings Bryan to Toronto and Montreal in February 1908 as he started his third run for the presidency and partially compare it to his visit in 1897 after his first defeat. Canadian newspapers welcomed his exercise in international goodwill, his praise of the British empire. Some of the Canadian press refrained from attacking Bryan or made mild criticisms of him, because the majority of the Canadian press hated Bryan the politician in 1896, 1900, and 1908 as a quixotic radical who threatened the politics and economy of both the United States and Canada. When comparing Bryan's visit in 1908 to 1897 the hostility of the press lessened. Editors were more sympathetic to Bryan during his visit than during the 1908 presidential election when most editors, Liberal and Conservative, favored Taft. However, the press respected Bryan's sincerity, honesty, idealism, and character even if they despised is political and economic beliefs. During his visit in February 1908 Bryan appeared more as a conservative religious and morals advocate than a radical Democratic political leader.

Keywords: Canada, Bryan, Canadian public opinion, Canadian press, 1908

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Introduction

In 1896 and 1900 the Canadian press was unanimously hostile to William Jennings, Bryan, the American presidential candidate of the Democratic Party. When Bryan ran a third time in 1908, the majority of business oriented Canadian Conservative Party, Liberal Party, and independent editors and publishers preferred the sane, safe, and more conservative Republican William Howard Taft. Canada's financial elite controlled most of the Canadian press and abhorred Byran's economic and political radicalism. Paul Rutherford, historian of nineteenth century Canadian journalism, that the set of shared economic interests by the Liberal and Conservative newspapers limited the independence of Canadian journalism. (Rutherford, 1982, 205) Historian James Page agreed: "the financial and business elite had a stranglehold on the Canadian press at this time." (Page, 1968, 114) These conclusions by historians were confirmed by contemporary observations. According to the *London Industrial Banner*, the official publication of Canadian trade unions, "our great dailies…are up for sale…money controls the management of modern newspaper corporations." (*Industrial Banner* October 1908, 4) At the same time the voice of western agrarians, Winnipeg's *Grain Gowers' Guide,* observed: "The ownership of newspapers in Canada has become the sideline for politicians and capitalists, and it is to suit the views of these people that the wells of truth

have been defiled." (*Guide*, 11 October 1910, cited in Cook 1963, 49).

Unlike 1896 and 1900, part of the Canadian press in 1908, representing radical agrarians in western Canada, social reform Liberals in western and eastern Canada, trade unionists, conservative Protestants, and militantly anti-Catholic Protestants linked to the anti-Catholic Orange Order admired Bryan and wanted him to win. Moreover, in 1908 many anti-Bryan editors commended Bryan's honesty, sincerity, and idealism. As an example, the editor of the strongly anti-Bryan Liberal *Kingston Whig*, described Bryan as charming, a gifted orator, and a thoughtful presidential candidate. (*Whig* 1908, 4). A certain degree of ambivalence emerged in 1908 because of the absence of free silver, populism, anti-imperialism, and anti-British diatribes, themes raised in his 1896 and 1900 campaigns. However, the majority of Canadian editors, like their American counterparts, viewed Bryan as too radical, and threatened Canadian business interests, and might encourage the growth of trade unionism and agrarian radicalism in Canada. Editors admired Byran the moral reformer but despised the social, economic, and political crusader. Historian James Page concluded that Bryan's radical beliefs were not compatible with Canadianism as articulated by Canada's financial elite and the two major political parties, Liberals and Conservatives. (Page 1968, 199).

Bryan was unique in his visiting Canada several times before or after his presidential campaigns. William Jennings Bryan went on speaking tours in Canada, in 1897, 1908, and twice in 1909.His visit in February 1908 was a rare example of an American presidential candidate speaking in Canada during his presidential bid. Traveling to Canada in 1909 after his third defeat was also unusual. Bryan's visit to Toronto and Montreal in February 1908 promoted Christianity, missionary work, and better Canadian American relations. The reception Bryan received in Montreal and Toronto suggested he was a well-known and popular American political personality and conservative Christian moral reformer in 1908. Byran's enthusiastic crowds and popular reception in February 1908 and the later enthusiastic reaction of Canadians to his two trips to western Canada in 1909 where he spoke about Christianity, but also political reform demonstrated the widespread popularity of Bryan in Canada. It appears to suggest an elite-mass split in attitudes about Bryan. For the most part, Canadian editors and publishers did not accurately reflect public opinion, and Bryan was a far more well know and popular American in Canada than most newspapers were willing to admit. His combination of agrarian political radicalism and conservative religious values appealed to a wider share of the Canadian population.

1897

Canadians had an opportunity in February 1908 to observe the "anarchist and Popocrat" of 1896 and 1900 at close range because Bryan visited Montreal and Toronto to speak. Bryan received a generally favorable reaction from the Canadian press. The papers praised Bryan's oratorical abilities and his character. Editors made a distinction between Bryan the man and Bryan the politician. This suggested a lessening of press hostility from 1900 to 1908. Canadians who came to hear Bryan responded enthusiastically to the loquacious orator from Nebraska. Large and friendly crowds attended Bryan's lectures. Bryan, who had no trouble drawing large crowds in the United States, found Canadians just as receptive and eager to hear the Great Commoner.

However, this was not Bryan's first visit to Canada. In June 1897, he made a speaking tour of Toronto, Montreal, Quebec, and Ottawa. Hundreds of people rushed to Union Station in Toronto to see Bryan. According to the *Buffalo Times,* the enthusiasm to see Bryan "has ever been excelled by that attending any event save one of National importance." (*Buffalo Times,* 6 June 1897, 1) During his stay in Toronto, Canadians besieged him "design to speak and to shake hands with him and he only obtained relief from the constant stream of visitors" by going on a guided tour of the city with Mayor Robert Fleming. (*Toronto Globe,* 5 June 1897, 14).

That night Bryan spoke on bimetallism to a packed audience of 3,000-4,000 people. Including some of the leading citizens of Toronto. When Mayor Fleming, who introduced Bryan, remarked that he expected the American people to elect Bryan President of the United States, many in the audience cheered. Throughout Bryan's speech the audience responded favorably, with cheers, laughter, and applause. Round after round of applause followed Bryan's finish, and hundreds of people came forward to shake the Great Commoner's hand. According to the *Toronto World,* "the platform was packed with a seething mass of humanity.' (*World,* 5 June 1897, 2) In Buffalo, the *Times* concluded that Bryan's talk on bimetallism received the same enthusiastic reception in Toronto as Bryan would have received in Buffalo. (*Times,* 8 June 1897, 1).

While in Montreal Bryan received the same cordial welcome from Canadians.(*Montreal Star,* 7 June 1897; *La Press,* 7 June 1897; *Montreal Gazette,* 7 June 1897; *Montreal Herald.* 7 June 1897) Interest in Bryan was so great in Canada that a reporter from *Kingston Whig i*ntercepted Bryan on route to Montreal and interviewed him for the Kingston newspaper. (*Whig,* 7 June 1897, 4) In Ottawa, Bryan met many members of the Canadian Parliament. When he spoke on free silver, he received the same enthusiastic reception as in Montreal and Toronto, with the crowds cheering and wildly applauding him. Newspapers reported tremendous applause when he completed his speech, and many people came up to shake his hand. (*Ottawa Citizen,* 8 June 1897; *Ottawa Journal,* 8 June 1897; *Ottawa Free Press,* 8 June 1897). Bryan ended his 1897 speaking tour with a sightseeing visit to Quebec. (*Quebec Chronicle,* 8. 10 June 1897.

In trying to explain why Bryan attracted such large crowds and received such a warm welcome from Canadians, the press argued that his 1896 presidential run made him famous in Canada. Newspaper editors believed Canadians came out because of curiosity or admiration of his character, but not out of sympathy for his policies. Toronto's *Saturday Night* believed Bryan impressed Canadians, yet "this would not mean he converted us to his views on the money question but merely that he satisfied us as to his ability and good faith." (*Saturday Night,* 12 June 1897, 7) However, the Conservative *Toronto Mail and Empire* admitted that Bryan had many supporters in Canada: "that the views he entertains have supporters in this city was evinced by the frequent hearty applause which greeted him." *(Mail and Empire,* 5 June 1897,10) The Democratic *Buffalo Times* went further arguing that Bryan was popular in Toronto, and many Torontonians shared his views on bimetallism. As a result of Bryan's visit "there were more there now." *(Times,* 6 June 1897, 1) Several Canadian newspapers admitted his popularity and that he was well known due to the 1896 presidential election. (*Toronto Globe,* 5 June 1897, 14; *Montreal Gazette,* 7 June 1897, 6); Toronto *Farmer's Sun,* 3 and 10 June 1897).

Reacting to Bryan's visit the Canadan press made clear its abhorrence of Bryan's free silver policy. Editors, publishers, and business leaders despised the political and economic policies advocated by Bryan. Noting the opposition of a Canadian financier Sir Frank Smith, *Buffalo Times*, observed: "Bryan hit the financiers pretty hard…and Sir Frank's face showed he didn't like it." (*Times*, 6 June 1897) Based on the admissions in the press, Bryan was well known in Canada in 1897 and based on audience responses to his speeches in Montreal and Toronto, a popular foreign figure. As the Conservative *Montreal Gazette* admitted the reception Bryan received "suggested …the admiration of a popular hero." (*Gazette*, 7 June 1897. 6) An elite mass split developed in Canada in attitudes towards Bryan. In spite of the hostility of both the American and Canadian press Bryan became popular in Ottawa, Montreal, and Toronto, The press appears to have not reflected the opinions of many Canadians towards Bryan in 1897.

Prophet of Righteousness

In 1897, Bryan stressed bimetallism (free silver) of his 1896 presidential campaign while speaking in Canada, but in 1908 he came to further the cause of Christ, not free silver. Bryan espoused liberal/radical economic and political positions on the leftwing of the Democratic Party, but he held fundamentalist conservative religious beliefs. Montreal's delegation to the 1907 annual meeting of the Layman's Missionary Association Movement in Washington, D.C. approached Bryan and requested he travel to Montreal to speak. Bryan in February 1908 lectured primarily on moral and religious topics and on Canadian American relations in Toronto and Montreal. Indirectly, he may have also sought to impress American voters of Canadian heritage. (*Saturday Night*, 16 March 1908, 1)

Bryan began his Canadian tour with a speech, "Missions,' on Sunday 9th February at the Erskine Presbyterian Church in Montreal. Over 2,000 people came to hear Bryan speak on foreign missionary work and filled the church to the rafters. It "was the gathering that ever met under the roof of the edifice." *(Montreal Star*, 10 February 1908, 14) Hundreds were turned away at the doors. Members of the audience warmly appreciated his talk because "the words of…Bryan were listened to with attention, and when some particular assertion or statement appealed to the men they promptly and vigorously applauded." (*Star*, 10 February 1908, 14) That evening Bryan spoke to an audience of over 2,000 people at the American Presbyterian Church delivering his famous oration, "Prince of Peace.' Again, the audience filled the church to overflowing. Long before Byran arrived the throng filled the church, and hundreds were turned away. However the crowd kept coming, "a continuous stream flowed to the church doors from every direction only to be turned away." During his address, the Nebraskan attacked evolution: "if any man takes pride in tracing his ancestry to an ape, I do not object, but I object to being connected to his family tree." (*Montreal Star*, 10 February 1908, 14) This remark sparked critical comments in some of the newspapers.

The next afternoon Bryan delivered a speech on the "Signs of the Times," at a Canadian Club luncheon. Again, a large audience welcomed the orator. "So large was the attendance," the *Montreal Gazette* explained "that strict rules had to be made that only regular members could be admitted and two policemen…[checked] the credentials of each member." When the Great Commoner appeared the 600 businessmen cheered and wildly applauded.

During his speech, Bryan wished the Canadian people well, adding Americans "can watch your development and rejoice when you rejoice." (*Gazette*, 11 February 1908, 5) When Bryan told his audience he did not want to bore them by speaking too long, members of the audience shout out "Go on" and "We have all day.' Finally, when Bryan completed his optimistic talk on moral, educational, and Political progress he sat down amidst thunderous applause.(*Montreal Star*, 10 February 1908, 7) *La Patrie* observed 'il s'assit au milieu d'un tonnere di applaudissments." (*La Patrie*, 11 February 1908, 6) Apparently, Bryan's optimistic speech was a hit among Montreal's businessmen who flocked to hear the Great Commoner. This is further evidence how well known and popular Bryan was in Canada in 1908 as he started his third run for the presidency.

While Bryan was in Montreal "many friends and admirers" according to the *Montreal Gazette* who met Bryan during his visit came to his hotel to welcome Bryan to the city. Among the visitors were Captain George O' Farrell and other representatives of several Quebec Irish societies who invited Bryan to visit and speak in Quebec. Senator Raoul Dandurand, Speaker of the Canadian Senate, urged Bryan to visit the Senate in Ottawa Moreover, Bryan received invitations to speak in many Canadian cities, including Halifax, Winnipeg, and Vancouver. (*Halifax Herald*, 10 February 1908, 1) These multiple requests for Bryan to visit other Canadian cities and speak suggest the magnitude of Bryan's fame and popularity in Canada in 1908. Very few American politicians could match the warm welcome Canadians gave to Bryan or the requests to speak at every major city in Canada.

Toronto

Arriving in Toronto on 11 February with Harry Walker, Bryan's traveling companion. Reverand James Macdonald and John Trumbull, President of the Toronto Canadian Club, met them. Macdonald, a Presbyterian minister, journalist, and editor of the *Toronto Globe* invited Bryan to speak in Toronto. Immediately besieged by newsmen Bryan agreed to an interview and discussed some of the issues of the presidential campaign including 'closer trade with Canada." (*Toronto Globe*, 11 February 19078, 2) Bryan attacked the influence of predatory wealth in American politics, an issue that the Canadian press did not want to discuss in Canadian politics . Liberal Party newspapers did not want to emphasize the free trade issue since it might endanger the National Policy and raise questions about Laurier's retreat from previous Liberal Party free trade planks.

Later, Bryan attended a luncheon at the Canadian Club delivering an address, "Influence of Ideals Upon the Life," Between 800 and 900 businessmen attended including some very prominent citizens. Byran's appearance resulted in thunderous applause and with the audience standing up and cheering the American. The *Toronto Star* noted "his reception by the densely crowded assemblage was in the nature of an ovation."(*Star*, 11 February 1908, 1) According to the *Toronto Telegram* "everyone in town seems filled with curiosity to see the Bryan of today." (*Telegram*, 11 February 1908, 13) The reaction to Bryan's visit to Toronto suggests widespread popularity of the Great Commoner in Canada, and Canadian interest in the American presidential election. (*Saturday Night*, 15 February 1908, 2; *Toronto Globe*, 12 February 1908, 2).

In the afternoon Bryan went to the Ontario legislature where he met Premier Whitney and several members of

the legislature. As the *Windsor Record* observed, " for a time Mr. Speaker had some difficulty in diverting the attention of his members from the distinguished visitor…" (*Record,* 12 February 1908, 8) From the legislature Bryan went to meet with Professor Goldwin Smith and later the Lieutenant-Governor at Government House. That evening the Toronto Press Club held a dinner in Bryan's honor attended by 150 members of the press. Many people could not get in and Bryan delivered an impromptu speech to the waiting crowd which the *Toronto Globe* described as "a gracious act which was fully appreciated." (*Globe,* 12 February 1908, 2) His last address at the University of Toronto attracted a crowd of 3,000. The audience consisted of not only students but a cross section of Torontonians including members of the Ontario legislature, provincial Cabinet ministers, clergy, judges, and university administrators. Byran delivered his "Prince of Peace" speech to an enthusiastic audience who gave him a rousing standing ovation. As the *Toronto World* page one headline phrased it, "Bryan the Remarkable During Busy Day Here Makes Hosts of Friends." *(World,* 12 February 1908, 1) A correspondent for the *Buffalo Times* reported "indeed all of Canada wants to see and hear Bryan." *(Times,* 11 February 1908, 9) Furthermore, at the *Times* concluded about his trip to Montreal," Montreal has never showered a more hearty welcome upon a private citizens of the United States than upon the Great Commoner." *(Times,* 10 February 1908, 1; 11 February 1908, 9) Bryan received same friendly and enthusiastic responses from University of Toronto students, journalists, businessmen, and government officials. Thousands of Canadians flocked to hear Bryan in Montreal and Toronto reflecting his popularity in Canada,

The response of the clergy and religious press was especially favorable, Members of the local clergy in Montreal "passed a resolution expressing their admiration of Mr. Bryan and thanking him" for his efforts on behalf of religion and his visit to Montreal. (*Buffalo Times,* 10 February 1908, 1) According to the *Presbyterian Witness,* published in Pictou, Nova Scotia, "Mr. Bryan is an earnest and evangelical Christian man…His addresses in Montreal very much appreciated," *(Witness,* 25 February 1908, 53) From Ottawa the *Dominion Presbyterian,* concluded: "Montreal and Ottawa have been privileged to listen to a powerful and attractive speaker in the person of William J. Bryan…No public man among our neighbors has grown more in the estimation of the Christian forces of society." (*Presbyterian,* 19 February 1908, 9) To the Toronto *Presbyterian,* "to say that he made a splendid impression is to put the truth in the mildest form." The publication added that as a result of his visit the American presidential election "will be watched with an even keener and more sympathetic interest than in the past." (*Presbyterian,* 20 February 1908, 227). A fourth Presbyterian publication, the *Presbyterian Record,* of Montreal, also commended Bryan's excellent addresses. (*Record,* March 1908, 99).

Other religious publications also published stories and editorials praising Bryan. In Toronto, *Canadian Baptist,* believed Bryan made a good impression on Canadians. According to the *Canadian Baptist,* "Judging from the expressions of satisfaction that have freely been spoken, it is safe to say that he came, and saw and conquered…and made his visit very popular." (*Baptist,* 20 February 1908, 1) The Methodist *Christian Guardian* of Toronto praised Bryan as a "man of sound judgement and wide experience." (*Guardian,* 19 February 1908, 4 and 6) as well as of "quiet thoughtfulness and deep moral earnestness." A publication of the Orange Order of Canada and militantly anti-Catholic Protestants, *Sentinel and Orange and Protestant Advocate, in Toronto* , edited by Horatio Hocken, late mayor of Toronto wrote favorably about Bryan the political leader, "who touches the heart of the common

man" *(Sentinel,* 5 March 1908, 1). To the anti-Rome *Montreal Witness,* "Mr. Bryan is the welcome messenger of peace and hope and light." *(Witness,* 10 February 1908, 12) Several of the Protestant religious newspapers, like *Christian Guardian,* emphasized that Bryan attracted audiences because he was well known to Canadians as a radical political leader, but the religious press found it a pleasant surprise that the famous American politician turned out to be also a prophet of righteousness. Due to the strongly religious and highly moral content of many of his speeches in February 1908 the Canadian Protestant press was deeply impressed with Bryan and strongly approved of him. Three of the Protestant newspapers, *Sentinel, Christian Guardian, and Presbyterian* believed Bryan's fame as a political orator attracted large audiences to hear him. They found much to admire in Bryan, the evangelical Protestant layman, and argued this increased his popularity in Canada.

In trying to explain Bryan's ability to draw large crowds and the warm reception he received in Montreal, one newspaper, *Montreal Star,* suggested that politicians usually do not speak on religious subjects with any real sincerity, but Bryan was different. "To find a foremost political leader…engage in support of an important spiritual movement may have occasioned a stir of curiosity.," bringing a large audience to hear Bryan. (*Montreal Star,* 10 February 1908, 14) A Toronto newspaper, *Toronto Star,* and a Protestant journal, *Presbyterian,* argued that Bryan's fame as a political orator attracted Torontonians to hear him. An independent national weekly magazine, *Canadian Courier,* published in Toronto, wrote favorably about Bryan "everybody likes Bryan." For the *Courier* his fame and character explained the large audiences: "His personality is everything…He is the biggest personality that ever-visited Canada." (*Canadian Courier,* 22 February 1908, 1) Another Toronto weekly magazine, *Saturday Night,* published an article written by "Hal" who argued that the men attending the Canadian Club speech of Bryan's gave Bryan an enthusiastic welcome, and Bryan delivered a "fine and masterful address." In his opinion " William Jennings Bryan is big and brainy and brilliant; he is wholesome and mellow and to an open mind he seems beyond doubt sincere." Hal believed Bryan's visit to Toronto impressed many Canadians and Bryan's discussion of Canadian American relations appeared the kind of attitude Canadians wanted to see in an American president. Bryan would make a safer and saner president for Canada. The Great Commoner left a favorable impression on Canadians: "He is today perhaps the most popular, the noblest American of them all, in the eyes of a great many stolid, conservative, steady going Canadians." (*Saturday Night,* 15 February 1908, 2).

Bryan appealed to wide range of Canadians. A student columnist, "W.G.R." in the University of Toronto's *Varsity* praised Bryan's talents as an orator and his sincerity for he lived up to the principles of love and self-sacrifice he preached. Students who heard Bryan came away impressed by the American. His visit "will not soon be forgotten by those who were fortunate to come within the range of his winning personality…The reception accorded Mr. Bryan is evidence that it is not alone the currency of the United States that passes for full value in Canada." (*Varsity,* 11 February 1908, 283) To the Conservative Party newspaper, *London Free Press,* "Bryan has come nearer to Canadians by reason of his visit and what he had to say while in Toronto revealed in a happy way" Bryan's character. (*Free Press,* 14 February 1908, 4) The *Kingston Whig,* a Liberal Party newspaper, agreed that as a result of his sojourn in Canada he "was making many friends." According to the *Whig:* "He is a man of the most likable personality, very approachable , very affable, very gracious in his manner." (*Whig,* 17 February 1908, 4).

Several other newspapers praised the Nebraskan. The Liberal *Guelph Mercury* wrote approvingly of his positive remarks about Canadian American relations. Agreeing with other newspapers, *Mercury* wrote sympathetically about Bryan's character: "He is a strongly sympathetic and humanist bias…He has a keen intellect and well-trained mind…He has great force of character…and a gentlemanly manner." (*Mercury*, 13 February 1908, 2) Another Ontario Liberal Party paper, *Goodrich Signal*, observed considering Bryan's fame "it is not strange that his visit to Canada has been the occasion for a good deal of interest among Canadians." The paper approved of his visit and added his addresses "had much the flavor of international good will." (*Signal*, 13 February 1908, 2) Similarly, the Conservative *Toronto Mail and Empire* commented very favorably about Bryan's visit, "no distinguished visitor in years more quickly established friendly and sympathetic relations than did the "Nebraskan'. Bryan had impressed all classes of Canadians, "he charmed Torontonians of all sorts." *(Mail and Empire*, 13 February 1908, 6) According to the Liberal T*oronto Globe*, the fame of Bryan was well known in Toronto and his visit added to his reputation among Torontonians. As the *Globe* stressed: "He will be long remembered as one who by his ability, his humanitarianism, his moral courage, and his abounding humor, has challenged their admiration, won their sympathy, secured their respect, and earned their gratitude." Whether he won in November or not "the remainder of his political career will be a matter of abiding interest to a large number of Canadians." (*Globe*, 12 February 1908, 6).

Several newspapers especially stressed their admiration for Bryan the man. The Conservative *Toronto Telegram* believed that the magnetic force of Bryan's personality and his obvious sincerity accounted for the warm reception Canadians gave Bryan. No Canadian could match Bryan's "genius for private thinking and public speaking." While the *Telegram* did not agree with Bryan's political views it admired his idealism and sincerity. While he "may not choose his ideas wisely…[he] is wholly admirable in his unpurchasable fidelity to the ideals he has chosen." (*Telegram*, 10 February 1908, 10) Another Conservative paper, *Hamilton Spectator* added to the chorus of admiration for Bryan's qualities as a man. "He is a man…good, honest, well rounded…Morally he is the commanding force which sterling integrity, conscientious and consistent conviction and a self-respect wholly lacking in any improper emphasis. Bryan is more concerned with the success of…ideas than with the success of Bryan." (*Spectator*, 12 February 1908, 9 and 6) Canadians who heard him speak had an illuminating experience. The *Spectator* especially liked Bryan's idealism and stated that "there will ever be a welcome for such men as William Bryan," who feeds man's soul hunger for ideals. (*Spectator*, 12 February 1908, 6).

Other newspapers, Conservative and Liberal, expressed their admiration for Bryan, the man. In Toronto, the Conservative *World* considered Bryan the embodiment of an ideal "of what A MAN should be." The *World* stressed Bryan's honesty, sincerity, and devotion to principle. Bryan won high place in the respect of English-speaking peoples because of these qualities. As a result, "Bryan, THE MAN, is worthy of emulation by our public men. Toronto is happy to have.,,,A MAN within her gates." *(World*, 12 February 1908, 6) From Brantford, the Liberal *Expositor*, described Bryan as "a fearless leader," [who] "does not hesitate in denouncing evil." *(Expositor*, 11 February 1908, 4) Bryan impressed the Liberal *Montreal Herald* for his intellectual ability. He understood "problems that vex and confuse the average mind." To the editor of the *Herald*, Bryan was man with "an indomitable will…high minded and strong." *(Herald*, 10 February 1908, 6) Liberal, Conservative, and

independent newspapers wrote sympathetically about Bryan because his sincerity, idealism, and honesty impressed them. In these qualities some of the press saw Bryan as superior to some of the Canadian politicians. While Bryan refrained from making any statements that would inflame Canadians, his couple of satirical comments about evolution sparked some criticism from the press. The *Christian Guardian, Presbyterian Record, and Canadian Courier* ran sympathetic editorials about his character and his visit to Canada, they did not share his views on evolution. As the *Canadian Courier* observed, "when a man int his time of day will treat the good old evolutionary theory as he did---dismissing it with a joke about 'monkey ancestors'---he has not brought a critical mind to the study of the situation." (*Courier,* 22 February 1908, 8) To the *Toronto Star,* Liberal, and one of the few Canadian newspapers that wrote favorably about Bryan's run for the presidency and regretted his defeat, criticized Bryan's views on evolution. (*Star,* 12 February 1908, 4) Another Liberal paper that favored Bryan, *Windsor Record,* and wanted Bryan to win the presidential election castigated Bryan's position on evolution. While the paper commended "his broad democracy and altruism" it denounced his views on evolution and theology. It concluded, "this theology is of shallow kind and had better be forgotten when he talks…on the regeneration of …society." (*Record,* 12 February 1908, 4) The most critical evaluation of Bryan's stance on evolution came from Professor James Cappon, Professor English and Dean of the Arts faculty at Queen's University in Kingston, Ontario. Cappon also served as one of the editors of *Queen's Quarterly,* an academic and literary journal. Professor Cappon commended Bryan's defense of spiritual values against materialism. "There is much in the spirit of Bryan's address…with which one must sympathize." However, Cappon condemned Bryan's intellectual profundity on evolution, and he viewed Bryan's address at the University of Toronto as "hardly…above the level of a revival sermon by Rev, Billy Sunday." Further, Cappon satirized Bryan. "evidently much practice in addressing primaries And other party conventions is not conducive to intellectual seriousness." (Cappon, 1908, 339) While only a few newspapers commented on Bryan's critique of evolution during his visit to Toronto, the comments about Bryan's position foreshadowed the attitudes the Canadian press would take seventeen years later during the Scopes Monkey Trial. Most Canadian newspapers ignored his comments on evolution. One newspaper, *Toronto Telegram,* defended Bryan's remarks on evolution and lashed out at the *Canadian Courier* and the *Christian Guardian* for their criticisms of Bryan's stand on evolution.(*Telegram,* 22 February 1908, 10).

Conclusion

Canadian newspapers responded to the moral and religious content that comprised most of Bryan's speeches in Toronto and Montreal in February 1908 unlike his stress on bimetallism and political issues in June 1897 visit to Canada. Most of the press refrained from emphasizing their opposition to his political and economic views that they would highlight during the 1908 presidential election. One newspaper, the independent Conservative *Toronto News* considered Bryan a "welcome guest." (*News,* 10 February 1908, 6) Members of the papers editorial staff admired his abilities as an orator and acclaimed him as a great preacher. However, the paper used his visit as an opportunity to castigate his alleged anti-business policies and to express their disdain for him as a politician. The *News* condemned Bryan's attempts to have the United States adopt "restrictive and inquisitorial legislation." (*News,* 12 February 1908, 6) Actually, the views of this Toronto newspaper represented those expressed by the

majority of the Canadian campaign during the American presidential election, which is why Canadians newspapers, Liberal, Conservative, and independent preferred to see Taft in the White House.

Bryan's visit to Canada in 1908 was in a sense an exercise in international goodwill. The friendly comments the famed American made about Canada and the British Empire were welcomed by the Canadian press. In turn, Canadian newspapers refrained from attacking the Great Commoner or made only mild criticisms of the content of his speeches. When comparing the reaction of the press to his visit in 1897 with 1908, and later his two visits in 1909, the hostility of the press lessened. The critique of Bryan's views on evolution by part of the press indicated concerns about Bryan had not totally disappeared. It would soon reappear in earnest, for the press was far more sympathetic to Bryabn during the 1908 visit than during the election campaign, Canadian newspaper editors and reporters respected Bryan's sincerity, idealism, honesty, and character even if editors and publishers abhorred his political beliefs which most the Canadian press viewed as too radical and quixotic. Bryan's visit impressed Canadians editors and publishers. Canadian newspapers admitted Bryan was quite popular in Canada and the most well-known and liked American, something they could not say about William Howard Taft. The press wrote approvingly about the large crowds and well attended lectures of Bryan in June 1897, February 1908, May and October 1909. Respect for Bryan, the man and moral leader did not extend to approval of his perceived radical economic and political policies. Only one newspaper, *Toronto Telegram,* seems to have been so impressed by Bryan's visit that it wrote sympathetically about him during the election campaign. Another newspaper, *Toronto Globe,* edited by Rev. James Macdonald, was influenced by the editor meeting Bryan and hearing his speeches. The Protestant press responded favorably as did the Montreal clergy to his Canadian trip and admired Bryan, the moral and evangelical layman.

During his 1908 visit the famed Nebraskan drew large and enthusiastic crowds. Based on the reaction of audiences and statements from the press Bryan had become a household name in Canada. He seems to have been "generally recognized" on the streets of Montreal and Toronto. (*Buffalo Times,* 11 February 1908, 9) Once again, Bryan received a warm welcome from audiences in June 1897, February 1908 and later in his post-election trips to western Canada in May and October 1909. Bryan received a friendly reception not only from general audiences but also from audiences composed of business and professional men. Even Toronto journalists gave him a rousing reception. Newspaper editors and publishers considered Bryan a welcome guest.

Bryan appealed to the elite as a moral not political crusader. Evidence suggests Bryan's popularity, and the press admitted that many people in Toronto and Montreal came to admire Bryan. This suggests an elite-mass split may have emerged in Canadian attitudes towards Bryan. The Canadian press and business elite respected Bryan the man and preacher of righteousness. However, the majority of the press and financial leaders still opposed Bryan the social, economic, and political crusader. Canadian editors and publishers showed far more approval of Bryan in February 1908 than they would in August or November 1908. The elite mass split may have extended to the presidential election. A correspondent from the *Buffalo Times* who interviewed several Canadians say: "I will be compelled to revise my high opinion of the people of the United States if they do not make Mr. Bryan their next President." *(Times,* 10 February 1908, 1).

References

Primary Sources:

Buffalo Times, 1897, 1908

Canadian Baptist, (Toronto), 1908

Canadian Courier, (Toronto), 1908

Cappon, James, "Current Events: Mr. Bryan in Toronto," *Queen's Quarterly, XV* (April 1908), 359

Christian Guardian, (Toronto), 1908

Dominion Presbyterian. (Ottawa0, 1908

Expositor, (Brantford, Ontario), 1908

Farmer's Sun, (Toronto), 1897, 1908

Goldwin Smith Papers, Cornell University

Goodrich Signal, (Ontario), 1908

Grain Gower's Guide, (Winnipeg), 1908, 1910

Guelph Mercury, (Ontario), 1908

Halifax Herald, (Nova Scotia), 1908

Hamilton Spectator, (Ontario), 1908

Industrial Banner, (London, Ontario), 1908

Kingston Whig, 1908

La Patrie, (Montreal, French), 1908

La Press (Montreal, French language), 1897

London Free Press, (Ontario), 1908

Montreal Gazette, 1897, 1908

Montreal Herald, 1897

Montreal Star, 1897, 1908

Ottawa Citizen, 1897

Ottawa Free Press, 1897

Ottawa Journal, 1897

Presbyterian, (Toronto). 1908

Presbyterian Record, (Montreal), 1908

Presbyterian Witness, (Pictou, Nova Scotia), 1908

Quebec Chronicle, 1897

Queen's Quarterly, (Kingston, Ontario, Queen's University), 1908, 1909

Saturday Night, (Toronto), 1897, 1908

Sentinel and Orange and Protestant Advocate, (Toronto), 1908

Toronto Globe, 1897, 1908

Toronto Mail & Empire, 1897, 1908

Toronto News, 1908

Toronto Telegram, 1908

Toronto World, 1897, 1908

Varsity, (University of Toronto), 1908

Secondary Sources:

Page, James. (1968), "Bryanism and Canada," (Unpublished doctoral dissertation, Queen's University, Kingston, Ontario, Canada)

Rutherford, Paul (1982). *A Victorian Authority.* Toronto: Macmillan.

Strum, Harvey. (1975), "Prophet of Righteousness," *Alberta History*, Autumn 1975, 21-27.

Education Science of Spectroscopy Analysis of Synchrotron Radiation, NASA and NOAA data in post-COVID era

Sunil Dehipawala
City University of New York Queensborough Community USA

Tak Cheung
City University of New York Queensborough Community College USA

Abstract: The education science (or pedagogy based on scientific principles) of the learning of spectroscopy analysis in terms of critical thinking was examined in a community college setting with high school outreach and senor college transfer students enrolling in courses and/or projects. The most important discovery of science in the 20th Century was the atomic structure through spectroscopy analysis with applications to data collected in National Facilities such as Synchrotron Radiation Labs, NASA and NOAA. The capability to include online-delivery-ready in post-COVID era is an important element. The critical thinking model of Leed University on problem solving posed on Youtube (2020) was found to be effective in the pedagogy of the learning of spectroscopy as problem solving when comparing the pre and post assessment data. In comparison, the NASA data was found to be the better example for the understanding stage, while the Synchrotron Radiation Lab data was a better example for the evaluation stage. The five strategies to further improve critical thinking of the "BBC Ideas/The Open University" posed on Youtube (2021) was also validated with positive assessment data. In comparison, the embrace-nuances strategy was found to be best illustrated by the NOAA data. A best practice of education science in which a single student project would spend 25% effort on data from all the three National Facilities, namely, Synchrotron Radiation Labs, NASA, and NOAA, is proposed to foster critical thinking development. The University of Hull detailed description of critical thinking, posed in seven Youtube videos (2020), and the transference of critical thinking education science to (and from) a Physics-mechanics introductory course are also discussed.

Keywords: spectroscopy analysis pedagogy, critical thinking, Synchrotron data, NASA data, NOAA data

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Introduction

The physical principles to enable the design and engineering of a cyber-physical system (NIST 2016), or Internet

of Things (IoT), can be presented as classroom topics via the interaction of matter, energy, and light. Every object has matter. The most important discovery of science in the 20th Century was the atomic structure of matter through spectroscopy analysis. Thus, the education science of spectroscopy analysis is an important issue, especially when Professor Jean-Marie Barbier argued that "Teaching is not a science, it is a culture of educative action (Barbier 2018). The CSEE (Cultural Studies of Science Education) started as a multidisciplinary journal since 2006. For instance, CSSE published an article advocating that critical thinking skill be used in examining scientific assumptions (Yacoubian, et al., 2020). The Culturally Relevant Pedagogy (CRP) has been advocated to relate science education to socio-political issues to reach a state of "critical consciousness" (Sedlacek, et al., 2024).

The COVID lockdown emphasized the importance of the Internet Technology in teaching and learning. Commercial cloud computing examples for scientific applications advocated by NASA (helio-physics data), NOAA (climate change data), NIH (bioinformatics data), LBL/ BNL (synchrotron radiation data for nanotechnology), etc. are gaining acceptance as classroom examples in the post-COVID era. For instance, cloud programming certification programs are offered in the Continuing Education Department at our Queensborough Community College for those wanting to use cloud programming tools. In addition, the pedagogy to enable students to understand Green IoT with sustainable energy in term of advanced materials cannot be underestimated. Given the rapid advances in Synchrotron-based X-ray spectroscopy with AI software and Cloud computing for material discovery (LBL Cloud Computing 2024; Li, et al. 2024), it is appropriate to evaluate the education science of the spectroscopy analysis of Synchrotron radiation data, in comparison to the spectroscopy analysis of NASA and NOAA data. Specifically, the education science (or pedagogy based on scientific principles) of the learning of spectroscopy analysis in terms of critical thinking was examined in a community college setting with high school outreach students and senor college transfer students enrolling in courses and/or projects.

Last but not the least, spectroscopic data analysis is budget friendly. Spectroscopic data analysis projects on the collected data only use computers, which are readily available in the Reopen era with purchases during the COVID Lockdown, and would require even less budget when compared to the low budget drone projects used in high school programs (Slater, 2024).

Method

A Synchrotron radiation student project in our community college consists of data collection, data analysis, and discussion which includes the formulation of a new hypothesis. Although the on-site data collection at National Facilities such as Brookhaven National Lab BNL, Cornell University Storage Ring, etc. are limited by the Synchrotron radiation beam allocation time slots and student college-working schedules, the various Youtube videos from reputable sources and tour of nearby BNL have been serving as reasonable substitutes for gaining a lab experience of data collection.

The Synchrotron radiation data collection experience as the recalling of Youtube episodes would be aided with simplified experiments such as radiation measurements with Geiger counters, spectrum analyzers, manual rotator platform for goniometer-like motion, etc., the typical equipment available in a community college setting. A data collection experience must have a concrete dataset for analysis. The public data from the French Synchrotron Facility would serve as practical examples with known answers. We recommended our students to login using the incognito mode. The steps are (1) https://data.esrf.fr/login, (2) Select: Sign in anonymous (then the webpage https://data.esrf.fr/public would pop up), (3) Search: XANES, and (4) Select: HG139 (as an example with 43 Excel files).

The NASA and NOAA spacecraft-based spectroscopy data analysis for project assignments have been conducted without the data collection part, since a community college facility lacks the sophistication to control spacecraft and/or telescope operations. The Edge computing examples with microcontroller sensors, drones, etc. could be used as substitutes to enable community college students to understand the remote sensing principles in the NASA and NOAA spacecrafts.

A spectroscopy data analysis usually would start with the standard programming steps of the subtraction of the noise and the establishment of a baseline. The data analysis component fully engaged the standard Synchrotron radiation data analysis software, and students were found to be delighted in the learning of the algorithms that drive the analysis software. For instance, “Matlab/Python curve fit” versus “Excel Solver fit” had been found as one of the interesting contrasts. Those students interested in Deep Machine Learning applications could use the XGBoost software library as well.

In addition to these technical computational steps, the critical thinking in terms of what-if, etc. is the crucial element for education science. The critical thinking model of Leed University on problem solving posed on Youtube (2020) was found to be effective in the pedagogy of the learning of spectroscopy as problem solving. The Leed University model can be summarized as (1) Understanding, (2) Analyze, and (3) Evaluate, and the associated rubric examples are shown in Table 1, Table 2, and Table 3 respectively.

Table 1. A rubric for the implementation of “understanding” in the Leed University Critical Thinking Model

	Good	Satisfactory	Needs improvement
What is the problem about	Describe 2 impacts on science advancement and 2 benefits on society	Describe one impact on science advancement and one benefit on society	Could not describe any impact-benefit
Who does it involve or affect	Describe the role of each specialist in a spectroscopy team	Describe the roles of a few specialists, but not all, in a spectroscopy team	Could not discern the role of any specialist
When is this happening	Describe the timing of the	Describe the timing of the	Describe the timing of

	spectroscopy work in terms of several historical development	spectroscopy work in terms of two historical development	the spectroscopy work in terms of only one historical development
Where is this happening	Describe the equipment environment, scientifically with budgeting	Describe the equipment environment scientifically without budgeting	Describe the equipment environment in budget without science

Table 2. A rubric for the implementation of "analysis" in the Leed University Critical Thinking Model

	Good	Satisfactory	Needs improvement
What are the contributing factors to the problem	Itemize all the factor-contribution to the spectroscopy baseline and peaks	Itemize 80% of the factor-contribution to the spectroscopy baseline and peaks	Itemize less than 80% of the factor-contribution to the spectroscopy baseline and peaks
How may one factor impact another	Determine each factor's independence and dependence	Determine 80% of the factors' independence and dependence	Determine less than 80% of the factors' independence and dependence
What if one factor is removed/altered and relationships between each part	Describe the results of "change of a factor with respect to another factor"	Describe partial results	Fail to describe any result
What if one factor is removed/altered and relationship to the whole	Describe the results of the change of each factor to the whole	Describe partial results	Fail to describe any result.

Table 3. A rubric for the implementation of "evaluate" in the Leed University Critical Thinking Model

	Good	Satisfactory	Needs improvement
What do I think about this	Assign: judgments, relevance, implications, significance, and value in the student's own perspective	Assign: implications, significance, and value in the student's own perspective	Assign: significance, and value in the student's own perspective
How is this result	Describe the result as	Describe the result as	Describe the result as

relevant to career plan	related to the student's career plan	related to the student's plan for next year	related to the student's plan for next semester
How does this compare to the other research I (the student) have read	Compare 3 similarities and contrast 3 differences to the other research I (the student) have read	Compare 2 similarities and contrast 2 differences to the other research I (the student) have read	Compare 1 similarity and contrast 1 difference to the other research I (the student) have read
Prospection: What could be the next experiment, based on the results	Describe a possible extension of the current project scientifically with a budget	Describe a possible extension of the current project scientifically without a budget	Describe a possible extension of the current project in budget without the science

There is another critical thinking model. The five strategies to further improve critical thinking of the "BBC Ideas/The Open University" posed on Youtube was also validated with positive assessment data. The Five simple strategies to sharpen critical thinking are (1) confirmation bias, (2) nuances to embrace complexity, (3) humility, (4) check sources, and (5) avoid fallacies. (BBC Ideas/The Open University Youtube 2021).

One of the most controversial issues could be the argumentative reasoning steps put forward by two opposing groups. For instance, the global warming potential GWP analysis on cow-methane emission illustrated by UC Davis challenged an earlier 2019 Lancet report on plant protein consumption with sustainability for a population of 10 billion people worldwide (Rocha, 2022, Willet et al. 2019). The spectroscopy advances for gas analysis such as the dual-comb spectroscopy are essential to support the prediction of GWP by NIST (NIST 2022; NIST 2024). The NOAA Earth Science Research Lab ESRL data contribution for GWP analysis cannot be underestimated as well.

In terms of wavelength analysis, the NASA Solar Dynamics Observatory has an AIA spectroscopy for capturing multiple wavelength data. In terms of data complexity with interconnected parts, the NOAA and NASA spacecraft data would rank higher when compared to the various National Facility Synchrotron radiation data. For instance, the Atmospheric Remote Sensing of NOAA that supported an assessment of the GWP of hydrogen is a good example of data complexity (NOAA Chemical Science Lab 2022, Sand, et al. 2023). Furthermore, the NOAA data complexity can be shown in the study of climate change data (Cai, et al., 2023), not to mention an early analysis of climate change related radiation data using entropy calculations (Delgado-Bonal, at al., 2020) and the nuanced relationships between temperature deviations and social conflicts (Mukherjee, et al., 2023). A rubric example is shown in Table 4

Table 4. A rubric for the implementation of "nuances to embrace complexity" in BBC Ideas/The Open University Critical Thinking Model

	Good	Satisfactory	Needs improvement
Interacting components in complexity	Correctly identify the number of interacting components in the differential equations used in the model	Misidentify one component	Misidentify two or more components
Origin of the nuances in the components	Correctly describe the origins of the nuances in the components	Misconception on the origin of one of the nuances	Misconceptions on the origins of two or more nuances
Parametrize the outcome sensitivity	Show the complete outcome sensitivity with the correct computation	Show some partial outcome sensitivity	Fail to show any outcome sensitivity
Predict emergent behavior	Able to predict emergent behavior with less than 50% uncertainty level	Able to predict emergent behavior at less than 100% uncertainty level	Predict emergent behavior at more than 100% uncertainty level

Results

Comparing the pre and post assessment data on Understanding, Analysis, and Evaluate using the above rubrics, the post-assessment data improved to "Good" N = 25 project students)

The assessments on the high school students taking a research project class (N = 14) in our Outreach Mission yielded the following scores (MRI spectroscopy data curve-fit via Excel Solver)
Understand (3-Good, 11-Satisfactory)
Analysis (3-Good, 9-Satisfactory, 2-Needs improvement)
Evaluate (3-Good, 8-Satisfactory, 3-Needs improvement)

Judging enthusiasm from students' responses, the following results emerged:
In comparison, the NASA data was found to be the best to deliver the understanding strategy in University of Leeds critical thinking model (enthusiasm induced from the knowledge of spectroscopic data of exoplanets related to alien life forms N = 8 scored Good out of 25)
In comparison, the Synchrotron Lab data was the best to deliver the evaluation strategy in U of Leeds critical

thinking model (enthusiasm induced from knowledge of health-related metabolism related to metals in tissues N = 12 scored Good out of 25)

In comparison, the NOAA data was found to be the best to deliver the embrace-nuances-complexity strategy in BBC model of critical thinking (enthusiasm induced from knowledge of NOAA GOES space weather and climate change satellite spectroscopic data N = 5 scored Good out of 25)

Discussion

The Synchrotron radiation data analysis component fully engages the standard Synchrotron software and students were found to be delighted in the learning of the algorithms that drive the analysis software. Although the project discussion which includes the formulation of a new hypothesis was found to be limited by the knowledge of a community college student, the pedagogy encourages the mindful reading of the latest Synchrotron based research news posted on reputable websites with faculty guidance to build a relationship to a chemical engineering related education.

A best practice of education science in which a single student project would spend 25% effort on data from all the three National Facilities, namely, Synchrotron Labs, NASA, and NOAA, is recommended to foster critical thinking development.

The University of Hull detailed description of critical thinking, posed in seven Youtube videos (Hull, 2020), and the transference of critical thinking education science to (and from) a Physics-mechanics introductory course are also important.

Transference to course content and the transference of critical thinking education science to (and from) a Physics-mechanics introductory course are also studied. A critical thinking application example is baseline subtraction of a graph and the concept of average concerning the data in a Physics One torque experiment. The equipment is a meter stick and weights to generate torques to mimic the playground see-saw mechanism (not to be confused with the seesaw mechanism in neutrino particle physics). Students were asked to select a fulcrum at x-cm off the center of mass of the meter stick, and to add a balance-mass at certain distance from the fulcrum to achieve an equilibrium. Each x-value would ask for a distinct product of (balance-mass * specific distance) to achieve equilibrium. The mass of the meter stick could be calculated as (balance-mass* specific distance / x). For a 4-trial data collection, the x-cm values could be 10 cm, 8 cm, 6 cm, and 4 cm. The meter stick mass would the average of the 4 trials, a Fifth-Grade average concept. The standard or actual value of the mass of the meter stick could be taken from the average reading of a triple beam balance or electronic balance.

A scatter plot of (balance-mass * specific distance) versus x-cm should yield a linear graph in which the slope would represent the meter stick mass. The graph method answer could differ from the arithmetic average, due to the presence of systematic error in the intercept. On the one hand, most students had difficulty in the

understanding of the difference between the slope-mass value and the average-mass value. On the other hand, (1) when a systematic 10 points was added to the grades, all the students knew that the class average would increase by 10 points, and (2) when a systematic 10 units was added to the y-axis data, only about 50% of the studied students knew that the slope and R-sq would remain the same values while the intercept value would increase. The what-if in the adding of points to the grades seemed to be easier to understand when compared to the what-if in the adding of a systematic value to the y-axis data, at least for the studied students in Physic One torque experiment. In other words, the critical thinking does not suddenly appear in spectroscopy analysis. The what-if in the baseline of spectroscopy analysis can be traced back to the what-if in the baseline of a graph in Physics One torque experiment and other experiments.

Table 4. Data

Distance: fulcrum to center of meter stick (cm)	Added mass to balance meter stick (grams)	Distance: fulcrum to add-mass (cm)	Torque of added-mass (gram-cm)	Calculated mass of meter stick (grams)
10	78	20	1,560	156
8	58	20	1,160	145
6	47	20	940	156.67
4	28	20	560	140
				Avg = 149.4

Here is the corresponding graph

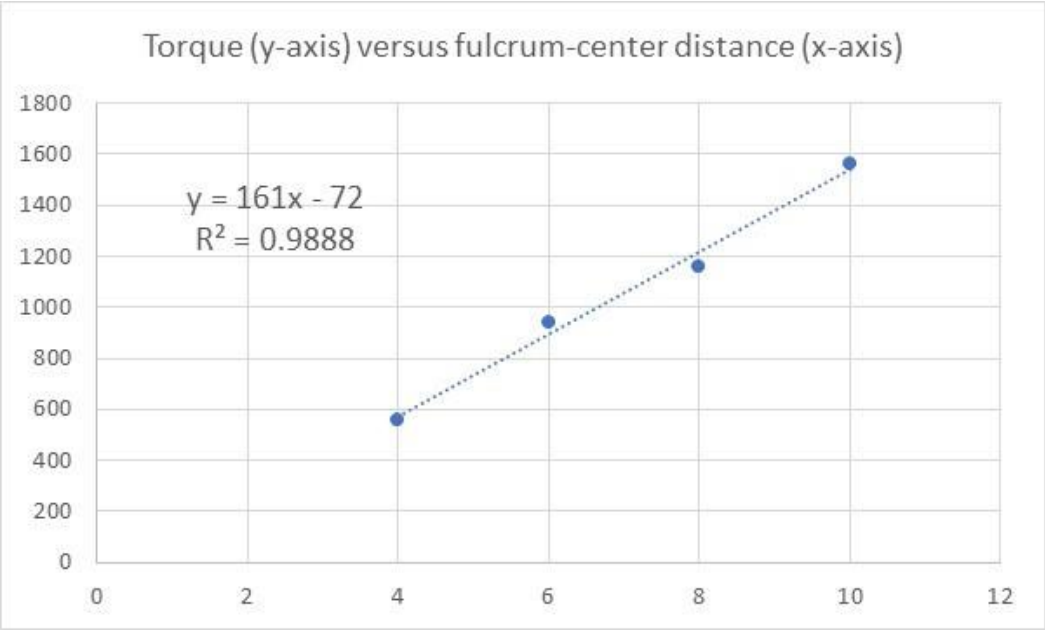

Figure 1. The torque values versus distance from the fulcrum in a meter-stick equilibrium experiment

Conclusion

The Education Science of spectroscopy data analysis is a sustainable method to add critical thinking value in terms of low budget and academic standards in the post-COVID era. The Education Science of ranking which dataset (Synchrotron Labs, NASA, NOAA) be the "best delivery of which critical thinking strategy" were discussed. Furthermore, the pedagogy of using the Synchrotron radiation student projects in community college has been found to broaden the students' horizons with induced aspiration and build connections to chemical engineering related education in the senior college setting.

Recommendations

A best practice of education science in which a single student project would spend 25% effort on different types of data from all the three National Facilities, namely, Synchrotron Radiation Labs, NASA, and NOAA, is recommended to foster critical thinking development, with a low budget requirement in the post COVID era.

The difference between slope-mass value and average-mass value in the developing of critical thinking should be included in every introductory physics course in the post-COVID era, since the see-saw principle is elementary in all cultures to the best of our knowledge.

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References

Barbier, J.M. 2018. Teaching is not a science; it is a culture of educative action (2018 February 26). Retrieved from https://theconversation.com/teaching-is-not-a-science-it-is-a-culture-of-educative-action-92313

BBC Ideas. (2021). Five simple strategies to sharpen your critical thinking. Retrieved from https://www.youtube.com/watch?app=desktop&v=NHjgKe7JMNE

Cai, W. (2023), Jia, F., Li, S. et al. Antarctic shelf ocean warming and sea ice melt affected by projected El Niño changes. Nat. Clim. Chang. 13, 235–239 (2023). Retrieved from https://www.nature.com/articles/s41558-023-01610-x

Delgado-Bonal, A. (2020), Marshak, A., Yang, Y. et al. Analyzing changes in the complexity of climate in the last four decades using MERRA-2 radiation data. Sci Rep 10, 922 (2020). Retrieved from https://www.nature.com/articles/s41598-020-57917-8

Hull Uni Library (2020). Defining critical thinking [Critical thinking 1]. Retrieved from https://www.youtube.com/watch?v=NPXd519hX94

LBL Cloud Computing 2024, https://it.lbl.gov/cloud-computing-for-science-at-lbl/

Leed University Library (2020). A Critical Thinking Model. Retrieved from https://www.youtube.com/watch?v=icv-BBtNpEU

Li, Q.M, (2024), Xing, R., et al., Synchrotron radiation data-driven artificial intelligence approaches in materials discovery. Artificial Intelligence Chemistry. Volume 2, Issue 1, June 2024, 100045. Retrieved from https://www.sciencedirect.com/science/article/pii/S2949747724000034

Mukherjee, U.K., (2023), Bagozzi, B.E., Chatterjee, E. A Bayesian framework for studying climate anomalies and social conflicts. Environmetrics.2023;34:e2778. Retrieved from https://onlinelibrary.wiley.com/doi/10.1002/env.2778

NIST (2016) National Institute of Standards and Technology US Department of Commerce. Cyber Physical Systems and Internet of Things Program. (Updated 2022) Retrieved from https://www.nist.gov/programs-projects/cyber-physical-systems-and-internet-things-program

NIST (2022) National Institute of Standards and Technology US Department of Commerce. Greenhouse Gas and Atmospheric Trace Gas Measurements. Retrieved from https://www.nist.gov/programs-projects/greenhouse-gas-and-atmospheric-trace-gas-measurements

NIST (2024), National Institute of Standards and Technology US Department of Commerce. Prediction of Global Warming Potential. Retrieved from https://www.nist.gov/programs-projects/prediction-global-warming-potential

NOAA Chemical Science Lab (2022). Atmospheric Remote Sensing. Retrieved from https://csl.noaa.gov/groups/csl3/

Rocha. A. (2022). GWP* — a better way of measuring methane and how it impacts global temperatures. Clarity and Leadership for Environmental Awareness and Research at UC Davis. Retrieved from https://clear.ucdavis.edu/explainers/gwp-star-better-way-measuring-methane-and-how-it-impacts-global-temperatures

Sand, M. (2023), Skeie, R.B., Sandstad, M. et al. A multi-model assessment of the Global Warming Potential of hydrogen. Commun Earth Environ 4, 203 (2023). Retrieved from https://www.nature.com/articles/s43247-023-00857-8

Sedlacek, Q.C. (2024), Lomelí, K. Towards authentic purposes for student science writing using culturally relevant pedagogy. Cult Stud of Sci Educ 19, 141–162 (2024). Retrieved from https://link.springer.com/article/10.1007/s11422-023-10203-1

Slater, T. (2024) Identifying Implementation Strategies for Integrating Drones into STEM and Career Technology Education CTE Programs. Educ. Sci. 2024, 14(1), 105;. Retrieved from https://www.mdpi.com/2227-7102/14/1/105

Willet, W. (2019), Rockstrom, J., et al. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. Lancet. 2019 Feb 2;393(10170):447-492. Retrieved from https://pubmed.ncbi.nlm.nih.gov/30660336/

Yacoubian, H.A. (2020) Is science a universal or a culture-specific endeavor? The benefits of having secondary students critically explore this question. Cult Stud of Sci Educ 15, 1097–1119 (2020). Retrieved from https://link.springer.com/article/10.1007/s11422-020-09975-7

Education Science Education Science of Community College Student Projects from Non-Newtonian Flow to Reaction-Diffusion Process and Gateway for Mechanical and Chemical Engineering Programs

Sunil Dehipawala
City University of New York Queensborough Community USA,

Tak Cheung
City University of New York Queensborough Community College USA,

Abstract: The Physics One Mechanics in a community college syllabus usually allocates more time to cover the topics in kinematics, dynamics, energy, momentum, and rotation; with relatively less time for the topics of fluid mechanics and heat diffusion in the creation of a knowledge gap for those students deciding on mechanical and chemical engineering education. The learning of fluid mechanics and diffusion process in student projects in a community college eliminates such knowledge gap that could discourage students' aspirations for mechanical and chemical engineering education programs in the senior colleges. Pedagogy borrowed from psychology counseling practice in terms of the creation of new memories and positive experiences with uncertainty reduction through self-affirmation has been applied. The new memories related to the differential equation solvers in Matlab have been found to be useful for skill development in student projects. The topics from the non-Newtonian flow with the Navier-Stokes equations to the Brusselator reaction-diffusion process with Turing pattern can be used to develop the differential equation solving skill, depending on each student's individual aspiration. Filling the knowledge gap and encouraging aspiration based on the engineering equation solving skills, knowledge of job market, and senior college academic perspective of industrial applications revealed in their publications, were found to foster self-affirmation in the participants. Assessment data on our community college pre-engineering students showed that the programing skill in solving coupled differential equations in terms of stability and deterministic chaos investigations are within their academic capability after taking Physics One Mechanics. The "differential equation solving skill" pedagogy provides a perspective of applied physics in the establishment of a practical connection with positive experience to the third and fourth years in the mechanical and chemical engineering related programs of the senior colleges. The transference to regular physics course pedagogy is also discussed,

Keywords: non-Newtonian flow pedagogy, reaction-diffusion process pedagogy, psychology counseling practice, engineering programs gateway

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Introduction

The Physics One Mechanics in a community college syllabus usually allocates more time to cover the topics in kinematics, dynamics, energy, momentum, and rotation so as to train the students with a basic knowledge on Exact Science with precise math tools. Such Exact Science learning experience comes with a trade-off, namely, the relatively less time and effort for the learning of fluid mechanics and heat diffusion, resulting in the creation of a knowledge gap for those students deciding on mechanical and chemical engineering education in a community college with an open admission policy.

The learning of fluid mechanics and diffusion process in student projects in a community college eliminates such knowledge gap that could discourage students' aspirations for mechanical and chemical engineering education programs in the senior colleges. A technical transition from a physics course such as Physics One Mechanics to a student project had been found to be successful when uncertainty learning was used as an introduction to student projects.

A pedagogy, borrowing from the psychology counseling practice, in terms of the creation of new memories and positive experiences with uncertainty reduction or through self-affirmation has been applied to enrich the learning in the student projects (Rachel Goldman, 2023). As a bonus, a throughout understanding of the technical uncertainty reduction in physics could provide support for students to use the science of uncertainty to enable positive experience (American Psychology Association, 2021). Furthermore, the new memories related to the differential equation solvers in Matlab have been found to be useful for skill development in student projects. Other almost zero-budget software packages such as Python, Octave, etc. can be used as well.

Method

Uncertainty

The concept of uncertainty is deep-rooted in human cognition. Daily life examples include (1) the hand holding of an object at a stationary position and the associated uncertainty due to the tiny vibrations of the hand, (2) hurricane path simulation uncertainty and the waiting duration for the hurricane to arrival, (3) the home thermostat example which uses the one-sided uncertainty signal as drift error signal for monitoring applications in engineering, etc. All of these simple daily examples have detailed STEM models with the reduction, control, and management of uncertainty. The muscle vibration has been modeled with the Langevin equation (Tamura et al, 2017). The hurricane path has been described with a cone of uncertainty (NOAA United States, 2022). The open access website Ventusky (also Apple/Google apps) offered simulation of hurricane path (or weather pattern path) using different models after a specific date and a location were selected (Ventusky, 2023). The Ventusky computer output contained the visualization of dynamical wind flow patterns, which were found to be suitable teaching

materials for high school students and liberal arts college students, in our opinion. Generally speaking, uncertainty in a simulation may not be all negative. The Harvard Business Review treated uncertainty as an opportunity (Saffo, 2007) and deep uncertainty would induce thinking exponentially (Webb 2019). Uncertainty contributes to risk and STEM has developed the understanding of the Bell curve width-value to quantify uncertainty and confidence intervals, based on the theory of probability density function. In addition to the uncertainty in simulation, uncertainty comes with any measurements in terms of comparison.

The concept of comparison in the learning process could carry subtlety issues. The difference of "compare-to" versus "compare-with" was illustrated by the poet Jacques Barzun (Barzun, 2001), and was explained in more detail by GrammarBook dot com (GrammarBook, 2023). Basically, "compare-to" refers to two objects/performances in the same category. On the one hand, comparing student-A to student-B using a Bell curve is called grading in education law which requires a set of clear numeric criteria. On the other hand, compare student-A in an open admission college with student-B in a highly selective college using standard instruments such as the Force Concept Inventory (FCI) test could be called assessment with possibly non-Gaussian (non-Normal) distributions. The open admissions college students would generally need some remediation to catch up due to less preparation in the high school years. The Bell curve carrying uncertainty information (the standard deviation) via the Central Limit Theorem explanation had been posted on Youtube by many authors. For instance, our STEM and liberal arts students found that the Youtube video with Excel illustration, starting with an introduction of population, to be useful (Jalayer Academy, 2012). Whether it is a simulation requiring the mapping of climate data measured with uncertainty, or a tradition measurement of the length of a selected table using a meter stick with uncertainty, the fundamental issue of "familiarity of uncertainty" remains as an important element in an education of physics as an Exact Science.

The neuroscience of uncertainty learning

A neuroscience inquiry to understand learning requires a budget. A recent study found that brain activation with electrodes (transcranial random noise stimulation) supported arithmetic skill in the adult participants who were poor in math learning (Surrey, 2023). Simple multiplicative tasks such as 16*3, 17*8, etc. were used as the baseline ability task with EEG recordings (van Bueren, et al, 2023). It would be productive to study whether such electrode activation would support physics calculation skill. Although our Community College cannot afford such pedagogy inquiry, the electrode intervention inspired the following project to understand the differences of uncertainty in verbal recall versus multiplication table content recall.

A low budget alternative was used by us to illustrate uncertainty to students. We administrated a multiplicative task as a 5-min pre-lab exercise to our liberal arts students and physics students taking remedial or developmental math. The preliminary results, via Blackboard online polling, showed that about half of the students got the wrong answers (N = 19). The major culprit was found to be the uncertainties in recalling the multiplication table of 1 to 9. A comparison to the learning of phonics could offer some insights in pedagogy. A phonics table of vowel sounds was given to the students for comparison as a prospection. The table had 10 columns made up from short

and long vowels. The table had 10 rows corresponding to the 10 consonants "bcdfghjklm". All the students in the polling knew the phonics table with applications without any uncertainties. For instance, every student showed no uncertainty in the short-a and long-a sounds in "A bar manager would impose a bare minimum purchase from a customer" (or "putting a tape on the tap would not stop the flow"). The learning of a social etiquette truth, a bare minimum purchase in a bar, should not be a matter of differences in the VARK learning styles (Visual, Auditory, Read/Write, Kinesthetics/tactile), but a matter of social content in the experience of going to a bar in social gathering. Simply put, the lack of arithmetic experience in daily life would let the mind accumulate uncertainty in the recalling of the multiplication table. Whether the accumulation of uncertainty in the content of the multiplication table is related to the level of dopamine would be an interesting topic for future studies, although studies on fruit fly transient forgetting and human reinforcement learning using fractal image task with reward had confirmed the importance of dopamine (Sabandal, et al, 2021; Chakroun, et al, 2023).

The 2023 Surrey report showed the importance of the dorsolateral prefrontal cortex (DLPFC) for mathematical learning task, an important neuroscience information for all of us interested in the pedagogy improvement. An earlier report also linked several brain networks, including the DLPFC and orbitofrontal cortex (OFC), with the model instruction pedagogy in first-year calculus physics (Brewe, et al, 2018). As for a pedagogy with multiple-choice question content, a 2023 report found that the orbitofrontal cortex OFC was associated with choice response in the studied population when a choice would carry uncertainty processing and threshold response (Balewski, et al, 2023). These recent brain scan data have showed that the numeric computation tasks from "16*3, etc." to "uncertainty computation tasks in physics" are using the frontal cortex. Incidentally, the experiment using cortical neurons grown in a lab dish showed that the neuronal network synchrony is controlled by the spontaneous noise fluctuation coupling with an input for reaching the threshold in high-information processing (Yamamoto, et al, 2023). The meta-analysis of the above neuroscience discoveries showed that the frontal cortex neurons would be activated/exercised by the learning of uncertainty.

The neuroscience of the learning of uncertainty was discussed with students. The neuroscience information offers an explanation to engineering students that the familiarity with uncertainty in technical physics could help in gaining positive experience with uncertainty reduction, as studied in the science of uncertainty. The knowledge of turbulent uncertainty and diffusion uncertainty projects are natural extensions of their knowledgebase after studying Physics One.

Uncertainty learning in student project

The student projects in terms of uncertainty learning could be started with the computation steps of Matab/Python. For instance, the diffusion coefficient value change would correspond to the change of amount of uncertainty in the studied system. The continuation of uncertainty learning in second-year physics using Matlab/Python skills is a unique approach, to the best of our knowledge.

The assessment rubric examples for the creation of new memories are displayed in Tables 1 and 2.

Table 1. Assessment rubric of creation of new memories in fluid understanding fluid understanding (first layer of Blooms' taxonomy: remember, https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/)

	Good	Satisfactory	Needs improvement
Reynold number	Understand the derivation in calculus.	Understand the derivation in algebra approximation	Fail to follow the derivation in algebra
Toy model	Solving the reduced-dimension scenarios in Matlab and Python	Solving the reduced-dimension scenarios in Matlab or Python	Solving the reduced-dimension scenarios in Excel-VBA only
Navier Stokes	Solving magneto-hydrodynamics scenarios in Matlab or Python	Solving hydrodynamics scenarios in Matlab or Python	Solving hydrodynamics scenarios in Excel-VBA only

Table 2. Assessment rubric of creation of new memories in reaction-process understanding

	Good	Satisfactory	Needs improvement
Reaction process	Knowing the science facts and recent information	Knowing the science facts	Knowing science information only
Reaction-diffusion process	Knowing stochastic process solution in Matlab and Python	Knowing stochastic process solution in Matlab or Python	Knowing stochastic process solution in Excel-VBA only
Turing pattern	Knowing complexity in terms of entropy and image fractal dimension computation	Knowing complexity in terms of image fractal dimension computation	Knowing complexity in terms of the meaning of each variable only

Support Positive Experience and Self-affirmation

It is necessary to support positive experience. The following positive experience strategies in Education Science were used:

(1) Positive experience with uncertainty management.
(2) Elementary programming replaced by AI, less programming jobs posted on indeed dot com, Matlab/Python experience are encouraging.
(3) Positive experience with critical thinking: finding paradoxical situations, differential entropy versus, approximate entropy, etc. (See Notes Section for examples.)
(4) Positive experience with critical thinking: Process complexity with an understanding of interconnected parts, etc. (See Notes Section for examples.)

Self-affirmation is an essential part of positive experience. Filling the knowledge gap and encouraging aspiration based on the engineering equation solving skills, knowledge of job market, and senior college academic perspective of industrial applications revealed in their publications, were found to foster self-affirmation in the participants.

Jobs are important to students. The 53 Self-Assessment Phrases for Professional Development is practical (Indeed Editorial Team, 2023). The phrases are 8 for previous goals, 16 for current work performance, 15 for collegiate group performance, and 14 for future goals.

Last but not least, the self-assessment strategy could be a double-edge sword. We must promote positive experience from self-affirmation using self-assessment and avoid metacognitive illusion (Cervin Ellqvist, et al., 2020). They explained that at-risk students could lack the ability to conduct self-assess learning (self-regulated learning) and then make incorrect judgement about their progress. An example of self-assessment rubric is displayed in Table 3, together with an example of assessment rubric for knowledge in Table 4.

Table 3. Rubric of self-affirmation assessment

	Good	Satisfactory	Needs improvement
Applied physics & engineering equation solving skills	Solving inverse problem of differential equation and stability calculation	Solving inverse problem of differential equation without stability calculation	Partially solving inverse problem of differential equation only
Knowledge of job market	Knowing various software packages used in different companies	Knowing 2 software packages used in 2 different companies	Knowing one software package used by a single company
Senior college academic perspective of industrial applications	Knowing engineering program gateways with 3 or more	Knowing engineering program gateways with 2 companies in 2	Knowing engineering program gateway in only a single company

	companies in 2 or more industries	different industries	

Table 4. The assessment rubric for fluid-physics knowledge (also for reaction-diffusion knowledge)

Deliverables	Good	Satisfactory	Needs improvement
Content of the Navier-Stokes equations	Know the physics origins of all the math variables	Know the physics origins of 80% of the math variables	Know the physics origins of less than 80% of the math variables.
Matlab process	Able to run the given Matlab examples with small changes in all the parameters	Able to run the given Matlab examples with small changes in 80% of parameters	Able to run the given Matlab examples with small changes in less than 80% of parameters.
Big world perspective with additional examples using Matlab/Python	Able to run 3 additional examples using Matlab/Python	Able to run 2 additional examples using Matlab/Python	Able to run one additional example using Matlab/Python
Reflection	Able to explain the reduction of uncertainty in all the parameters	Able to explain the reduction of uncertainty in 80% of the parameters	Able to explain the reduction of uncertainty in less than 80% of the parameters.

Results

The number of students involved were less than 10 so far, so assessment statistical analysis discussion would be unreliable at the moment.

The new memories related to the differential equation solvers in Matlab have been found to be useful for skill development in student projects. The topics from the non-Newtonian flow with the Navier-Stokes equations to the Brusselator reaction-diffusion process with Turing pattern can be used to develop the differential equation solving skill, depending on each student's individual aspiration.

Assessment data on our community college pre-engineering students showed that the programing skill in solving

coupled differential equations in terms of stability and deterministic chaos investigations are within their academic capability after taking Physics One Mechanics.

There was a case study consisting of two advanced high school students in Physics One Mechanics course. Both advanced high school students were interested in chemical engineering related computational jobs. The instructor used a published Matlab program to show the learning of uncertainty. A Matlab program (less than 30 coding lines) for a stochastic Brusselator simulation with the corresponding image was used (Horchler, 2022). The two interested students edited the diffusion coefficient value in the partial differential equation to control the amount of uncertainty. Then extra image information entropy calculation codes were added to use entropy as a summary statistical measure for the output image. The image entropy was shown to reach a local minimum as a function of the edited diffusion coefficient values, that is, the amount of diffusion uncertainty. Both students scored at the Good competent level in the case study. The good assessment result in the case study could be attributed to the following two reasons. Firstly, the running of a simulation is generally straight forward when compared to the inverse problem of data fitting to a system of differential equations using dataset from NASA, NIH-USA, etc. Secondly, the high school students taking college physics generally would have good attitudes, consistent with the Stanford report results (Burkholder, et al. 2020).

The transference of self-affirmation assessment to regular physics courses showed some limitations for the at-risk students. Self-affirmation assessment data showed that at-risk students gained positive experience but did not score well in solving regular physics problems (not non-Newton flow projects, not diffusion reaction projects). There were two cohorts: N = 20 in a calculus physics course, and N = 44 in an algebraic physics course. Basically, the positive experience inconsistency with examination scores contributes to metacognition illusion when self-regulated learning fails, consistent with the results in a prior publication based on a cohort of engineering students (Cervin Ellqvist, et al., 2020).

Discussion

The acceptance of the creation of positive experiences in psychology has two aspects, namely, (1) the education science, and (2) the culture pedagogy proposed by Professor Jean-Marie Barbier that “Teaching is not a science, it is a culture of educative action (Barbier 2018).

The first level of Education Science for the development of computational skill to create neuro connections as regular excitations without the dopamine spikes could include culture pedagogy such as such as brown bag luncheon, learning from STEM leaders in online webinar, exchange ideas in poster sessions, etc. The Education Science second level of critical thinking and the third level of prospection (on the extension of the current project in terms of science and budget and resources) could incorporate socio-political issues as well.

The “differential equation solving skill” pedagogy provides a culture of using applied physics in the establishment

of a practical connection with positive experience to the third and fourth years in the mechanical and chemical engineering related programs of the senior colleges. The culture of using Youtube videos as information sources on differential equation solutions are accepted by students in the post-Lockdown era. The culture of job awareness is in every student's mind given the current economic inflation to the best of our knowledge. For instance, the fact that STEM graduates are not working in STEM fields is worrisome for most of our students (Skrentny, 2024). The differential equation solution application projects offer unique experience and add value to education in job related issues.

The transference to regular physics course pedagogy gave the following results. The Youtube physics videos by other instructors using good recording equipment could be used in a community college setting and supplemented with faculty spending more time on scoring the precision tests/assessments. A precision test aims to probe precisely the learning status of an individual student. Each student receives a unique set of numeric inputs for a given problem (hence more time needed for scoring).

Mastery of arithmetic operations generates positive experience for students passing algebra, but untrue for at-risk students in algebra physics course in our assessment data. For students passed Calculus One already, the pre-calculus level derivation skills should be at the mastery level, but untrue for at-risk students in a Calculus Physics One course when a test involves deriving equations with different numeric information for each student. The Think-pair-share strategy did not generate positive experience in the at-risk student group. The numeric inputs to the derivation steps could be "Let the amplitude be (50+5X) meters with X = last 2-digit of University ID # (if 00 use the first 2-digit)" in the solving of an oscillation problem in Calculus Physics One course.

Conclusion

We found that the extension of uncertainty learning with Matlab/Python differential equation packages beyond first-year calculus physics can be conducted as student projects, which then would serve as gateway for mechanical and chemical engineering programs in a community college setting. It is beneficial to discuss the neuroscience of the learning of uncertainty. The neuroscience information offers an explanation to engineering students that the familiarity with uncertainty in technical physics could help in gaining positive experience with uncertainty reduction, as studied in the science of uncertainty. The knowledge of turbulent uncertainty and diffusion uncertainty projects are natural extensions of their knowledgebase after studying Physics One.

We also found that Culture is important, with self-assessment, positive experience from self-affirmation to support new memories, but it is necessary to avoid metacognitive illusion by rigorous self-assessment or self-regulated learning in student projects. Future studies could include an investigation on the relationships of self-affirmation and metacognitive illusion in the Think-pair-share pedagogy, etc. for the at-risk student group in regular physics courses to maintain diversity, equity and inclusiveness.

Recommendations

(1) We recommend that community college students interested in mechanical engineering and chemical engineering should be exposed to differential equation solution applications to non-Newtonian flows and reaction-diffusion processes.

(2) Positive experience, self-affirmation or self-regulated learning, and metacognition illusion are key concepts in Education Science in terms of quantifiable data, while Culture could affect "to remember" in the pre-dawn era of neuroscience trying to explain psychology. Therefore, we recommend the use of self-affirmation assessment for project students (not at-risk students in regular physics course at the moment).

(3) We recommend 11-week quantitative physics, followed by 3-week conceptual physics with activities such as post-FCI assessment (15-week semester), fully consistent with the findings of Education Science in which both “to remember” and positive experience foster the learning process. Furthermore, a recent neuroscience discovery that memory is supported by the dynamic G-Quadruplex DNA 3-D structure, in additional to the usual DNA functions in coding and epigenetics (Marshall, P., et al. 2024), would support the quantitative skill development implementation in the first 11-week before the critical thinking development in the last 3-week requiring both verbal and math skills.

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Notes

Information entropy examples for critical thinking skill development

A paradoxical result of using differential entropy versus approximate entropy for a measure of complexity to support critical thinking skill development was found to generate positive experience. The project skill could be shown to students with established open access codes from verified sources. Firstly, students need data. For instance, the sound files available in the report of Khait, Lewin-Epstein, O., et al. 2023 March were used (Sounds emitted by plants under stress are airborne and informative. Cell. 2023 Mar 30;186(7):1328-1336.e10. https://pubmed.ncbi.nlm.nih.gov/37001499/)

Secondly, students need to do calculations. A simulation using an ultrasound signal wav file plus a noise wav file was used. The popular 44,100 Hz in the noise simulation was used, regardless of the frequency in the signal. The resulting data file contained a power spectrum differential entropy value and a time series approximate entropy value. The Python SciPy truncnorm codes, with the average of 10 calculations, was used to represent a single

data point shown in Figure Notes-1. Different noise amplitude (for instance, divided by 2) would not affect the curve. The time series approximate entropy values reached a maximum around the zero differential entropy value, in contrary to the monotonic increase of the differential entropy values. Furthermore, the negative differential entropy could be called Type One, while positive differential entropy Type Two.

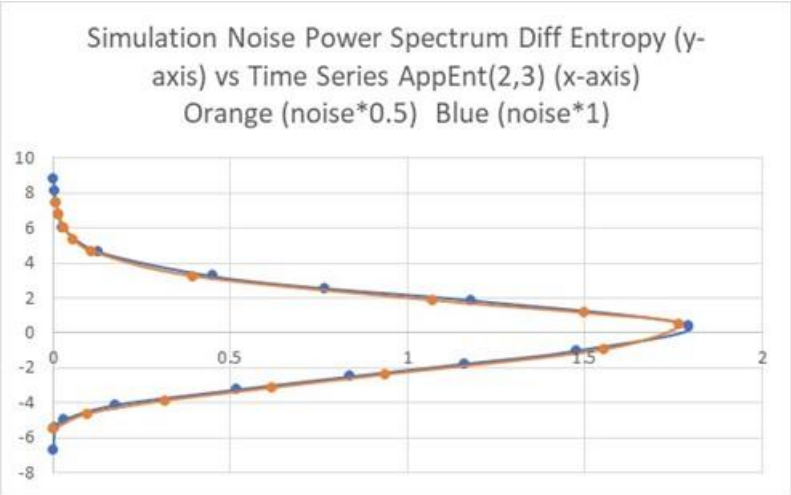

Figure Notes-1: Differential entropy (y-axis) versus approximate entropy (x-axis). Blue represented noise amplitude *1 and Orange represented noise amplitude divide by two. The colored lines were displayed as easy visual guides, not the results of further data fitting. (The graph was shown in the ASEE Conference Northeast Section at Fairfield University Connecticut on April 20 2024 and is included here for easy reference.)

Other codes available online were used. They are listed here for the readers interested in entropy study.
https://stackoverflow.com/questions/24382832/audio-spectrum-extraction-from-audio-file-by-python
https://stackoverflow.com/questions/66132799/generating-audio-noise
https://stackoverflow.com/questions/14058340/adding-noise-to-a-signal-in-python
https://stackoverflow.com/questions/2890703/how-to-join-two-wav-files-using-python
https://docs.scipy.org/doc/scipy/reference/generated/scipy.stats.differential_entropy.html
https://en.wikipedia.org/wiki/Approximate_entropy

Other than the above example in the finding of a paradox, there are examples on using the trend of information entropy to support critical thinking skill development. The Libretext Math Scientific Computing, Simulations, and Modeling contains the topic of Reaction-diffusion Systems with convenient embedded python codes and Turing image patterns.
https://math.libretexts.org/Bookshelves/Scientific_Computing_Simulations_and_Modeling/Book%3A_Introduction_to_the_Modeling_and_Analysis_of_Complex_Systems_(Sayama)/13%3A_Continuous_Field_Models_I__Modeling/13.06%3A_Reaction-Diffusion_Systems

Using the NIH (USA) free software ImageJ, the image entropy calculation of the Turing image patterns (figure 13.6.4 of the book) showed a gradual variation with a minimum for the displayed Turing patterns (in the book). The following Matlab codes were found to be helpful in student projects carrying programming skill learning outcome. They are listed here for the readers interested in Turing pattern parameterization.

Andrew Horchler / Stochastic Brusselator Simulation 2022.
https://www.mathworks.com/matlabcentral/communitycontests/contests/5/entries/10325

Pink_panther/Wavy Pattern 2022
https://www.mathworks.com/matlabcentral/communitycontests/contests/5/entries/10335

Andrew Horchler (2024). SDETools (https://github.com/horchler/SDETools), GitHub. Retrieved April 24, 2024.
https://mathworks.com/matlabcentral/fileexchange/56406

Non-Newtonian flows examples for critical thinking development

The study of non-Newtonian flows supports the critical thinking skill development of students. An understanding of complexity in terms of the interconnected parts would be assessable using rubrics. Students could start with the Matlab differential equation solver. For instance, the open lecture pdf-file from Washington University in St. Louis Chemical Engineering 512 Course on Matlab differential equation solver bvp4c was found to be explanatory to our students. The pdf file of "Shampine, Kierzenka, Reichelt 2000 October 2006 "Solving Boundary Value Problems for Ordinary Differential Equations in Matlab with bvp4c" could be retrieved from https://classes.engineering.wustl.edu/che512/bvp_paper.pdf)

An application of differential equation solver to fluid example could be found in the Matlab library. The link is listed here for easy reference. https://www.mathworks.com/matlabcentral/answers/516147-boundary-value-problem-with-bvp4c

A magneto-dynamics application example suitable for our students can be found online as well. (For instance: Ahmad, K. (2017), Ishak, A. Magnetohydrodynamic (MHD) Jeffrey fluid over a stretching vertical surface in a porous medium. Propulsion and Power Research. Volume 6, Issue 4, December 2017, Pages 269-276. Retrieved from https://www.sciencedirect.com/science/article/pii/S2212540X17300640)

References

Barbier, J.M. 2018. Teaching is not a science; it is a culture of educative action (2018 February 26). Retrieved from https://theconversation.com/teaching-is-not-a-science-it-is-a-culture-of-educative-action-92313

Balewski, Z.Z. (2023), Elston, T.W., Knudsen, E.B, Wallis, J.D. Value dynamics affect choice preparation during decision-making. Nat Neurosci 26, 1575–1583 (2023). Retrieved from https://pubmed.ncbi.nlm.nih.gov/37563295/

Barzun, Jacques (2001) Simple & Direct. Perennial; 4th edition. ISBN-13: 978-0060937232. Retrieved from

https://www.harpercollins.com/products/simple-direct-jacques-barzun?variant=32118142763042

Brewe,E. (2018), Bartley J.E., Riedel M.C., Sawtelle V., Salo T., Boeving E.R., Bravo E.I., Odean R., Nazareth A., Bottenhorn K.L., Laird R.W., Sutherland M.T., Pruden S.M., Laird A.R. Toward a Neurobiological Basis for Understanding Learning in University Modeling Instruction Physics Courses. Front IC. 2018 May;5:10 Retrieved from https://pubmed.ncbi.nlm.nih.gov/31106219/

Burkholder, E. (2020), Blackmon, L., Wieman, C. What factors impact student performance in introductory physics? PLoS One. 2020 Dec 17;15(12): e0244146. Retrieved from https://pubmed.ncbi.nlm.nih.gov/33332432/

Chakroun, K. (2023), Wiehler, A., Wagner, B. et al. Dopamine regulates decision thresholds in human reinforcement learning in males. Nat Commun 14, 5369. Retrieved from https://pubmed.ncbi.nlm.nih.gov/37666865/

Cervin-Ellqvist, M. (2020), Larsson, D., Adawi, T. et al. Metacognitive illusion or self-regulated learning? Assessing engineering students' learning strategies against the backdrop of recent advances in cognitive science. High Educ 82, 477–498 (2021). Retrievd from https://link.springer.com/article/10.1007/s10734-020-00635-x

Grammarbook (2023) Compare to versus compare with. Retrieved from https://www.grammarbook.com/blog/definitions/compare-to-vs-compare-with/

Horchler, A. (2022 October) Stochastic Brusselator Simulation. Matworks Matlab Mini Hack. Retreived from https://www.mathworks.com/matlabcentral/communitycontests/contests/5/entries/10325

Indeed Editorial Team (2023 December) 53 Self-Assessment Phrases for Professional Development. Retrieved from https://www.indeed.com/career-advice/career-development/self-assessment-phrases

Jalayer Academy (2012) Excel - Central Limit Theorem clearly visualized. Retrieved from https://www.youtube.com/watch?v=kd6ElHgAgfY

Marshall, P. (2024), Davies, J., Zhao, Q., et al. Research Articles, Cellular/Molecular. DNA G-Quadruplex Is a Transcriptional Control Device That Regulates Memory. Journal of Neuroscience 10 April 2024, 44 (15) e0093232024; Retrieved from https://pubmed.ncbi.nlm.nih.gov/38418220/

NOAA (2022) The Tropical Cyclone Track Forecast Cone: A conversation with Jamie Rhome, acting director of the National Hurricane Center. Retrieved from https://www.weather.gov/news/101722-jamie-rhome-cone?ftag=YHF4eb9d17

Rachel Goldman (2023 December). People can change the way they react to the holidays by creating new memories and positive experiences or through self-affirmation. Excerpts in UK Dailymail News Report: Scientists reveal psychology behind why Christmas really DOES feel special. Retrieved from https://www.dailymail.co.uk/sciencetech/article-12860965/Experts-reveal-happier-memories-christmas.html

Sabandal, J.M. (2021), Berry, J.A., Davis, R.L. Dopamine-based mechanism for transient forgetting. Nature. 2021 Mar;591(7850):426-430. Retrieved from https://pubmed.ncbi.nlm.nih.gov/33473212/

Saffo, Paul (2007) Six Rules for Effective Forecasting. Harvard Business Review. Retrieved from https://hbr.org/2007/07/six-rules-for-effective-forecasting

Santoro, H. (2021 November). The science of uncertainty. American Psychological Association. Retrieved from

https://www.apa.org/monitor/2021/11/lab-science-uncertainty

Skrentny, J, (2024) Opinion: Why pushing STEM majors is turning out to be a terrible investment. LA Times 2024 Jan 9. Retrieved from https://www.latimes.com/opinion/story/2024-01-09/science-jobs-technology-stem-majors

Surrey, University of (2023) Exciting the brain could be key to boosting maths learning, says new study, Published: 31 August 2023. Retrieved from https://www.surrey.ac.uk/news/exciting-brain-could-be-key-boosting-maths-learning-says-new-study

Tamura, Y. (2017), Ito, A., Saito, M. A model of muscle contraction based on the Langevin equation with actomyosin potentials. Comput Methods Biomech Biomed Engin. 2017 Feb;20(3):273-283. Retrieved from https://pubmed.ncbi.nlm.nih.gov/27472485/

van Bueren, N.E.R. (2023), van der Ven, S.H.G., Hochman, S, Sella, F, Kadosh, R.C. Human neuronal excitation/inhibition balance explains and predicts neurostimulation induced learning benefits. PLoS Biol 21(8): e3002193. https://pubmed.ncbi.nlm.nih.gov/37651315/

Ventusky (2023) Wind Ran Temperature Maps. (2023) Retrieved from https://www.ventusky.com/

Webb, Amy (2019) How to Do Strategic Planning Like a Futurist. Harvard Business Review. Retrieved from https://hbr.org/2019/07/how-to-do-strategic-planning-like-a-futurist

Yamamoto, H. (2023), Spitzner, F.P., Takemuro, T., et al. Modular architecture facilitates noise-driven control of synchrony in neuronal networks. Sci Adv. 2023 Aug 25;9(34): eade1755. https://pubmed.ncbi.nlm.nih.gov/37624893/

Reflections on Developing, Teaching, and Evaluating a Cultural Competence Course

Rufaro A. Chitiyo

Tennessee Technological University, USA, https://orcid.org/0000-0001-5675-7289

Abstract: Over the last 25 years, cultural competence education has gained prominence in various helping professions (Kaihlanen et al., 2019; Shepherd et al., 2019; Stubbe, 2020). Interestingly, there are opposing perspectives regarding whether cultural competence training is necessary and/or relevant in such fields. Examples of such divisions are captured in Weaver's (2008) work explaining how (1) some critics cite political correctness as a mandate for incorporating such kinds of courses in different curricula, and (2) others say it's fear of offending some marginalized groups of people that drives the need for including cultural competence as part of getting an education, while (3) yet others argue that because culture defines who people are and how they function/behave, there is a definite need to prioritize cultural competence training to produce not only effective but culturally sensitive professionals as well. In addition to these opposing views, other scholars believe that the emphasis on cultural competence is inevitable due to the extent to which cultural diversity and related issues are increasing in the United States (Gustafson, 2005; LaRoche, 2005; Nair & Adetayo, 2019; Wear, 2003; Westermeyer et al., 2006). The purpose of this paper is to discuss the process of developing a cultural competence course.

Keywords: Cultural competence, Cultural competence education, Cultural competence training, Helping professions

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Introduction

In today's increasingly diverse society, the need for cultural competence in the helping professions has become imperative. As professionals in fields such as family science, counseling, social work, and psychology engage with clients from varied cultural backgrounds, it is essential that they possess the necessary skills and awareness to effectively understand and address their clients' needs. Cultural competence encompasses not only the ability to recognize and respect cultural differences but also to actively integrate this awareness into practice to provide more equitable and effective services (Cross et al., 1989). As Sue et al. (2009) emphasize, cultural competence involves a continual process of self-reflection, education, and skill development. It goes beyond mere awareness of cultural differences to include the ability to adapt interventions and approaches to meet the unique needs of individuals from diverse backgrounds (Sue et al., 2009). Failure to do so can result in miscommunication,

misunderstanding, and even harm to clients (Ponterotto et al., 2006).

Moreover, in the context of globalization and increased migration, the demographics of many communities are rapidly changing, highlighting the urgency for professionals to be equipped with the knowledge and skills to work effectively with diverse populations (Sue et al., 2009). Without cultural competence, helping professionals risk perpetuating systemic inequalities and disparities in access to services (Ponterotto et al., 2006).

Thus, this paper explores the controversies/debates surrounding cultural competence education and provides guidance into the process of developing new courses to fill the cultural competence gaps in curricula. By examining the literature on cultural competence this paper aims to underscore the necessity of such training in promoting the well-being and empowerment of all individuals whether they are providing or seeking services.

Understanding the Controversy: Perspectives and Debates

The discourse surrounding cultural competence education is characterized by a tapestry of conflicting viewpoints and debates. At the heart of this controversy lies the question of necessity, with scholars diverging on the relevance of such training within professional curricula. Some voices within academia and practice circles challenge the imperative of cultural competence education, attributing its incorporation to factors such as political correctness or apprehensions about causing offense. These critics argue that mandating cultural competence courses may inadvertently perpetuate tokenism or superficial engagement with diversity, rather than fostering genuine understanding and inclusivity (Gustafson, 2005; LaRoche, 2005; Westermeyer et al., 2006).

Conversely, proponents of cultural competence education passionately advocate for its integration into professional training paradigms. They assert that cultivating cultural competence is not merely a response to external pressures or mandates but a moral and ethical imperative. By equipping professionals with the knowledge, skills, and attitudes to navigate diverse cultural landscapes, cultural competence education fosters inclusivity, equity, and effectiveness in service delivery. Moreover, it empowers practitioners to engage authentically with individuals and communities from varying cultural backgrounds, thereby enhancing the quality and efficacy of interventions (Nair & Adetayo, 2019; Wear, 2003).

Beyond theoretical debates, the imperative of cultural competence education is underscored by the palpable realities of contemporary society. The United States, once characterized by a predominantly homogenous demographic fabric, has undergone profound demographic shifts in recent decades. The fabric of American society is now interwoven with a rich tapestry of cultural diversity, encompassing individuals from myriad ethnic, racial, linguistic, religious, and socioeconomic backgrounds (Moe, 2011).

In this context, the imperative of cultural competence education transcends theoretical conjecture, assuming tangible significance within the daily praxis of helping professionals. Professionals across disciplines are

increasingly confronted with the need to navigate the complexities of cultural diversity in their interactions with clients, patients, students, and communities. Failure to recognize and respond sensitively to cultural nuances can result in disparities in access to and quality of services, exacerbating existing inequities within society.

Navigating the Terrain of Developing Cultural Competence Courses

The process of developing cultural competence courses tailored for the helping professions is a multifaceted endeavor that demands thoughtful deliberation and collaborative engagement. At its core lies the imperative of aligning course content, pedagogical approaches, and assessment strategies with the evolving needs and contexts of diverse learners. Below is a suggested step-by-step guide of developing a new course.

Step 1: Gathering Feedback: The journey commences with gathering student feedback regarding the extent to which curriculum prepares them to work with diverse populations. The benefits of getting students' feedback include (but are not limited to) giving them a voice and increasing student engagement. Here, the goal is to identify gaps in students' cultural knowledge, skills, and attitudes. Once feedback is collected using multiple means (both summative and formative), use it. An additional exploration of the specific cultural competencies required by professionals within their respective fields is warranted. This will ensure that the proposed course will indeed be a beneficial component to add to existing curriculum.

Step 2: Designing new Course: The development of new courses necessitates collaborative partnerships among faculty members in any academic unit. Drawing upon different perspectives and expertise helps create course content that encapsulates a nuanced understanding of cultural competence. To succeed, get buy-in from all involved parties before embarking on developing the new course. Once the course is developed, present it back to the academic unit as the first step in the channel of getting approval at the institutional level.

Step 3: Offering the Course: Once the course is approved, the next step is to pilot it at a small scale to assess how students interact with the course (Harmon, n.d.). This also helps identify problems with both course content and course design, thereby providing feedback about the new course (Harmon, n.d.). After testing the course out comes further revisions as needed before officially offering the new course.

Step 4: Reflective Practice: Central to the cultivation of cultural competence is the cultivation of self-awareness and reflexivity among learners (Winkelman, 2005). Integrating reflective practices throughout the curriculum encourages students to critically examine their own cultural biases, assumptions, and privileges (Samuels, 2018). Based on experience teaching a cultural competence course, reflective practice also empowers students to engage authentically with diverse individuals and communities, transcending cultural barriers and fostering meaningful connections.

Step 5: Ongoing Evaluation and Adaptation: The journey towards cultural competence is an iterative process characterized by continuous learning and adaptation. Ongoing evaluation and feedback play a pivotal role in

assessing the effectiveness and relevance of cultural competence courses. Soliciting feedback from students enables curriculum developers to identify areas for improvement, refine course content, and enhance pedagogical approaches to better meet the evolving needs of diverse learners (SmartEvals, n.d.).

Conclusion

In today's multicultural and interconnected world, the importance of cultural competence education within the helping professions cannot be overstated. It serves as a fundamental cornerstone of professional training, offering a crucial pathway towards fostering inclusivity, equity, and effectiveness in service delivery. While debates persist regarding its necessity, the undeniable realities of cultural diversity in contemporary society underscore the imperative of integrating cultural competence education within curricula. As an educator, I believe cultural competence education enhances the delivery of quality services by promoting effective communication and collaboration across cultural boundaries. I have witnessed students who are culturally competent prove to be better equipped to recognize and address cultural biases, stereotypes, and barriers that may hinder the delivery of equitable and inclusive services.

Educators play a pivotal role in creating inclusive learning environments that encourage dialogue, reflection, and critical thinking about cultural issues. By incorporating diverse perspectives, experiences, and voices into the curriculum, educators can enrich the learning process and promote a deeper understanding of cultural diversity. In addition, educators can contribute to the realization of a more equitable, inclusive, and just society for all by prioritizing cultural competence education.

In conclusion, cultural competence education is not just a desirable add-on to educational training—it is an essential component that underpins effective and ethical practice within the helping professions. By integrating cultural competence into curricula and embracing collaborative approaches to course development, educators can empower professionals to navigate the complexities of cultural diversity with sensitivity, humility, and efficacy.

References

Cross, T., Bazron, B., Dennis, K., & Isaacs, M. (1989). *Towards a culturally competent system of care* (Vol. 1). Washington, DC: Georgetown University Child Development Center, CASSP Technical Assistance Center.

Gustafson, D. L. (2005). Transcultural nursing theory from a critical cultural perspective. *Advances in Nursing Science, 28*(1), 2–16.

Harmon, L. (n.d.). Pilot testing a course. https://intulogy.com/pilot-testing-course/

Kaihlanen, AM., Hietapakka, L. & Heponiemi, T. (2019). Increasing cultural awareness: qualitative study of nurses' perceptions about cultural competence training. *BMC Nursing 18*(38). https://doi.org/10.1186/s12912-019-0363-x

La Roche, M. (2005). The cultural context and the psychotherapeutic process: Towards a culturally sensitive psychotherapy. *Journal of Psychotherapy Integration, 15*, 169–185.

Moe, J. (2011). The myth of Americanization or the divided heart: U.S. immigration in literature and historical data, 1890-2008. *European Journal of American Studies*, 6(2). https://doi.org/10.4000/ejas.8935

Nair, L., & Adetayo, O. A. (2019). Cultural competence and ethnic diversity in healthcare. *Plastic and Reconstructive Surgery. Global oOpen*, *7*(5), e2219. https://doi.org/10.1097/GOX.0000000000002219

Ponterotto, J. G., Utsey, S. O., & Pedersen, P. B. (2006). *Preventing prejudice: A guide for counselors, educators, and parents* (2nd ed.). Sage.

Samuels, A. J. (2018). Exploring culturally responsive pedagogy: Teachers' perspectives on fostering equitable and inclusive classrooms. *SRATE Journal*, *27*(1). https://files.eric.ed.gov/fulltext/EJ1166706.pdf

Shepherd, S.M., Willis-Esqueda, C., Newton, D., Sivasubramaniam, D., & Paradies, Y. (2019). The challenge of cultural competence in the workplace: perspectives of healthcare providers. *BMC Health Services Research 19*(135). https://doi.org/10.1186/s12913-019-3959-7

SmartEvals. (n.d.). 6 benefits of hourse hvaluations in higher ed **(n.d.).** https://info.smartevals.com/6-benefits-of-course-evaluations-in-higher-ed/

Stubbe D. E. (2020). Practicing cultural competence and cultural humility in the care of diverse patients. *Focus (American Psychiatric Publishing)*, *18*(1), 49–51. https://doi.org/10.1176/appi.focus.20190041

Sue, S., Zane, N., Nagayama Hall, G. C., & Berger, L. K. (2009). The case for cultural competency in psychotherapeutic interventions. *Annual Review of Psychology*, *60*, 525–548. https://doi.org/10.1146/annurev.psych.60.110707.163651

Wear, D. (2003). Insurgent multiculturalism: Rethinking how and why we teach culture in medical education. *Academic Medicine, 78*(6), 549–554.

Weaver, H. N. (2008). Striving for cultural competence: Moving beyond potential and transforming the helping professions. In R. H. Dana & J. R. Allen (Eds.), *International and Cultural Psychology: Cultural Competency Training in a Global Society.* Springer. 139–162.

Westermeyer, J., Mellman, L., & Alarcon, R. (2006). Cultural competence in addiction psychiatry. *Addictive Disorders & Their Treatment, 5*(3), 107–119. https://doi.org/10.1097/01.adt.0000210719.10693.6c

Winkelman, M. (2005). *Cultural awareness, sensitivity and competence*. Eddie Bowers Publishing Company.

Enhancing Graduate-Level Education: Strategic Approaches to Service-Learning for Health Professionals

Hamidah Sharif

Assistant Professor Fort Valley State University https://orcid.org/ 0009-0001-5536-5176

Abstract: Service learning in public health education offers multifaceted benefits to students and communities alike. This research investigates the effectiveness of integrating service learning via article writing for a community health blog to enhance public health students' abilities in educating and engaging the local community compared to traditional coursework alone. Employing a qualitative observational design, the study assesses a cohort group's experiences in a foundational public health course at a Georgia public university. Results from qualitative content analysis reveal themes of personal growth, community empowerment, impact, relevance, trust, and credibility. Students' writing experiences deepen their understanding of public health concepts, enhance communication skills, and foster a sense of community connection. Residents appreciate the blog's local relevance, evidence-based information, and advocacy for positive change. This study underscores the transformative potential of service learning in public health education, bridging theory with practice while empowering students and benefiting the communities they serve.

Keywords: Service Learning, Public Health Education, Community Engagement, Blog Article Writing, Qualitative Analysis

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Introduction

Service learning in public health education offers numerous advantages to students. It provides a hands-on approach to understanding health issues and needs within local communities, fostering a sense of belonging and social responsibility among students (Essa-Hadad et al., 2015). Actively engaging with communities enables students to deepen their understanding of public health issues and the healthcare system (Diab & Flack, 2013). This practical experience not only enhances academic performance but also improves social skills and self-confidence (Webb, 2016). Moreover, service-learning aids in developing crucial competencies required in public health practice (Brown, 2017). Additionally, it contributes to diversifying the public health workforce and ensures that students are well-prepared to address the intricate public health challenges faced by communities (Armstrong-Mensah et al., 2019). It also facilitates transformative learning by enriching student experiences and skill development (Gardner et al., 2017). Through service learning, students can apply theoretical knowledge in real-

world settings, thereby enhancing their comprehension of public health concepts and practices (Leblanc et al., 2021). Furthermore, service-learning benefits not only students but also the community by establishing partnerships between academic institutions and communities, leading to improved teaching practices and increased familiarity with the healthcare system (Diab & Flack, 2013). Service-learning projects can have a lasting positive impact on communities, as students contribute to community health while gaining practical experience (Burns et al., 2020). Moreover, service-learning aids in the development of competent health professionals who are responsive to community needs (In et al., 2022). In conclusion, service learning plays a pivotal role in public health education by providing students with practical experiences, fostering community engagement, and enhancing essential competencies. It serves as a valuable pedagogical approach that bridges classroom learning with real-world practice, benefiting both students and the communities they serve.

Research Question

"Does integrating service learning through article writing for a community health blog effectively enhance public health students' abilities to educate and engage the local community compared to traditional coursework alone?"

Methods

This research will employ a qualitative observational design featuring a cohort group to evaluate the effectiveness of integrating service learning into public health education to teach students community education and engagement skills through writing articles for a community health blog. Participants were public health students enrolled in a foundational public health course at a Georgia public university. The intervention entailed students in the service-learning group crafting articles for a community health blog addressing local health issues, with faculty members or mentors providing guidance throughout the writing process. Articles produced by students in the intervention group will undergo evaluation based on criteria including clarity, relevance, and engagement with community health topics. Community feedback will be gathered through surveys or interviews to gauge the perceived utility and impact of the blog articles. Potential limitations include constraints in sample size, subjectivity in article evaluation, and the challenge of attributing outcome changes solely to the service-learning intervention. This methodology aims to furnish evidence on the efficacy of using service learning to equip public health students with skills for community education and engagement through blog article writing, contributing to advancements in public health education pedagogy.

Results

Qualitative Content Analysis

Theme 1: Personal Growth and Community Empowerment

Skills Enhancement: Writing for the health blog has not only deepened students' understanding of public health concepts but also honed their communication, research, teamwork, and leadership skills. Similarly, residents

appreciate the accessibility of the health blog, finding it to be a valuable resource for obtaining information on various health topics, from nutrition to mental well-being.

Understanding of Public Health: Students and residents alike acknowledged how writing for and engaging with the health blog has broadened their understanding of public health concepts and empowered them to make informed decisions about their health.

Community Connection: Both students and residents highlighted the sense of community fostered by the health blog, where they could share their experiences, learn from others, and feel supported in their health journey. This connection empowers residents to take control of their health and make positive lifestyle changes.

Theme 2: Impact and Relevance

Local Relevance: Students recognized the importance of addressing local health issues and initiatives in their blog articles, which residents appreciated as it provided them with practical and applicable information tailored to their community.

Advocacy and Change: Students saw the health blog as a platform for advocating for important public health issues and driving positive change within their community. Similarly, residents viewed the health blog as a trusted resource that contributes to the health and well-being of the community.

Applicability to Daily Life: Both students and residents found the content of the health blog to be practical and applicable to their daily lives, offering tips, advice, and resources that they could easily incorporate into their routines.

Theme 3: Trust and Credibility

Evidence-Based Information: Both students and residents appreciated that the health blog provided evidence-based information from trusted sources, helping them navigate the abundance of health advice available online.
Building Trust in Healthcare: Residents noted that the health blog helped bridge the gap between the public and the healthcare system, building trust and facilitating communication between residents and healthcare providers. Similarly, the sense of trust and credibility fostered by the health blog helps residents feel empowered to make informed decisions about their health.

Discussion

Incorporating blog development into public health education programs offers numerous advantages. Blogs serve as valuable platforms for disseminating knowledge, fostering engagement, and enriching learning experiences for

students. By integrating blogs into public health education, students stand to gain in various ways. Blogs provide a platform for effective communication, idea sharing, and discussions on public health topics, thereby enhancing students' communication skills crucial for effective public health practice (Joshi et al., 2017). Moreover, blogs contribute to increasing student engagement by offering spaces for interactive learning, discussions, and feedback, which in turn enhances participation and motivation in public health education programs (Zinger & Sinclair, 2013). Additionally, blogs serve as mediums for disseminating health information, research findings, and best practices in public health, fostering broader understanding among students and the wider community (Joshi et al., 2017). Engaging in blogging encourages students to reflect on their learning journeys, articulate their thoughts, and engage in critical thinking, thus deepening their comprehension of public health concepts and enhancing analytical skills (Osman & Koh, 2013). Furthermore, through blogging, students develop digital literacy skills, online professionalism, and establish professional online identities, all of which are valuable for their future careers in public health (Bumguardner et al., 2014). Blogs also facilitate collaboration among students, educators, and professionals in the public health field, fostering networking opportunities, mentorship, and collaborative projects (Duarte, 2015). Additionally, the flexibility of blogs as a learning platform allows students to access course materials anytime and anywhere, accommodating diverse learning styles and preferences (Zinger & Sinclair, 2013). In conclusion, the integration of blog development into public health education programs enriches the learning experience, promotes engagement, and enhances the development of essential skills for future public health professionals.

Future Research

Future research in this area could explore the longitudinal effects of service-learning interventions on public health students' career trajectories and community outcomes. Additionally, investigating the optimal methods for integrating service learning into public health curricula across diverse educational settings could provide insights into best practices for maximizing student learning and community impact. Exploring the role of technology and digital platforms in facilitating community engagement and education in public health, beyond blog article writing, could also be a fruitful area for investigation. Furthermore, examining the perspectives of community stakeholders, such as local residents and healthcare professionals, on the effectiveness and sustainability of service-learning initiatives could provide valuable insights for refining program design and implementation. Lastly, exploring the potential for interdisciplinary collaborations between public health education programs and other academic disciplines or community organizations could enhance the comprehensiveness and effectiveness of service-learning experiences for students and communities alike.

Conclusions

The qualitative content analysis reveals that writing for and engaging with the health blog has profound personal, professional, and community-wide benefits. Both students and residents appreciate the accessibility, relevance, and credibility of the health blog, which provides them with practical information and resources tailored to their

local community. Furthermore, the sense of connection and trust fostered by the health blog empowers individuals to take control of their health, advocate for positive change, and engage more actively in their healthcare. Overall, the health blog serves as a trusted and valuable resource that contributes to the health and well-being of the community while providing students with practical skills and insights into the field of public health.

References

Armstrong-Mensah, E., Ramsey-White, K., & Alema-Mensah, E. (2019). Integrative learning in us undergraduate public health education: a review of student perceptions of effective high-impact educational practices at georgia state university. Frontiers in Public Health, 7. https://doi.org/10.3389/fpubh.2019.00101

Brown, C. (2017). Linking public health nursing competencies and service-learning in a global setting. Public Health Nursing, 34(5), 485-492. https://doi.org/10.1111/phn.12330

Bumguardner, K., Strong, R., Murphrey, T., & Dooley, L. (2014). Examining the blogging habits of agricultural leadership students: understanding motivation, use, and self-efficacy. Journal of Agricultural Education, 55(3), 32-42. https://doi.org/10.5032/jae.2014.03032

Burns, K., Strickland, C., & Horney, J. (2020). Public health student response to covid-19. Journal of Community Health, 46(2), 298-303. https://doi.org/10.1007/s10900-020-00910-z

Diab, P. and Flack, P. (2013). Benefits of community-based education to the community in south african health science facilities. African Journal of Primary Health Care & Family Medicine, 5(1). https://doi.org/10.4102/phcfm.v5i1.474

Duarte, P. (2015). The use of a group blog to actively support learning activities. Active Learning in Higher Education, 16(2), 103-117. https://doi.org/10.1177/1469787415574051

Essa-Hadad, J., Murdoch-Eaton, D., & Rudolf, M. (2015). What impact does community service learning have on medical students' appreciation of population health?. Public Health, 129(11), 1444-1451. https://doi.org/10.1016/j.puhe.2015.05.009

Gardner, J., Ronzio, C., & Snelling, A. (2017). Transformational learning in undergraduate public health education: course design for generation z. Pedagogy in Health Promotion, 4(2), 95-100. https://doi.org/10.1177/2373379917721722

In, N., Tomisawa, T., Mikami, K., Urushizaka, M., Tanaka, K., Itaki, C., … & Osanai, M. (2022). Service-learning experiences related to health support activities for residents who have returned home after evacuation due to a radiation disaster. Healthcare, 10(8), 1467. https://doi.org/10.3390/healthcare10081467

Joshi, A., Wangmo, R., & Amadi, C. (2017). Blogs as channels for disseminating health technology innovations. Healthcare Informatics Research, 23(3), 208. https://doi.org/10.4258/hir.2017.23.3.208

Leblanc, P., Occelli, P., Etienne, J., Rode, G., & Colin, C. (2021). Assessment of community-based service learning at the university of lyon: an opportunity to rethink public health education.. https://doi.org/10.21203/rs.3.rs-389752/v1

Osman, G. and Koh, J. (2013). Understanding management students' reflective practice through blogging. The Internet and Higher Education, 16, 23-31. https://doi.org/10.1016/j.iheduc.2012.07.001

Webb, G. (2016). Learning through teaching: a microbiology service-learning experience. Journal of Microbiology and Biology Education, 17(1), 86-89. https://doi.org/10.1128/jmbe.v17i1.997

Zinger, L. and Sinclair, A. (2013). Using blogs to enhance student engagement and learning in the health sciences. Contemporary Issues in Education Research (Cier), 6(3), 349. https://doi.org/10.19030/cier.v6i3.7907

Perceptions of Burnout Among Nursing Faculty: A Qualitative Study

Mayantoinette Watson

University of Southern Mississippi, United States, https://orcid.org/0000-0001-6536-9237

Abstract: Burnout among nursing faculty is a growing concern, yet there is limited qualitative research exploring the perceptions of contributing factors to burnout among nursing faculty in the U.S. A qualitative study design was utilized using a descriptive method. Semi-structured interviews were conducted with a purposeful sample of academic nursing faculty (*n*=15) from across the U.S. Content analysis and coding were utilized in the study. Faculty incivility, student incivility, unrealistic workload, and lack of support are contributing factors that lead to burnout among nursing faculty. Decreased workload, mental health support, and financial stability are factors that play an important role in combating burnout. Strategies for improving civility among faculty and students are needed in efforts to combat undesirable and negative work environments that could lead to burnout. Implementing interventions to support mental well-being among nursing faculty can also create a healthy work environment to prevent burnout and improve retention. Addressing nursing faculty burnout is essential for maintaining a strong nursing workforce, advancing the nursing profession, improving patient care, and tackling healthcare challenges in the future.

Keywords: Burnout, Nursing Education, Qualitative Research

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Introduction

The World Health Organization (WHO) (2019) defines burnout as a condition caused by unmanaged workplace stress that can lead to symptoms of exhaustion, feelings of negativism or cynicism regarding one's job, and a decrease in professional efficacy. Burnout among nursing faculty is a critical issue that not only affects the well-being of educators but also impacts the quality of nursing education and ultimately patient care. Recent research has highlighted incivility as a causative source of burnout among faculty (McGee, 2023; Thomas, 2019; Zangaro et al., 2023). Incivility can be found among student-student, faculty-student, and faculty-faculty relations and is defined as students' or professors' upsetting, disruptive, or disrespectful behaviors that violate mutual respect (Muliira et al., 2017). While burnout has been extensively studied in healthcare professionals, including nurses, there is limited qualitative research specifically exploring burnout among nursing faculty members. Understanding the factors contributing to burnout in this population is crucial for developing effective interventions to mitigate its impact. This qualitative study aimed to explore the perceptions of burnout among nursing faculty in the Southeastern US. Uncovering contributing factors to burnout may aid in identifying potential

strategies for prevention and intervention.

Methods

Participants

Purposive sampling was used to recruit participants in a follow-up interview from a listserv of individuals who participated in an initial quantitative study measuring burnout. The quantitative study utilized the Oldenburg Burnout Inventory (OLBI) to measure burnout among nursing faculty in Southeastern US. Those participants were offered an option to win an incentive of a $50 gift card to participate in a follow-up interview by providing a contact email. The target population included participants from the previous quantitative study that included contact information and that scored a 35 or above on the OLBI survey tool, indicating burnout. Research criteria also included nursing faculty 18 years of age or older, full-time employees in a Bachelor of Science in Nursing (BSN) program, which is located in one of the southeastern states. The southeastern states include the following states: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Maryland, Virginia, and West Virginia (World Population Review, 2024). The researcher's desire was for at least 10-15 participants to complete a follow-up interview. Nursing faculty n=15 from various nursing educational institutions across the Southeastern US fully consented to participate.

Data Collection

This study was approved by the University of Southern Mississippi's Institutional Review Board (IRB-23-0461) Participants were sent a consent form via email that was required to be completed prior to conducting any interviews via Zoom platform of via phone (See Table 1. for interview questions).

Table 1. Interview Questions

1.	What are some stressors or things that have caused you stress that lead to feelings of burnout while working as a nursing faculty member?
2.	What things have you done to cope with stressors and feelings of burnout while working as a nursing faculty member?
3.	How has your social support system, such as family, friends, or your nursing school helped you as a nursing faculty member?
4.	Do you believe that your nursing school provides adequate mentorship for nursing faculty? Why or why not?
5.	Do you believe that your nursing school supports inclusion and diversity among nursing faculty? Why or why not?
6.	Do you believe that your nursing school provides adequate mental health resources and support for nursing faculty? Why or why not?
7.	What do you believe are some factors that contribute to the ongoing nursing faculty shortage?
8.	What do you believe are some solutions that could help with burnout among nursing faculty?
9.	Do you ever think about leaving nursing academia? Why or why not?

Participants indicated informed consent to continue with the interview and were given the option to withdraw at any time if they needed to. The Zoom and phone interviews took approximately 20 minutes. Interview data was collected over a 3-month period during the months of September 2023 and December 2023 to ensure that faculty were interviewed during an active school period. The interviews were audio-recorded and transcribed verbatim to facilitate data analysis. No identifying information was collected, and all participant's information was kept confidential. See Table 1. for interview questions.

Data Analysis

Thematic analysis was utilized to identify recurring themes and patterns within the interview data. A six-step thematic analysis method was conducted based on Braun and Clarke's (2008) approach. The six-step approach includes: Familiarization, coding, generating themes, reviewing themes, defining and naming theme, and finally writing up. Transcripts were coded independently by two researchers, and discrepancies were resolved through discussion until a consensus was reached. Emerging themes were then organized into broader categories to facilitate interpretation. Final themes were defined and named.

Results

The nursing faculty (n=15) were middle age with an average age of 45 years old. Britannica (2024) defines middle age as, "being between the ages of 40 and 60 and the period of human adulthood that immediately precedes the onset of old age" (para. 1). The youngest participant was years old and the oldest was 55 years old. There were 12 faculty that identified as Caucasian, 1 African American, and 1 Other-Indian American. There were 14 female participants and 1 male participant. Thirteen of the participants were married, 1 participant was living with a partner, and 1 participant had never been married. The average length of employment years was 8, with 1 year being the least amount and 20 being the most amount. Participants were from a wide range of institutional affiliations across the Southeastern US. See Figure 1.

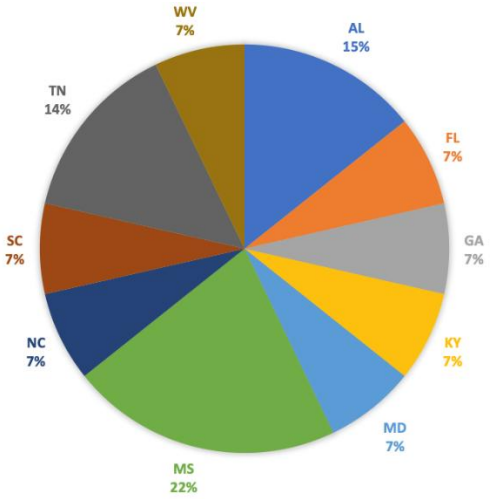

Figure 1. Location of Participants

Perceptions of Stressors

Faculty-to-faculty and student-to-faculty incivility were a prominent theme, with participants expressing challenges regarding incivility issues that result in a negative work environment. Participants felt that incivility issues in the workplace hindered the learning process and academic success of students. Those participants who voiced concerns about faculty-to-faculty incivility were asked to provide examples. One participant spoke about a situation where a colleague was overheard making rude comments about another faculty member to a student. Another participant gave an example of faculty-to-faculty incivility as a colleague unwilling to negotiate or compromise. One participant stated that "faculty-to-faculty incivility can be someone not pulling their workload." Participants who voiced concerns regarding student-to-faculty incivility were also prompted to elaborate or provide examples. One participant spoke about their experience when a student yelled at them in the classroom. Another participant stated that "students questioning and arguing about test questions rudely is incivility." One participant stated that "rude and unprofessional emails from students are incivility."

Unrealistic workloads were another prominent theme, with participants expressing frustration over the demands of teaching, research, and administrative responsibilities. Many felt overwhelmed by the sheer volume of work expected of them, leading to feelings of exhaustion and disillusionment. Furthermore, a lack of institutional support was identified as a major contributing factor to burnout. Participants described feeling undervalued and unsupported by their institutions, particularly in terms of resources and professional development opportunities. Despite these challenges, participants identified coping strategies for stressors. Taking breaks, self-care interventions, and family or friends as support were prominent themes found among coping strategies. When participants were prompted to expand on social support, participants voiced that their social support system played a crucial role in combatting the potential for burnout. Social support viewed as a platform for validation and empathy was a prominent theme among participants. Participants also used their home support to vent. One participant stated, "My home support is my stress reduction where I can vent in a safe environment."

Perceptions of Work Environment

There were two different themes regarding adequate mentorship in the workplace. About half of the participants (n=7) felt that there was adequate mentorship in the workplace, and the other half (n=8) felt that there was inadequate mentorship and a lack of enough faculty in the workplace. Regarding inclusion and diversity, there were also two different prominent themes found. Challenges regarding inclusion and diversity were seen in half of the participants (n=8), where participants stated that no actions were taking place in the workplace for inclusion and diversity. The other half of the participants (n=7) spoke about improvements toward inclusion and diversity implemented in the workplace and the establishment of committees to address inclusion and diversity. The lack of mental health support and more focus on student mental health rather than faculty mental health was a prominent theme regarding mental health resources in the workplace. Participants felt there was less support and available mental health resources by their specific schools but did feel more support and more available resources from the overall university or college. When participants were asked about what reasons they believed were

contributing to the faculty shortage, decreased pay, incivility, lack of leadership, lack of support, and unrealistic workloads were prominent themes.

Perceptions of Solutions and Intent to Leave

Many participants emphasized the need to reduce the workload of nursing faculty members. They expressed concerns about the overwhelming demands of teaching, research, and administrative duties, which often lead to burnout. Improving compensation for nursing faculty was a prominent theme as a strategy to mitigate burnout. Participants identified strong leadership as essential for creating a supportive and conducive work environment. Cultivating a positive and better work environment was another prominent theme to combat burnout. Participants emphasized the need for greater flexibility in work arrangements to accommodate the diverse needs and preferences of nursing faculty. Finally, participants underscored the importance of institutional support mechanisms for addressing burnout among nursing faculty. When participants were asked if they had any intention of leaving nursing academia or had ever thought about leaving nursing academia, most of the participants (n=10) answered yes. A prominent theme among these participants was the burden of workload and the perceived lack of effective leadership within academic institutions. Those participants who expressed their intention to remain in nursing academia despite its challenges voiced that their decisions were primarily driven by a strong passion for teaching and a lack of desire to return to bedside nursing where the work schedule can be restricting.

Discussion

The findings of this study highlight the multifaceted nature of burnout among nursing faculty and underscore the importance of addressing both individual and systemic factors. Faculty incivility, student incivility, unrealistic workloads, and lack of institutional support were identified as significant contributors to burnout, aligning with previous research in healthcare settings.The prevalence of faculty incivility and its impact on burnout emphasizes the need to foster a culture of respect and support within academic institutions (Clark, 2019). Efforts to address incivility should involve faculty training, institutional policies, and the promotion of a positive work environment. Similarly, addressing unrealistic workloads requires systemic changes, including workload distribution, resource allocation, and recognition of faculty contributions. Institutions must prioritize faculty well-being (Mixer et al., 2013) by implementing policies that promote a healthy work-life balance and provide adequate support for teaching, research, and administrative responsibilities.

Conclusion

In conclusion, this qualitative study provides valuable insights into the perceptions of burnout among nursing faculty in the United States. By identifying the key factors contributing to burnout and potential strategies for prevention and intervention, this research contributes to the growing body of literature on faculty well-being in academic settings.

Efforts to address burnout among nursing faculty must involve a multifaceted approach that targets both individual and systemic factors. By fostering a supportive work environment, providing resources for self-care, and advocating for institutional change, we can create healthier and more sustainable academic environments for nursing educators.

References

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Britannica. (2024). *Middle age.* https://www.britannica.com/science/middle-age

Clark, C. (2019). Fostering a culture of civility and respect in nursing. Continuing Education, 10(1), 44-52. https://doi.org/10.1016/S2155-8256(19)30082-1

McGee, P. L. (2023). The relationship among faculty-to-faculty incivility and job satisfaction or intent to leave in nursing programs in the United States. Journal of Professional Nursing, 47, 73-80. https://doi.org/10.1016/j.profnurs.2023.04.006

Mixer, S. J., McFarland, M. R., Andrews, M. M., & Strang, C. W. (2013). Exploring faculty health and wellbeing: creating a caring scholarly community. *Nurse education today*, *33*(12), 1471–1476. https://doi.org/10.1016/j.nedt.2013.05.019

Muliira, J.K., Natarajan, J. & van der Colff, J. Nursing faculty academic incivility: perceptions of nursing students and faculty. BMC Med Educ 17, 253 (2017). https://doi.org/10.1186/s12909-017-1096-8

Thomas, C. M., Bantz, D. L., & McIntosh, C. E. (2019). Nurse Faculty Burnout and Strategies to Avoid it. Teaching and Learning in Nursing, 14(2), 111-116. https://doi.org/10.1016/j.teln.2018.12.005

World Population Review. (2024). Southeast States. https://worldpopulationreview.com/state-rankings/southeast-states

Zangaro, G. A., Rosseter, R., Trautman, D., & Leaver, C. (2023). Burnout among academic nursing faculty. Journal of professional nursing: official journal of the American Association of Colleges of Nursing, 48, 54–59. https://doi.org/10.1016/j.profnurs.2023.06.001

Deploying AI Technologies in Returning Fairness, Balance and Objectivity to News

Beatrice Epwene

Penn State University, USA, https://orcid.org/0009-0001-5776-9473

Abstract: This paper will discuss how Artificial Intelligence could assist researchers, news consumers and reporters in returning fairness, balance, and objectivity to news. The trust meter for journalism globally has plummeted as journalists are seen as the least trusted societal leaders today. Ordinary citizens are expected to decipher where to get news they can trust, even though most news consumers are not sophisticated enough for the task. Researchers have difficulties proffering solutions to resolve the issue of how to hold reporters accountable. Also, concerns about artificial intelligence and deepfakes only exacerbate these situations even more. Yet, the work of journalists and news reporters has never been more important. With natural language processing and machine learning capabilities made possible via AI tools, we can analyze news reports at scale to uncover the sentiments expressed in news stories and measure them against news canons. The framework used for this study is journalistic standards. A digital tool, the mEditor, powered by AI, will crawl the web for news stories and conduct Sentiment Analysis to generate matrices on reputation for fairness, balance, accuracy and objectivity by various reporters and media houses. This tool will help in immediate and direct decision making for users.

Keywords: Artificial intelligence, Sentiment analysis, News standards, mEditor, News

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Introduction

This paper will discuss how Artificial Intelligence could assist researchers, news consumers and reporters in returning fairness, balance, and objectivity to news. Lately, the news media appears to have lost credibility with the viewing, listening, and reading public and there's a vicious cycle of distrust fueled by a growing lack of faith in media and government (Edelman Trust Barometer Report, [Edelman Report] 2022). The trust meter for journalism globally has plummeted as government leaders and journalists are seen as the least trusted societal leaders today, with less than half of (poll) respondents trusting either government leaders at 42% or journalists at 46% ([Edelman Report] 2022).

In this "post truth era," (Bounegru et al., 2017, Introduction) characterized by accusations and perceptions of fake news, misinformation, disinformation, misrepresentations and outright lies in media coverage of global events,

van der Linden et al., (2020) found that there is a significant "fake news effect," where partisans from both sides of the political spectrum in the case of America for instance, are likely to label media sources that do not align with their ideologies as "fake news," and specifically noted that liberals and conservatives associate media outlets traditionally viewed as leaning towards opposing ideologies, such as CNN by conservatives and Fox News by liberals, with the term "fake news." Fichman and Rathi (2023) highlight the same ideological differences and polarization between Democrats and Republicans in their study.

News coverage appears to be stilted and unbalanced, exhibiting polarity in ideologies, fueling the perception that there is a lot of biased reporting and the infusion of personal, ideological, and institutional agendas, beliefs, stereotyping and one-sidedness in news reports and headline making stories. The Edelman Report (2022) found that nearly one out of every two respondents to a poll viewed government and media as divisive forces in society, 48% and 46%, respectively (p. 1). It appears that the proliferation of opinion journalism rather than hard news, based on verifiable facts as should be expected from the news, is now hard to come by. Research by Melek and Raza (2023), builds on prior research findings indicating that media outlets often exhibit framing biases aligned with their perceived political leanings and through disinformation and division, these two institutions (government and media) are feeding the cycle (of distrust), exploiting it for commercial and political gain" The Edelman Report (2022). This phenomenon compromises America's very nature as a country and undermines her place as a leading democracy. Fichman and Rathi (2023) in their work, explore the pervasive issues of online trolling, disinformation, and deception and the profound impact these have on democratic processes. To add, the possibility of the eruption of global conflicts as a result of biased reporting is not far-fetched. With each news bulletin or with each election cycle nationally and internationally, threats of opinion journalism, misinformation, disinformation, half-truths, and untruths deepen and widen divisions and polarizations, infusing threats to global security.

Amidst all these, ordinary citizens are expected to be able to decipher for themselves where and from whom to get news they can trust, even as evidence shows that most news consumers are not sophisticated enough to undertake the task (News Literacy Project). Tsfati and Ariely (2014), discuss several individual-level variables that significantly influence trust in the media. They found that political interest, interpersonal trust, and regular exposure to traditional media sources like television news and newspapers all positively correlate with increased trust in the media while higher education levels and greater exposure to news on the Internet, the researchers found, were negatively associated with media trust.

To add, researchers have had difficulty in designing studies that could proffer solutions to resolve the issue of how to know news is objective, balance, fair and accurate or how to hold accountable those who detract from positive public discourse and serving the public interest instead of commercial interest (The Edelman Report, 2022). In addition, concerns with artificial intelligence and deepfakes only exacerbate these situations even more, affecting everything from how we view the world, to threats to our democratic systems. Ahmed (2023), for instance found a positive correlation between the exposure to deepfakes and increased skepticism towards news on social media.

The News Standard Framework

Yet, the work of journalists and news reporters has never been more needed and more important in providing the lens through which most people see the world. The AP News Service proclaims that, "In the 21st century, that news is transmitted in more ways than ever before… we insist on the highest standards of integrity and ethical behavior as we gather and deliver the news. We abhor inaccuracies, carelessness, bias or distortions. We will not knowingly introduce rumor or false information into material intended for publication or broadcast; nor will we distort visual content," (AP News, Standards and Values).

These standards for news are not only an expectation from the public but are the canons to which news outlets hold themselves. Individual reporters and news organizations take pride in touting these standards as the basis of their news philosophy and they are central in setting the news gathering agenda for news organizations. For instance, *The Associated Press* further states that, "We have a long-standing role setting the industry standard for ethics in journalism. It is our job…to report the news accurately and honestly." And *The New York Times* echoes the same saying, "our greatest strength is the authority and reputation of The Times. We must do nothing that would undermine or dilute it and everything possible to enhance it." (*The New York Times*, Ethical Journalism)
It is, therefore, imperative that news reports remain sacrosanct, true, and unbiased and that reporters strive to be fair, balanced, objective and accurate in their reports. Myllylahti and Treadwell (2022) also underscore the increasing necessity of trust and trustworthiness as foundational values within the journalism sector, further emphasizing why news outlets are required, by their own standards, to never become the news as is currently the case. Today, even with the proliferation of social media platforms as "pseudo news houses" (some) journalists still strive in this milieu to observe and preserve journalistic standards. Walters (2022) found that despite the adaptation to social media logics and the partial relinquishment of gatekeeping authority to platforms, journalists continue to uphold traditional journalistic values such as speed, objectivity, and fairness and attempt to maintain some control over their content. It is for this reason that the theoretical basis for this paper is the journalistic standards set by news agencies themselves as explained above.

Artificial Intelligence, Natural Language Processing and Machine Learning

As scholars and researchers, it behooves us to look for answers to this prevailing dilemma and evaluate currently available tools to remedy this situation. Fortunately, with natural language processing and machine learning capabilities made possible via AI tools today, we can analyze news reports at scale to uncover the sentiments expressed in news stories and measure them against news canons (balance, fairness, objectivity and accuracy). (AWS, Sentiment Analysis; Medhat et al., 2014). It is possible today to go beyond fact checking (accuracy canon) (factcheck.org) to also measure skewness in terms of balance, fairness and objectivity, thereby covering all basic news canons and values. Going even further, we can probe for tone, tenor, and emotions present and expressed in stories and burrow down to sentiments applicable to specific entities within stories such as people, events, places, and themes. Then we can generate objective and unbiased findings that could provide guidance, enhancing the

ability for the public to make decisions about the news they consume.

Bounegru et al., (2017) catalog several ways that have been attempted to deal with the problematics of fake news, disinformation, and misinformation. They include new media literacy, educational and fact-checking initiatives, new laws, policies, and fines for technology companies who fail to remove offending content (Bounegru. et al., (2017). They also discuss attempts and technical fixes by a host of new startups for authenticating content and automating fact-checking (Bounegru et al., 2017). This paper advocates the latter, deploying technology for "technical fixes" to the problem of returning Fairness, Objectivity, Balance and Accuracy to news.

Researchers have also found that there is a broader acceptance and trust in the objectivity of algorithmically generated content within certain contexts. Wu (2020) notes that news stories generated by algorithms rather than human journalists are perceived as more objective and credible and less biased compared to human-written stories while Baldwin-Philippi (2020) found that media's depiction of data and analytics in political campaigns (news) often amplifies the perceived objectivity and efficacy of these methods. The evidence, therefore, is clear, that deploying algorithmic/technology-driven enhancements in news analysis could be a possible solution for empowering the public with tools to recognize news they can trust. For this reason, this research paper takes the position that Sentiment Analysis [SA] with the help of AI, Machinge Learning and Natural Language Processing could be the answer to returning Fairness, Objectivity, Balance and Accuracy to news.

Defining Sentiment Analysis

Medhat et al., (2014) define Sentiment Analysis (SA) or Opinion Mining (OM) as "the computational study of people's opinions, attitudes and emotions toward an entity…The entity can represent individuals, events or topics," (p. x). While Amazon Web Services [AWS, Sentiment Analysis]) simply defines Sentiment Analysis as "the process of analyzing digital text to determine if the emotional tone of the message is positive, negative, or neutral." Though these sources principally discuss SA in business use cases, they agree that SA is not only applicable to product reviews such as in posts and comments, but this technique can also work for news articles or political debates as well (Medhat et al., 2014; AWS, Sentiment Analysis). Wu (2020) and Baldwin-Phillipi (2014) also all do agree that news stories generated by algorithms rather than human journalists, are perceived as more objective and credible and less biased compared to human-written stories. This reflects a broader acceptance and trust in the objectivity of algorithmically generated content. The next section of this paper discusses the benefits of SA that can be applied to news analysis.

Using Sentiment Analysis in News

The framework used for this study is journalistic standards set by news agencies themselves as explained and examined above. Four news canons, Fairness, Objectivity, Balance and Accuracy will be discussed to address how the strengths of SA could be explored within stories to unveil sentiments expressed about the whole story or

about entities within stories such as events, people, places and themes, as well as the tone, tenor and emotions expressed within those stories.

Objectivity

The objectivity standard calls for a just-the-facts approach to news reporting without editorializing or providing any form of personal opinions in news stories.

Schudson (2001) states that, "according to the objectivity norm, the journalist's job consists of reporting something called 'news' without commenting on it, slanting it, or shaping its formulation in any way. Sentiment Analysis is, therefore, the perfect approach to achieve this considering that, "Sentiment analysis, also known as opinion mining, is an important …tool because it provides objective insights…avoid personal bias associated with human reviewers by using artificial intelligence (AI)–based sentiment analysis tools," (AWS, Sentiment Analysis) and the results from such analysis are consistent and objective. Sentiment analysis, thus, becomes important in taking bias and lack of objective from news analytics and reports with the power and objectivity of the AI algorithms.

Fairness

The doctrine of fairness requires that no value words that would indicate or betray partisanship or side-taking be used in news reports because it primes the readers/users about what a reporter thinks or story tells about a certain entity including person, place, thing event or theme. Pratte (in Shudson, 20140 explains fairness as impartiality, opinion free and bias free news reports." Thus, analyzing for fairness is achievable using SA, since the target of SA is to find opinions, identify the sentiments they express, and then classify their polarity Medhat, W. et al. (2014).Thus it would be possible to tell where a reporter stands in regard to an entity in news stories and whether or not a news story or reporter is paying deference to one side or the other in a story.

Accuracy

Accuracy entails verifiability of the facts in a news story and the ability to report them wholly and completely in a news report. The accuracy standard requires facts in news stories to be true and verifiable with triangulation from credible outside sources if necessary. Mining information from vast amounts of data–made possible by machine learning, analyzing at scale and triangulating from multiple sources returns objective results, flagging and minimizing the propagation of falsehoods. This is also absolutely possible using AI tools with dependable results as a factor of the sheer volume of data parsed with AI and algorithmic systems. SA using AI can also point to other sources that researchers or users can further pursue in order to confirm or deny facts presented in a story. Baldwin-Phillipi (2020) and Wu (2020) have all written and reported on the advanced credibility of carefully prompted and trained AI generated/algorithmic results.

Balance

The idea of Balance calls for the presence of all sides to a story and all voices represented in news reports. According to Harcoup (2014), the idea of balance /means even-handedness and fairness in assessing and presenting different sides of an issue, argument, or conflict but not necessarily a strict evenness between the time devoted to different sources, nor does it imply that all viewpoints be treated equally. Rather, balance within journalism requires that journalists approach stories with open minds and report matters fairly, having regard to the evidence, and acknowledging the existence of different explanations and interpretations (p. x). SA is thus a reliable approach for evaluating polar opposite ideas and angles in news stories in a fair and balanced way. As an example, Fichman and Rathi (2023), found distinct differences in online trolling, disinformation, and deception when they compared differences between two ideological camps. Democrats and republicans and two prominent networks CNN and fox news across Facebook Instagram and twitter. Finding notable variations in the style and frequency of trolling activities between these platform and media channels from revieing social media comments and posts cements indicating balance in AI's ability to parse out and read differences between entities fairly.

Baldwin-Phillipi (2020) however, critiques the use of data-driven reports in political campaigns and the use of data as an omnipotent force within political campaigns (news), despite limited empirical evidence supporting such claims. In news analysis research, however, algorithmic data provides irrefutable evidence in results sought Wu, (2020) and Baldwin-Phillipi, (2020) and, therefore, this paper believes AI and algorithmic analytics is the best way to go, at this time, in evaluating news for returning Fairness, Objectivity, Balance and Accuracy to news.
Besides squarely and directly addressing journalistic canons as seen above, SA and Natural Language Process [NLP] and Machine Learning [ML] provide a host of other advantages and reasons to utilize them in news analytics as discussed further below.

Analyzing at scale and generating real time results

Unlike the manual work done by others in the field of news verification and triangulation, this paper argues for the ability to leverage the power of ML, NLP and AI capabilities to do work at scale and objectively and to add, SA offers results which will enable news users to make quick decisions about stories, sources and even motives in real time and take immediate actions. Well-built systems can even be structured to generate alerts when sentiment scores reach certain levels for particular stories, key words or entities (cf AWS, Sentiment Analysis). Such a system could even flag stories and reporters/reports when a questionable news story starts circulating. This will be real time help and support to users.

Some will argue that AI tools are not bias free, are sometimes prone to errors and hallucination and are also restricted in their abilities to parse fresh and up to the minute information, a main critique of OpenAI's ChatGPT. For instance, in comparing off the shelf automated sentiment analysis tools for content analysis against manually coded news articles to measure the tone of news stories, Bouke et al., (2020) found that off-the-shelf sentiment analysis tools are mostly unreliable and unsuitable for research purposes in the context of Dutch economic news,

and that manual validation is still necessary . However, though these (AI) tools are new to the public, they are evolving quickly. With the dawn of 2023 and onwards, AI tools are now more developed and even more sentient than before.

Also, it is necessary to create proprietary tools, specially built for reporting and specifically trained on news data, so that they can return more reliable and dependable results at scale in the news domain. This will ensure that instances of hallucination, bias etc. are greatly reduced. This is specifically the argument this paper sets out to make and also provides an adequate platform for introducing the mEditor, an AI-powered tool for news analysis.

The mEditor Tool

The mEditor describes a digital tool which will crawl the web for news stories and then utilize Artificial Intelligence to conduct Sentiment Analysis probing for themes, tone, tenor, emotions, bias and skewness of stories based on journalistic canons, then generate sentiment scores, generating various matrices, ratings and rankings for stories, reporters and news stations following prescribed parameters. It will also ensure that all stories are evaluated in fair and objective ways, generating scores instantly which users can rely on to make decisions about news to the consumer.

How it would work for News Analysis

A sentiment analysis solution categorizes text by understanding the underlying emotion. It works by training the ML algorithm with specific datasets or setting rule-based lexicons. /Seeding text (AWS, Sentiment Analysis). In the case of news, there will be no shortage of available, free and open data sets for training the AI model to perfection on the news canons as defined above. therefore, the AI algorithm will know to look for just the variables and parameters as defined and identify, classify and rank them for every news story, article or headline fed through the system with the same parameters and without the emotional bias present in human coding (The Associated Press, n.d); Wu (2020) and AWS (Sentiment Analysis).

Ramasamy and Meena Kowshalya (2022) explain that Sentiment Analysis or Opinion Mining as a technique for mining sentiment from text that effectively measures public opinion tendencies and helps in analyzing subjective information. The method evaluates opinion by assessing sentiment as positive, negative or neutral and is critical for describing real-world scenarios. They further explain that Sentiment analysis can be performed at document level, sentence level and feature level. This can be done even without enormous cost as AWS (Sentiment Analysis) offers cloud-based sentiment analysis tools whiihc allow analysis at scale and at an affordable cost offers cloud training as a means to reduce cost and there are also several other web crawling models for sourcing training data even free of charge.

Tool benefits and Recommendations

Using the mEditor, researchers will be able to analyze stories, using sentiment analysis to generate findings on reputation for fairness, balance, accuracy and objectivity by various reporters and media houses. while helping researchers to query and draw conclusions from the work of various journalists, media houses and news outlets. Thus, this tool will help in immediate and direct decision making for users. The tool will complement other platforms such as factcheck.org or reptrak.com or newsliterarcyproject.org. These various offerings focus narrowly just on checking individual facts or just putting out reputation scores for businesses in general or are for teaching news literacy and not specifically for news analytics. The mEditor will put the power back into people's hands, by giving them the ability to instantly recognize useful content from news and empowering them to make more reliable decisions. It will also help hold news outlets and reporters to account for the material they provide to the reading public today. Therefore, news houses need tools such as this as to self-police by regularly testing their news stories to check for bias, inaccuracies and skewness. The mEditor platform will continuously publish, on a daily basis, statistics and matrices about particular news businesses and reporters on their credibility indexes and thus challenge news houses to self-examine and align their practices with their sworn canons, ethics and codes of conduct.

Conclusion

As we seek to understand this new tool and technology called artificial intelligence, this is one instance where it is clear the use of AI will be a benefit as we strive for fairness, objectivity, balance and accuracy in our media waves. With the addition of artificial intelligence into the picture, the accuracy in evaluating news sources on trust factors and empowering users, through the mEditor, is dramatically improved.

Notes

This paper is the first in a series of three. The mEditor Tool is forthcoming and will be discussed in the second and third papers following. A website and app address to access The mEditor will also be provided then.

References

Ahmed, S. (2023). Navigating the maze: Deepfakes, cognitive ability, and social media news skepticism. *New Media & Society*, *25*(5), 1108-1129. https://doi-org.ezaccess.libraries.psu.edu/10.1177/14614448211019198

Amazon Web Services (n.d.). What is Sentiment Analysis? https://aws.amazon.com/what-is/sentiment-analysis/

Baldwin-Philippi, J. (2020). Data Ops, Objectivity, and Outsiders: Journalistic Coverage of Data Campaigning. *Political Communication*, *37*(4), 468–487. https://doi org.ezaccess.libraries.psu.edu/10.1080/10584609.2020.1723751

Bounegru, L., Ray, J., Venturini, T. & Mauri, M. (2017). *A field guide to "Fake News" and other information disorders: A collection of recipes for those who love to cook with digital methods*. Public Data Lab. Amsterdam.

Mark Boukes, Bob van de Velde, Theo Araujo & Rens Vliegenthart (2020) What's the Tone? Easy Doesn't Do It: Analyzing Performance and Agreement Between Off-the-Shelf Sentiment Analysis Tools, Communication Methods and Measures, 14:2, 83-104, DOI: 10.1080/19312458.2019.1671966

Edelman (2022). Edelman Trust Barometer, 2022. https://www.edelman.com/trust/2022-trust-barometer

Factcheck.org (n.d.). Our Process. https://www.factcheck.org/our-process/

Fichman, P., & Rathi, M. (2023). Trolling CNN and Fox News on Facebook, Instagram, and Twitter. *Journal of the Association for Information Science and Technology*, *74*(6). https://doi-org.ezaccess.libraries.psu.edu/10.1002/asi.24753

Harcup, T. (2014). *A Dictionary of Journalism*. Ed. 1. Oxford University Press (Online vrsn) Schudson, M. (2001). The objectivity norm in American journalism. Journalism Vol. 2(2): 149–170 [1464-8849(200108)2:2;149–170;018145] Medhat, W., Hassan, A., & Korashy, H. (2014). Sentiment analysis algorithms and applications: A survey. Ain Shams Engineering Journal, 5(4), 1093–1113. https://doi-org.ezaccess.libraries.psu.edu/10.1016/j.asej.2014.04.011

Melek, G., & Raza, Z. (2023)/ Melek, G., & Raza, Z. (2023). Three stories of one truth? Visual framing of AP, CNN & FOX news Instagram coverage of the 2020 US presidential candidates. Visual Studies, 38(5), 880-893. https://doi.org/10.1080/1472586X.2023.2209050

Myllylahti, M., & Treadwell, G. (2022). In media we trust? A comparative analysis of news trust in New Zealand and other Western media markets. Kōtuitui: New Zealand Journal of Social Sciences Online, 17(1), 90–100. https://doi.org/10.1080/1177083X.2021.1948873

News literacy project (n.d.). Our Mission. https://newslit.org/about/mission/#nlp-mission

Ramasamy, M., Meena Kowshalya, A. Information Gain Based Feature Selection for Improved Textual Sentiment Analysis. *Wireless Pers Commun* **125**, 1203–1219 (2022). https://doi-org.ezaccess.libraries.psu.edu/10.1007/s11277-022-09597-y

Reptrak.com (n.d). Reptrak Reputation Platform https://www.reptrak.com/reptrak-platform/reputation/

Schudson, M. (2001). The objectivity norm in American journalism. *Journalism* Vol. 2(2): 149–170 [1464-8849(200108)2:2;149–170;018145]

The Associated Press (n.d.). News Values and Principles. https://www.ap.org/about/news-values-and-principles/

The New York Times (n.d.). Ethical Journalism: A Handbook of Values and Practices for the News and Opinion Departments https://www.nytimes.com/editorial-standards/ethical-journalism.html#

Tsfati, Y., & Ariely, G. (2014). Individual and Contextual Correlates of Trust in Media Across 44 Countries. *Communication Research*, *41*(6), 760-782. https://doi-org.ezaccess.libraries.psu.edu/10.1177/0093650213485972

Van der Linden, S. et al (2020)./ van der Linden, S., Panagopoulos, C., & Roozenbeek, J. (2020). You are fake news: political bias in perceptions of fake news. *Media, Culture & Society*, *42*(3), 460-470. https://doi-org.ezaccess.libraries.psu.edu/10.1177/0163443720906992

Walters, P. (2022). Reclaiming Control: How Journalists Embrace Social Media Logics While Defending Journalistic Values. Digital Journalism, 10(9), 1482–1501. https://doi-org.ezaccess.libraries.psu.edu/10.1080/21670811.2021.1942113

Wu, Y. (2020). Is automated journalistic writing less biased? An experimental test of auto-written and human-written news stories. Journalism Practice, 14(8), 1008–1028. https://doi.org/10.1080/17512786.2019.1682940

Time Use and Health Outcomes in Later Life: A Racial and Ethnic Comparative Study of Older Americans

Renata Kochut, Ph.D.
SUNY Empire State University, USA

Ruifang Hope Sun, Ed.D.
SUNY Empire State University, USA

Abstract: This study examines how individuals from various racial and ethnic groups allocate their time in later years and how it affects their health outcomes. By analyzing data from the American Time Use Survey (ATUS), this research explores patterns of time use among older adults, focusing on activities such as physical exercise, paid and unpaid work, traveling, or resting. Findings indicate that results differ among various racial and ethnic groups suggesting the need for culturally appropriate interventions to improve health outcomes. The study uses multinomial logistic regression to detail the relationship between daily activities and health status and provides actionable insights for policymakers and health practitioners to foster a higher quality of life for aging populations.
Keywords: Time use, Health outcomes, Older adults

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Introduction

As the American population ages, understanding the factors contributing to healthy aging becomes increasingly critical. The National Institute of Aging lists physical activities, a healthy diet, a good night's sleep, quitting smoking and alcohol, regular doctor visits, and mental health care as factors slowing or preventing age-related declines in physical health. Time use - how individuals allocate their time across various activities each day – also appears to be a crucial element influencing health outcomes. Therefore, studies that focus on time use and health outcomes among older adults are very important and offer multiple benefits. By understanding the correlation between time use and health outcomes, public health officials and policymakers can design culturally appropriate interventions to improve health (Stewart et al., 2001, Morey et al., 2008). Also, as populations age, maintaining a high quality of life becomes a priority. Different ethnic and racial groups might have unique challenges and strengths that influence their aging process. Understanding these can help in crafting specific strategies to enhance well-being among older adults, such as by promoting activities that are shown to improve mental health, social connections, and physical health (Green et al., 2003). These studies can contribute to policymaking, promote inclusive healthcare practices that respect cultural differences (Singleton et al., 2009), and help predict future

healthcare needs and costs (Fowe et al., 2022).

Patterns of Time Use Studies

General patterns of time use among older adults are shaped by the transition from paid work to retirement (Hamermesh, 2019; Ferranna et al., 2022), changes in social roles, physical and cognitive capacities, and often health status (Capatina, 2015; Bloom et al., 2014). A reduction in paid work leads to behavior optimization and modification (French, 2005; French & Jones, 2011). Older adults often have more leisure time, which results in more physical activities like walking, gardening, golf, or aerobics activities. The literature shows that these result in positive health outcomes such as substantial improvements in physical function and reduced disability (Binder et al., 2002; Halloszy et al., 1995) or enhanced muscle strength and overall skeletal health (Gollie et al., 2022). However, with the retirement and loss of work-based social networks, older adults can become socially isolated. Being socially active through contact with friends, family, or community groups has been shown to have a positive effect on mental health and declining cognitive health (Crooks et al, 2008; Murata et al., 2019; Zhang et al., 2021). Volunteering has also been shown to have both benefits to physical and mental health due to increased social interaction and the sense of purpose it provides (UnitedHealth Group Report, 2013). Another factor positively correlated with a reduced risk of cognitive decline is spending time on mentally stimulating activities such as reading books, playing games, doing puzzles, or learning new skills. A study by Krell-Roesch et al. (2019) has shown that adults engaged in frequent and diverse mentally stimulating activities have a lower risk of developing mild cognitive impairment (MCI). Also, engaging in a variety of these activities, especially later in life, appears to offer protective benefits against cognitive decline. Similarly, participation in creative and cultural activities was found to reduce stress and improve the well-being of older adults (Crealey et al., 2023). The final factor positively correlated with health in adults 65 and older is knowledge about health and proactive healthcare management. Dong et al., (2024) found that for adult patients with chronic pain, after two years, those who received proactive care experienced less deterioration in daily living activities and better physical functioning compared to usual care. Another study by Greene & Hibbard (2012) found that higher patient activation scores, defined as the knowledge, skills, and confidence for managing one's health, were associated with better health behaviors and clinical indicators and lower usage of costly health services.

Two factors that negatively correlate with the health outcomes of older adults are poor-quality sleep patterns and sedentary behaviors that result from increased free time. With age, sleeping patterns often change, resulting in inconsistent sleeping schedules. Mander et al. (2017) find that poor and shorter sleep results in impairment on numerous cognitive tests, particularly on tasks that involve verbal memory encoding. Additional factors negatively impacting health outcomes and often leading to problems like metabolic syndrome, waist circumference, or overweightness/obesity are prolonged sedentary behaviors like watching television, extended time reading, or computer use (de Rezende et al., 2014; Taylor et al., 2020). These studies have shown that even though rest and relaxation are important for recovery and overall well-being, excessive amounts of them can lead to both physical and mental decline.

Even though we could find a vast literature analyzing the time use of elderly adults and how it influences their health, the studies that looked at racial and ethnic differences in time use are very limited. This study has two objectives. First, we aim to investigate how various racial and ethnic groups spend their time in older years and how these activities impact their overall health results. Second, we intend to identify actionable insights that can help enhance health outcomes through lifestyle interventions.

Data and Definitions

The study design utilizes data compiled from the American Time Use Survey (ATUS) by the U.S. Bureau of Labor Statistics. The ATUS measures the amount of time spent on various activities, such as paid work, childcare, volunteering, and socializing (U.S. Bureau of Labor Statistics, n.d.). Our dataset represents cross-sectional data of 45,934 observations compiled from data collected over multiple separate years: 2006-2008, 2010-2016, and 2021-2022. Each year's dataset provides a distinct snapshot, capturing information about different subjects at those specific points in time. We recognize that comparisons over time do not track the same subjects. Therefore, the setup of this study is useful for identifying broad patterns and immediate correlations rather than long-term trends or causal relationships.

Since the study analyzes the time outcomes based on the time use of elderly people, we used only data for the population of age 65 and older. The race data were simplified and divided into five groups: White, Black, Asian, Other (American Indian, Hawaiian Pacific Islander, White-Black, White-American Indian, White-Asian, White-Hawaiian, Black American Indian, Black-Asian, Asian-Hawaiian, White-Black-American Indian, White-Asian-Hawaiian) and Hispanic. Hispanic origin may be of any race but are classified as Hispanic for analysis. Table 1 shows the distribution of gender in the study population. It's skewed towards females, who constitute 60.47% of the total, while males represent 39.53%. This imbalance shows that females participate or are represented more in the survey. This distribution can highlight potential gender-based differences or biases in participation that could influence the study's findings and interpretations.

Table 1. Distribution of Gender in the Study Population

Sex	Freq.	Percent	Cum.
Female	27,775	60.47	60.47
Male	18,159	39.53	100
Total	45,934	100	

The racial distribution (Table 2) predominantly comprises of White individuals, who account for 83.52% of the total. Black individuals represent 13.67%, followed by Asians at 1.47%, and an "Other" category, which includes multiple mixed and other racial groups, making up 1.33%. Additionally, the study identifies 7.89% of the total population as Hispanic, which highlights the ethnic diversity within the group, albeit this category overlaps racially with others mentioned.

Table 2.Distribution of Race in the Study Population

Race	Freq.	Percent	Cum.
White	38,366	83.52	83.52
Black	6,281	13.67	97.19
Asian	677	1.47	98.66
Other*	610	1.33	100
Total	45,934	100	
Hispanic	3,625	7.89	

*Other includes American Indian, Hawaiian Pacific Islander, White-Black, White-American Indian, White-Asian, White-Hawaiian, Black American Indian, Black-Asian, Asian-Hawaiian, White-Black-American Indian, White-Asian-Hawaiian

Our dependent variable provides the respondent's general assessment of his or her own health and is divided into five categories: Excellent, Very Good, Good, Fair, and Poor.

The ATUS survey covers a wide range of activity categories. For this study, we decided to focus on six categories that were used as our independent variables: working and work-related activities, household services, government services and civic obligations, sports, exercise, and recreation, volunteer activities, and traveling. According to the U.S. Bureau of Labor Statistics (2023) ATUS User's Guide, working and work-related activities include time spent on any activities related to income-generating work or job search efforts. The household services variable represents any time spent arranging for and purchasing household services provided by someone else. These services can include housecleaning, cooking, lawn care and landscaping, pet care, tailoring, laundering, and dry cleaning, vehicle or home maintenance and repairs, and construction (U.S. Bureau of Labor Statistics., 2023). The government services and civic obligations variable represents time spent obtaining and using government services (police, fire, social services and time spent purchasing government-required licenses or paying fines or fees, as well as fulfilling government-required duties (jury duty, parole meetings, court appearances), and participating in activities that assist or impact government processes (voting, town hall meetings). Sports, exercise, and recreation represent participation, attending or watching sports, exercise, and recreational activities. Recreational activities include yard games like croquet or horseshoes, as well as activities like billiards and dancing (U.S. Bureau of Labor Statistics., 2023). Volunteer activities represent any unpaid activities done by the respondent. Finally, traveling represents any activity while traveling, commuting, walking, biking, or waiting for transportation. To focus on the occurrence rather than the duration of the activities, our independent variables were converted from time (minutes) to binary variables, indicating whether the respondent engaged in a specific activity during the day. The multicollinearity among the variables used in the study was assessed by examining the correlations between predictors and by calculating the variance inflation factor (VIF). The analysis indicated that there was no

multicollinearity among the variables.

Method

Since the dependent variable, genhealth, represents categories of general health status (such as poor, fair, good, very good, and excellent), we find multinomial logistic regression the most suitable econometric method for our study. Our analysis follows the following equation:

$$\text{genhealth}_i = \beta_0 + \beta_1 * \text{govserv} + \beta_2 * \text{hhserv} + \beta_3 * sports + \beta_4 * vol + \beta_5 * work + \beta_6 * travel + \varepsilon_i$$

The model estimates the log odds of being in each health category relative to the reference category based on predictors like government services, household services, sports, volunteering, work, and travel. The reference category for general health is "good". The regression analysis was performed for each race group and population of Hispanic origin.

Results

Results of the Multinomial Logistic Regression are reported based on the general health categories in tables 3, 4, 5, and 6. Table 3 shows results for "excellent" general health status reported by the respondents. For Whites, an increase in sports activities is associated with a statistically significant increase in the log odds of reporting "excellent" health status (b = 0.739, p < 0.001). In addition, volunteering activities (b = 0.438, p < 0.001), work (b = 0.548, p < 0.001), and travel (b = 0.283, p < 0.001) show a significant positive relation with the log odds of reporting "excellent" health. For Blacks, only increased sports (b = 0.729, p < 0.001) and work (b = 0.611, p < 0.01) activities are significantly associated with higher log odds of "excellent" health. The population of Hispanic origin shows a significant positive association between work activities and reporting "excellent" health status (b = 0.889, p < 0.001).

Table 3. Coefficients from MLR by Race for "Excellent" Health Status

EXCELLENT	White	Black	Asian	Other	Hispanic
govser	-0.07	-14.342	-15.868	0	-15.116
	(-0.28)	(-11.61)	(-32.03)	(.)	(-18.82)
hhserv	0.136	-0.133	14.477	0.835	0.411
	(-0.13)	(-0.46)	(-8.32)	(-1.26)	(-0.7)
sports	0.739***	0.729***	0.28	0.925	0.312
	(-0.05)	(-0.17)	(-0.33)	(-0.49)	(-0.2)
vol	0.438***	0.087	-0.083	0.882	0.439
	(-0.07)	(-0.22)	(-0.71)	(-0.71)	(-0.34)
work	0.548***	0.611**	0.748	1.086*	0.889***
	(-0.06)	(-0.19)	(-0.41)	(-0.53)	(-0.23)
travel	0.283***	0.129	0.421	0.618	0.371
	(-0.06)	(-0.15)	(-0.37)	(-0.53)	(-0.21)
cons	-1.393***	-1.764***	-1.555***	-2.240***	-1.753***
	(-0.05)	(-0.12)	(-0.33)	(-0.47)	(-0.19)

We also observed differing results by race when respondents assessed their general health as “very good” (Table 4). The results show that White respondents engaging in sports (b = 0.297, p < 0.001), volunteering (b = 0.285, p < 0.001), working (b = 0.312, p < 0.001), and traveling (b = 0.161, p < 0.001) are positively associated with the likelihood of reporting "very good" health. For the Black respondents, sports (b = 0.341, p < 0.01) and travel (b = 0.347, p < 0.001) activities were significantly associated with higher odds of reporting "very good" health.

Table 4. Coefficients from MLR by Race for “Very Good” Health Status

VERY GOOD	White	Black	Asian	Other	Hispanic
govser	-0.112	0.051	-15.832	0	-0.811
	(-0.22)	(-0.65)	(-24.88)	(.)	(-1.12)
hhserv	-0.139	0.33	15.04	-15.558	0.202
	(-0.11)	(-0.28)	(-8.32)	(-20.11)	(-0.59)
sports	0.297***	0.341**	0.085	0.016	0.238
	(-0.04)	(-0.13)	(-0.28)	(-0.4)	(-0.16)
vol	0.285***	0.043	-0.263	0.676	0.447
	(-0.06)	(-0.16)	(-0.63)	(-0.56)	(-0.27)
work	0.312***	0.071	0.288	0.103	0.201
	(-0.05)	(-0.15)	-0.39)	(-0.44)	(-0.21)
travel	0.161***	0.347***	0.081	0.306	0.057
	(-0.04)	(-0.11)	-0.29)	(-0.33)	(-0.15)
cons	-0.294***	-0.851***	-0.586*	-0.577*	-0.685***
	(-0.04)	(-0.09)	(-0.24)	(-0.27)	(-0.13)

For the “Fair” general health status (Table 5), the negative coefficients for activities suggest that less engagement in these activities is associated with a higher likelihood of reporting "fair" health. For Whites, engaging less in household services (b = -0.310, p < 0.05), sports (b = -0.305, p < 0.001), volunteering (b = -0.372, p < 0.001), work (-0.400, p < 0.001), and travel (b = -0.365, p < 0.001) is associated with higher odds of reporting "fair" health. For Blacks, less volunteering (b = -0.670, p < 0.001), work (b = -0.938, p < 0.001), and travel (b = -0.206, p < 0.05) are statistically significant and associated with higher odds of reporting "fair" health. The association with travel is also negative and significant for the Hispanic population (b = -0.378, p < 0.01).

Table 5. Coefficients from MLR by Race for “Fair” Health Status

FAIR	White	Black	Asian	Other	Hispanic
govser	-0.184	0.293	-15.758	0	0.15
	(-0.28)	(-0.58)	(-27.53)	(.)	(-0.71)
hhserv	-0.310*	-0.319	1.129	-0.358	-0.471
	(-0.15)	(-0.34)	(-8.32)	(-1.25	(-0.63)
sports	-0.305***	-0.156	0.312	-0.787	-0.008
	(-0.06)	(-0.14)	(-0.3)	(-0.5	(-0.15)
vol	-0.372***	-0.670***	0.256	-14.941	-0.101
	(-0.08)	(-0.18)	(-0.64)	(-807.44	(-0.27)

work	-0.400***	-0.938***	-1.054	0.072	-0.234
	(-0.08)	(-0.19)	(-0.65)	(-0.44	(-0.21)
travel	-0.365***	-0.206*	-0.414	0.293	-0.378**
	(-0.04)	(-0.09)	(-0.3)	(-0.33	(-0.12)
cons	-0.253***	-0.054	-0.559*	-0.428	0.237*
	(-0.04)	(-0.07)	(-0.25)	(-0.27	(-0.1)

Finally, Table 6 shows regression results for the "Poor" general health category by race. For Whites a significant negative association with "poor" health (b = -0.932, p < 0.01) suggests that more household services activities are associated with lower odds of reporting "poor" health. Similarly, more sports (b = -0.695, p < 0.001), volunteering (b = -0.718, p < 0.001), work (b = -1.105, p < 0.001), and travel (b = -0.893, p < 0.001) activity is significantly associated with lower odds of reporting "poor" health. For Blacks, more sports (b = -0.499, p < 0.05), volunteering (b = -1.374, p < 0.001), work (b = -1.708, p < 0.001), and travel activity ((b = -0.763, p < 0.001) are significantly associated with lower odds of reporting "poor" health. For Asians (b = -0.962, p < 0.05), Others (b = -1.352, p < 0.01), and Hispanics (b = -0.782, p < 0.001), more travel activity is significantly associated with lower odds of reporting "poor" health. The chi-square statistics and associated probabilities that are reported for the regressions in Table 6 indicate that the models are overall statistically significant. Also, Psudo R2 values indicate a reasonable fit for logistic regression models.

Table 6. Coefficients from MLR by Race for "Poor" Health Status

POOR	White	Black	Asian	Other	Hispanic
govser	0.06	0.422	-15.275	0	1.025
	(-0.41)	(-0.83)	(-48.08)	(.)	(-0.77)
hhserv	-0.932**	0.337	15.904	-15.286	0.678
	(-0.3)	(-0.44)	(-8.32)	(-29.44)	(-0.64)
sports	-0.695***	-0.499*	0.524	-0.511	-0.663**
	(-0.1)	(-0.23)	(-0.46)	(-0.6)	(-0.25)
vol	-0.718***	-1.374***	1.381	0.623	-0.878
	(-0.15)	(-0.4)	(-0.75)	(-0.89)	(-0.54)
work	-1.105***	-1.708***	0.287	-14.24	-0.69
	(-0.16)	(-0.46)	(-0.69)	-6.98	(-0.37)
travel	-0.893***	-0.763***	-0.962*	-1.352**	-0.782***
	(-0.06)	(-0.13)	(-0.49)	(-0.44)	(-0.17)
cons	-0.821***	-0.768***	-1.743***	-0.35	-0.474***
	(-0.05)	(-0.09)	(-0.38)	(-0.26)	(-0.12)
Nb of obs	21,002	3,582	394	333	2,072
LR chi2	1483.43	270.84	36.1	64.63	136.17
Prob>chi2	0	0	0.05	0	0
Psudo R2	0.37	0.33	0.13	0.16	0.22

Conclusions and Actionable Insights

The results support the common view that how different racial and ethnic groups spend their time does impact

their overall health, particularly as they age, with noticeable differences among the groups. These differences can be also indicative of varying health outcomes based on racial and ethnic backgrounds due to disparities in access to healthcare, socioeconomic status, community resources, and cultural factors. To draw more concrete conclusions, further research specifically focusing on health outcomes linked to these activities would be necessary. However, based on the study results, targeted recommendations can be made for different racial and ethnic groups. For the White population, we see benefits in the development of programs that encourage participation in sports and physical activities, as these were strongly associated with both "excellent" and "very good" health. Additionally, programs that promote and facilitate volunteering opportunities should be encouraged as they are linked to better health outcomes. Finally, it is important to work towards policies that support a healthy work-life balance to ensure that work activity contributes positively to health without leading to burnout. For the Black population, the recommendations include supporting sports initiatives, improving access to quality jobs as well as encouraging and facilitating access to travel and leisure activities, as all these have a beneficial effect on health outcomes. For the Hispanic population, work seems to be an important factor; thus, improving job opportunities could enhance health outcomes. Furthermore, encouraging sports and travel activities may benefit this group's health. Lastly, for Asian and other racial categories, the results showed that the most beneficial programs for these groups should be culturally tailored to ensure they are relevant and effective within specific community contexts. Also, improving access to both preventive and curative health services can significantly improve health outcomes.

References

Binder, E. F., Schechtman, K. B., Ehsani, A. A., Steger-May, K., Brown, M., Sinacore, D. R., Yarasheski, K. E., & Holloszy, J. O. (2002). Effects of exercise training on frailty in community-dwelling older adults: results of a randomized, controlled trial. Journal of the American Geriatrics Society, 50(12), 1921–28.

Bloom, D. E., Canning, D., and Moore, M. (2014). Optimal retirement and saving with increasing longevity. Scandinavian Journal of Economics 116(3): 838–858.

Capatina, E. (2015). Life-cycle effects of health risk. Journal of Monetary Economics 74: 67–88.

Crealey, G., McQuade, L., O'Sullivan, R., & O'Neill, C. (2023). Arts and creativity interventions for improving health and wellbeing in older adults: a systematic literature review of economic evaluation studies. BMC public health, 23(1), 2496.

Crooks, V. C., Lubben, J., Petitti, D. B., Little, D., & Chiu, V. (2008). Social network, cognitive function, and dementia incidence among elderly women. American journal of public health, 98(7), 1221–1227.

De Rezende, L. F. M., Rey-López, J. P., Matsudo, V. K. R., & do Carmo Luiz, O. (2014). Sedentary behavior and health outcomes among older adults: a systematic review. BMC Public Health, 14(1), 333–333.

Dong, HJ., Peolsson, A. & Johansson, M.M. (2024). Effects of proactive healthcare on pain, physical and activities of daily living functioning in vulnerable older adults with chronic pain: a pragmatic clinical trial with one- and two-year follow-up. Eur Geriatr Med.

Fowe, I. E., & Boot, W. R. (2022). Understanding older adults' attitudes toward mobile and wearable technologies

to support health and cognition. Frontiers in Psychology, 13, 1036092–1036092.

French, E. (2005). The effects of health, wealth and wages on labor supply and retirement behavior. Review of Economic Studies 72(2): 395–427.

French, E., and Jones, J. B. (2011). The effects of health insurance and self-insurance on retirement behavior. Econometrica 79(3): 693–732.

Gollie, J. M., Cohen, S. D., & Patel, S. S. (2022). Physical Activity and Exercise for Cardiorespiratory Health and Fitness in Chronic Kidney Disease. Reviews in cardiovascular medicine, 23(8), 273.

Green, C.R., Anderson, K. O., Baker, T. A., Campbell, L. C., Decker, S., Fillingim, R. B., Kaloukalani, D. A., Lasch, K. E., Myers, C., Tait, R. C., Todd, K. H., Vallerand, A. H. (2023). The Unequal Burden of Pain: Confronting Racial and Ethnic Disparities in Pain, Pain Medicine, 4(3), 277–294.

Greene, J., & Hibbard, J. H. (2012). Why does patient activation matter? An examination of the relationships between patient activation and health-related outcomes. Journal of General Internal Medicine, 27(5), 520–526.

Hamermesh, D. (2019). Spending Time: The Most Valuable Resource. Oxford University Press.

Holloszy J.O., Kohrt W.M. (1995). Sect. 11. Chapt. 24: Exercise. In: Handbook of Physiology. Aging. Bethesda (MD): American Physiological Society; p. 633-66.

Krell-Roesch, J., Syrjanen, J. A., Vassilaki, M., Machulda, M. M., Mielke, M. M., Knopman, D. S., Kremers, W. K., Petersen, R. C., & Geda, Y. E. (2019). Quantity and quality of mental activities and the risk of incident mild cognitive impairment. Neurology, 93(6), e548–e558.

Mander, B. A., Winer, J. R., & Walker, M. P. (2017). Sleep and Human Aging. Neuron, 94(1), 19–36.

Morey MC, Sloane R, Pieper CF, Peterson MJ, Pearson MP, Ekelund CC, Crowley GM, Demark-Wahnefried W, Snyder DC, Clipp EC, Cohen HJ. (2008). Effect of physical activity guidelines on physical function in older adults. J Am Geriatr Soc.;56(10):1873-8.

Murata, C., Saito, T., Saito, M., & Kondo, K. (2019). The Association between Social Support and Incident Dementia: A 10-Year Follow-Up Study in Japan. International journal of environmental research and public health, 16(2), 239.

National Institute on Aging. (n.d.). What do we know about healthy aging? Retrieved on 4/29/2024, from https://www.nia.nih.gov/health/healthy-aging/what-do-we-know-about-healthy-aging

Singleton, K., Krause, E., (Sept. 30, 2009) "Understanding Cultural and Linguistic Barriers to Health Literacy" OJIN: The Online Journal of Issues in Nursing. Vol. 14, No. 3, Manuscript 4.

Stewart, Anıta & Mılls, Krıstın & Kıng, Abby & Gıllıs, Dawn & Ritter, Philip. (2001). CHAMPS Physical Activity Questionnaire for Older Adults: Outcomes for interventions. Medicine and science in sports and exercise. 33. 1126-41. 10.1097/00005768-200107000-00010.

Taylor, W. C., Rix, K., Gibson, A., & Paxton, R. J. (2020). Sedentary behavior and health outcomes in older adults: A systematic review. AIMS Medical Science, 7(1), 10+.

U.S. Bureau of Labor Statistics. (2023). American Time Use Survey user's guide. Retrieved on 4/30/2024, from https://www.bls.gov/tus/atususersguide.pdf

U.S. Bureau of Labor Statistics. (n.d.). Overview of BLS Statistics on Spending and Time Use. Retrieved on 4/30/2024, from https://www.bls.gov/bls/spending.htm

UnitedHealth Group. (2013). Health and Volunteering Study. Retrieved on 4/29/2024 from https://www.unitedhealthgroup.com/content/dam/UHG/PDF/2013/UNH-Health-Volunteering-Study.pdf

Zhang, Y., Natale, G., & Clouston, S. (2021). The Characteristics of Social Network Structure in Later Life in Relation to Incidence of Mild Cognitive Impairment and Conversion to Probable Dementia. Journal of Alzheimer's disease: JAD, 81(2), 699–710.

Secondary School Students' Views on Global Climate Change and Weather Events

Özkan AKMAN

Süleyman Demirel University, Isparta , https://orcid.org/0000-0002-8264-3178

Melis ORUÇ

Süleyman Demirel University, Isparta, https://orcid.org/0009-0001-7186-8873

Abstract: Climate change, which has become one of the most important problems of our age, has increased its impact in recent years. The aim of this study is to determine the views of students taking social studies and science courses in secondary school about global climate change, the factors that cause global climate change, and how to intervene in global climate change. Global climate change is an important problem that needs to be analyzed in a broad framework. It has an impact on every aspect of life and this increases its importance. If the right interventions are not made, it will have unavoidable consequences. Individuals should take responsibility for this. In line with this study, how much individuals know about global climate change and their awareness will help solve this problem. The research was prepared using semi-structured interview technique from qualitative research methods. The study was conducted with the participation of 50 7th and 8th grade students. In the light of the results obtained, it is seen that most of the participants have superficial knowledge about global climate change and these are rote knowledge. It is seen that most of the participants do not have sufficient knowledge about what should be done to prevent the causes of global climate change. Most of the participants explained the effects of global climate change on our country by emphasizing the increase in air temperature and the change of seasons. As a result, the education of students about what global climate change is, how it occurs and how it should be combated should be continued in a spiral manner, starting from an early age. By giving students responsibility, we should ensure that they grow up as conscious and responsible individuals. In order to combat global climate change, everyone in the country should fulfill their responsibilities.

Keywords: Global climate change, Environmental problems, Awareness.

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Introduction

Climate is the average of the weather conditions reached as a result of long-term observations in any area on earth. According to climatologists, weather is the name given to all atmospheric events experienced in any area and at

any moment on earth (Türkeş, 2000). National meteorological organizations regularly record climate elements such as weather, rain, hail, snow, lightning, storms (Türkeş, M., Sümer, U. M. and Çetiner, G. 2000). The climatic elements that affect living beings the most in their vital activities are temperature, precipitation, humidity and wind (Kayhan, 2007). Many human activities depend on weather events and short-term predictions allow people to organize their lives by being affected by the weather. Climate change is defined as changes in precipitation and temperature patterns (Rankoana, 2016).

The world was in constant change until the existence of man. As humanity has become more active in the world, this change in the world has accelerated. The influence of human beings on the world has increased the interaction between nature and human beings by becoming more effective day by day. As a natural result of this interaction, changes took place. These changes have increased in the industrialization process that started with the Industrial Revolution. With the industrial revolution, as a result of the increase in the use of fossil fuels with the influence of humans as well as natural factors, and consequently the destruction of forests and consequent changes on the land and industrialization, the accumulation of greenhouse gases in the atmosphere is increasing, which leads to an increase in temperatures and consequently to a change in climates (DPT, 2000:2). In this process, increasing consumption due to population increases and rapid consumption of resources have negatively affected the natural environment and accelerated global climate change. The climate change experienced in the oceans and continents on a global scale in recent years has had an impact on people and natural systems, and for example, the change in precipitation regimes, melting of snow and glaciers has become a threat to many lives (Demirbaş and Aydın, 2020). Changing seasons, decreasing precipitation and increasing temperatures have led to loss of agricultural yield. This leads to a food crisis. Global climate change is an environmental disaster that occurs in the context of many problems. In this respect, global climate change is multidimensional and complex (Kahraman, Şenol, 2018). Its complexity comes from the complexity of the human-nature relationship. Global climate change causes huge environmental problems that increase with the impact of human beings and affect the whole world with its consequences. These environmental problems affect all human life. The fact that it affects all human life is a kind of indicator of how important global climate change is. According to researches, the Mediterranean Climate Zone, which includes Turkey, is one of the places where the effects of climate change will be seen much more (Selçuk, 2023). The plans to be made in this direction should be carefully prepared and applicable. Everyone should act selflessly while our world is in such danger. All stakeholders, non-governmental organizations, educational institutions and the media have important duties to combat global climate change (Atik, Doğan, 2019).

In order to combat climate change, the awareness levels of decision-making mechanisms in society should be increased (Yüce, Yörük & Varer, Akpınar, 2023). Awareness movements in this direction will make the complex structure of climate change a little more understandable. Therefore, awareness is important. The change seen in awareness of climate change is the increase in temperatures and decrease in precipitation (Rankoana, 2016). These changes are the most noticeable. The problems experienced by individuals in their environment related to climate change have made them more sensitive to the issue (Gülsoy & Korkmaz, 2020). For individuals living in the village, drought and low rainfall bring difficult periods for agriculture. However, the degree of importance varies for someone living in the district. The environment in which they live makes them more interested in that subject.

Educational institutions should provide the education needed to raise awareness against global climate change and to raise environmentally sensitive and conscious individuals (Kaya, 2022). The education to be provided in educational institutions should be qualified, comprehensive and from a critical perspective. In this direction, environmental education is realized through lifelong education in order to raise individuals and societies who can decide on the rapid changes brought by the age of environmental education, implement them, care about the environment and environmental problems and act with concern (Kaya, 2022). Research shows that many students have superficial and incorrect knowledge of the concept of climate change (Lee, Lester, Ma, Lambert & Jean-Baptiste, 2007). When the literature is examined, many studies have been conducted to investigate students' misconceptions about environmental problems (Ayvacı & Çoruhlu, 2009).

Teachers are the key point here. In order for teachers to fulfill their responsibilities on this issue in the most accurate way, the curriculum to be prepared should be prepared for today's expectations and for the future. Trainings can be provided to improve teachers' knowledge on climate change (Kaya, 2022). In the studies conducted, it was determined that teachers had similar misconceptions about climate change. The fact that teachers have the same misconceptions with students will cause students to learn incorrectly. In order to prevent this, teachers should first organize their knowledge and have more accurate knowledge about that subject. Teachers will provide students with the right knowledge. This is why teachers are the key to education.

Purpose of the Research

This study was conducted to learn the views of middle school students on global climate change and weather events. In order to find out what global climate change is, what are its possible effects on Turkey and what can be done to prevent it, it was tried to understand how sensitive, interested and conscious students are about their environment. It was aimed to determine the students' level of knowledge and misconceptions about the subject. It was tried to have information about what their awareness is and what they pay attention to. In this direction, the following questions were sought to be answered in accordance with the study;

1. What are the students' opinions on the causes, consequences and impact of global climate change?
2. Is the place where students live effective in their attitudes towards global climate change?
3. What kind of policy should be followed to prevent global climate change?

Method

Research Model

Action research, one of the qualitative research designs, was used. Action research is a qualitative research design that requires active participation in order to understand a problem, issue or situation and to produce solutions and intervene (Elliott, 1996). Action research consists of four steps: (1) seeing, (2) thinking, (3) action and (4) results (Berg, 2001). Action research generally focuses on a specific context and the results are valid in that context

(Özdemir & Tuti, 2023).

Qualitative data collection tools such as observation, interview and document analysis are used in qualitative research (Yıldırım and Şimşek, 2008, p.39). Interview is a technique based on mutual interaction and communication (Yazıcıoğlu, 2020). The basis of the interview is a conversation to collect information (Berg & Lune, 2015.) Interview is a way of explaining the feelings and thoughts of the people participating in the research on that subject. In this study, semi-structured interview technique, one of the sub-techniques of interview, was used. In this technique, interview questions are prepared in advance, but during the interview, the researcher is given flexibility and the opportunity to reorganize them. provides.

Working Group

The study group of the research consists of 7th grade and 8th grade students studying in a central and a village secondary school in Yalvaç District of Isparta Province in the 2023-2024 academic year. It was applied to a total of 50 students. Since the data of 30 students were missing, the data of 20 students were taken into consideration. Of the 20 students who participated in the study, 5 were in the 7th grade and 15 were in the 8th grade. Twelve of the students participating in the study were girls and eight were boys.

Table 1. *Distribution of Students by Grade Level and Place of Residence*

	Class Level	
Place of Residence	7th grade	8th grade
Village	5	6
Center	0	9
Total	5	15

Data Collection

In this study on global climate change, a semi-structured interview form was used in qualitative research methods. The data were collected with a semi-structured interview form created by the researcher. A literature review was conducted in the preparation of the interview questions. The draft form was reorganized in line with expert opinions and finalized. Care was taken to ensure that the prepared questions were easy to understand. The interview was completed within one class hour. Questions used in the interview form;

1) What do you think about global climate change?
2) What are the impacts of global climate change on Turkey?
3) What do you think are the factors that cause global climate change?
4) What can be done to prevent global climate change?
5) Do you have concerns about global climate change and if so, what are they?

Data Analysis

In qualitative research, there are two data analysis processes: descriptive and content analysis (Yıldırım & Şimşek, 2008: 223-230). In this study, descriptive analysis method and content analysis method were used. Descriptive analysis is the description of the demographic characteristics and different qualities of the participants (Miles and Huberman, 1994). The data collected in content analysis are analyzed in four stages (1) collecting data, (2) finding codes, themes and categories, (3) organizing codes, categories and themes, and (4) interpreting the findings (Eysenbach and Köhler, 2002; Miles and Huberman, 1994). The data obtained from the semi-structured interview form were first pre-reading. Then the data obtained were transferred to the computer. The data pre-read by the researcher were categorized according to the themes. During the analysis, the interviewed students were given numbers such as S1, S2, ...S19, S20 respectively. The data were analyzed without any changes and collected on certain themes. The data were shown in a table to increase comprehensibility.

Results

The findings of the students' opinions on what they think about global climate change, what are its effects on Turkey, what causes it, what can be done to prevent it and what are their concerns about the issue are presented in Tables 2,3,4,5 and 6 below.

Table 2. *Thoughts on Global Climate Change*

Theme	Codes (Student views)	Frequency
Reflections on global climate change	Early warming of the weather	4
	Disrupting the equilibrium	4
	Extreme weather events	3
	People's irresponsibility	3
	It harms living things	2
	Technology reaching dangerous levels	1
	Fossil fuel use	1
	Impact of greenhouse gases	1
	Global warming	1

The coding based on the question “What do you think about global climate change?” was shown through the theme. By examining the definitions, 4 of the students defined it as early warming of the weather, 4 as disruption of the balance, 3 as extreme weather events, 3 as irresponsibility of people, 2 as damaging to living things, one as the use of fossil fuels, one as the effect of greenhouse gases and one as global warming. Most of the students tried to explain global climate change through a single situation. They did not make an association with other situations.

S9: “*Global climate change is an important event for humans. As a result of global warming, our world is slowly*

disappearing and one of the biggest causes of global warming is humans. People are slowly losing their home, that is, their world, because of what they do and what they cannot do".

S4: "*Because habitats, that is, the natural habitats of some animals, are starting to disappear and the temperature is constantly increasing".*

S8: "*Global climate is a worrying situation. What is worrying is that it affects many areas. Most importantly, it affects our life, therefore global climate is important".*

S7: "*The change of glaciers due to the effect of greenhouse gases is climate change and this is called global climate change".*

Table 3. *Student views on the effects of global climate change on Turkey*

Theme	Codes (Student views)	Frequency
Impacts of global climate change on Turkey	Drought	7
	Agricultural yield loss	5
	Declining water resources	5
	Change of seasons	3

The coding of the answers given to the question "What are the effects of global climate change on Turkey?" is shown through the theme. Accordingly, 7 of the students stated drought, 5 stated loss of agricultural yield, 5 stated decrease in water resources, and 3 stated change of seasons. According to the opinions of the students, the situation in which Turkey is most affected by global climate change is drought. Following this, loss of agricultural yield and decrease in water resources are the main factors. This is also the opinion of the students.

S17: "*Decrease in biodiversity and increase in unwanted species and insect infestation, increase in forest fires, decrease in rainfall".*

S18: "*Drought caused by decreased rainfall. Food crisis due to the decrease in agriculture as a result of drought. Increase in forest fires".*

S11: *"Increasing unseasonal temperatures and seasonal differences in Turkey affect daily life and production. Untimely hot and cold imbalances damage the products, the yield in production decreases day by day with the factors of agricultural frost and drought, and the risk of famine occurs in the future".*

Table 4. *Student views on the factors that* cause *global climate change*

Theme	Codes (Student views)	Frequency
Causes of global climate change	Fossil fuel use	5
	Forest degradation	4
	Exhaust emissions	4
	Factory chimneys	3
	Greenhouse gases	2
	Ozone layer	2

The opinions of the students who answered the question "What do you think are the factors that cause global climate change?" were coded and thematized. Five students answered fossil fuel use, four student answered deforestation and exhaust emissions, three students answered factory chimneys, and two students each answered ozone layer and greenhouse gases. In terms of the reasons in the opinions of the students, human impact is the obvious reason. Excessive use of fossil fuels such as coal, oil, natural gas and exhaust emissions are the main reasons. Forests are very sensitive to climate change and forests have become even more vulnerable to fire, settlement and agriculture (Öztürk, 2002). In addition, two students' view of the ozone layer is a misconception. This should be corrected.

S6: "*The ozone layer is depleted due to the use of deodorants etc., fossil fuels are used, greenhouse gases affect, exhaust fumes, fumes from factory chimneys pollute the air. People throw garbage on the ground".*
S19: *"Exhaust gases from cars, gases released from deodorants, cutting down trees, gases released into the air from factory chimneys".*

Table 5. *Students' views on what can be done to prevent global climate change*

Theme	Codes (Student views)	Frequency
Preventing Global Climate Change	Afforestation	8
	Reducing car use	4
	Raising public awareness	3
	Installing filters on factory chimneys	3
	Use renewable energy sources	2

Student opinions on the question of what can be done to prevent global climate change are as above. According to Table 5, 8 of the students stated afforestation, 4 of the students stated reducing the use of cars, three students each stated raising public awareness and installing filters on factory chimneys, and two students stated using renewable energy sources.

S12:" *It can be prevented by a joint decision of all countries, especially by rapidly switching to electricity in vehicles, stopping and banning the production of perfumes and deodorants".*
S10: *"The wastes released into nature should be taken under control, factories should be inspected, filters should be installed in their chimneys, forest fires should be prevented and reduced as much as we can, afforestation should be done".*
S5:" *Everyone should use public transportation instead of having individual cars. Chimneys in factories should be fitted with things like filters".*

Students' opinions on concerns about global climate change are given. According to Table 6, 9 of the students expressed their views on thirst and drought, 4 on resource crisis, 3 on extinction of animal species, two students each on wastes and severe weather events.

Table 6. *Student views on concerns about global climate change*

Theme	Codes (Student views)	Frequency
Concerns about global climate change	Dehydration, drought	9
	Resource crisis (food, water)	4
	Animal extinction	3
	Waste (Garbage)	2
	Severe weather events	2

The majority of students expressed their concerns over drought and thirst. The 3 students who expressed their views on animal extinction live in the village.

S12*:" I believe that the effects will be more at the end of the next 20-30 years. I have concerns such as groundwater withdrawal and drying up of ponds".*
S20: *"Yes. We can say that there will be an increase in the frequency and impact of extreme weather events such as drought, floods, severe hurricanes, rise in ocean and sea water levels, increase in the acidity of the oceans, melting of glaciers".*
S11: *" Yes, there is. If permanent measures are not taken against climate change and temperature increases day by day, drought will increase, drinking water shortage will occur, production will decrease, famine will occur and many species will be in danger of extinction".*

Discussion & Conclusion

Our world has undergone continuous change since its existence and this change has never stopped in any period. Our world will continue to change in the future. The fact that people actively abuse nature and do not give the necessary value has led to environmental problems. Climate change has accelerated with the influence of humans. The inability of the states to take the necessary measures has made climate change unavoidable. As climate change has become more evident in recent decades, it has signaled the problems that will be experienced in the future. Global climate change shows its effect in every field. It has an impact on health, economy, agriculture, water resources, industry, etc. (Şen, 2022). The drought problem experienced in recent years due to the location of its impact on Turkey stands out. Water scarcity is the main problem to be experienced now and in the future. It is thought that the food crisis and clean water issue carries a great risk in the coming periods and will affect health conditions and pose vital dangers (Emecen, Y. and Erdem, N. 2022).

This study aims to investigate middle school students' attitudes towards global climate change and weather events. In this study, in general, students' opinions were collected on the basis of drought, lack of precipitation and water problems that we encounter as problems in our normal lives. Based on the basic problems, students explained global climate change. Although they have insufficient knowledge about what can be done to prevent global climate change, all of the examples given about what can be done are common superficial information. As Emecen

and Erdem (2022) say, a general awareness has started to be formed starting from children.

Is the place where students live effective on their attitudes towards the subject? To answer this question, the study was conducted in two different settlements. Students living in the village generally discussed global climate change in terms of natural environment, agriculture and animal husbandry. Students living in the district explained it in terms of drought and weather conditions. The fact that students living in the village are more intertwined with animals and the natural environment has an effect on this. The problems they experienced in agriculture were the lack of precipitation and the difficulties in agriculture due to the constant change in the weather. Students living in the district explained their views based on general knowledge.

There are many reasons for the low level of students' knowledge. These reasons may be that the environmental education subject in the curricula is not discussed in detail, its achievements are insufficient, it is not presented to the students in an understandable way, effective environmental education is not provided, teachers cannot correct misconceptions, etc. (Atik and Doğan, 2019). Inadequate knowledge of teachers in correcting misconceptions will cause students to learn incorrectly. Care should be taken to ensure that the education to be given to these students is qualified and applicable. We need to deepen students' superficial knowledge. Students come to schools with the education received from their families, and teachers who will advance this education should continue education with a lifelong structuring starting from Grade 1. Climate change is a global problem. It concerns the whole world, not a single region or area. Decisions that concern everyone from children to the elderly should be taken with the joint decision of all countries. It should be explained to all segments of the public and explained in detail. Educators should improve themselves on this issue. It is necessary to raise conscious people who are aware of global climate change, who love and protect nature.

Recommendations

The suggestions developed according to the findings obtained in the study are given below:
1) Students' misconceptions and misinformation in the context of the subject should be corrected and the reasons for this should be examined.
2) The concept of global climate change should be examined in the curriculum and how it should be organized.

References

Atik, A.D., Doğan, Y., *High School Students' Views on Global Climate Change*. Academy Journal of Educational Sciences. 2019;3:84-100.

Ayvacı, H. Ş. and Çoruhlu, T. Ş. (2009). *A developmental research on students' views on global environmental problems and misconceptions*. Journal of Hasan Ali Yücel Faculty of Education, 12(2), 11-25.

Berg, B. L. (2001). Qualitative research methods for the social sciences (4th ed.). Allyn and Bacon.

Berg, B. L., & Lune, H. (2015). *Qualitative research methods in social sciences.* (Translated by Aydın H.). Konya:

Eğitim Publishing House.

Demirbaş, M. and Aydın, D., (2020). *The 21st Century's Biggest Threat: Global Climate Change*, Ecological Life Sciences (NWSAELS), 15(4):163-179, DOI: 10.12739/NWSA.2020.15.4.5A0143.

DPT (2000), *Climate Change Special Specialization Commission Report*, Eighth Five-Year Development Plan, Ankara.

Emecen, Y. and Erdem, N. (2022). *Evaluation of Awareness towards Climate Change from the Perspective of University Students:* The Case of Ondokuz Mayıs University Faculty of Architecture. Meriç International Journal of Social and Strategic Research, 6(16), 206-224.

Eysenbach, G., & Köhler, C. (2002). *How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews.* Bmj, 324(7337), 573-577 .

Gulsoy, E., Korkmaz, M., *The effects of socio-economic characteristics of university students on their perceptions of global warming and climate change.* Turkish Journal of Forestry. 2020;21:428-37.

Kahraman, S. & Şenol, P. (2018). *Climate Change: Global, Regional and Urban Impacts.* Ankara.

Kaya, N. (2022) *Climate Change Education*.Ankara: Pegem Akademi.

Kayhan M. 2007. *Global Climate Change and Turkey*. Proceedings of I. Turkey Climate Change Congress, 81-83.

Lee, O., Lester, B.,Ma, L., Lambert, J.& Jean- Baptiste, M.(2007). *Conceptions of the greenhouse effect and global warming among elementary students from diverse languages and cultures.* Journal of Geoscience Education, 55(2), 117-125.

Miles, M. B. and Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook.* New York: Sage Publications, Inc.

Özdemir, M. & Tuti, G. (2023). *Qualitative research designs: A methodological grounding.* Journal of Çankırı Karatekin University Karatekin Faculty of Literature, 11(2), 217-235.

Öztürk, K. *Global Climate Change and Its Possible Effects on Turkey*, Journal of Gazi Faculty of Education Volume 22, Issue 1 (2002) 47-65.

Rankoana, S.A., 2016. *Perceptions of climate change and the potential for adaptation in a rural community in Limpopo Province,* South Africa. Sustainability, 8(672): 1-10.

Selçuk, S. F. (2023*). International climate change agreements and Turkey's attitude*. National Research Journal of Environmental Sciences. (2023) Issue 6(1): 9-19.

Şen, Z. (2022). "*Climate Change and Turkey",* Journal of Environment, City and Climate. Year: 1. Issue: 1. pp. 1-19.

Türkeş, M.(2001). *Weather, climate, severe weather events and global warming*. General Directorate of State Meteorological Affairs 2000 Year Seminars, Technical Presentations, Seminar Series: 1: 187-205, Ankara.

Türkeş, M., Sümer, U. M. and Çetiner, G. 2000. *'Global climate change and its possible impacts'*, Ministry of Environment, United Nations Framework Convention on Climate Change Seminar Notes (April 13, 2000, Istanbul Chamber of Industry), 7-24, Gn. Md., Ankara.

Yazicioglu, A (2020). Data Collection Tools. Oğuz, E (Ed.), *Research Methods in Education* (pp:141-165). Ankara: Eğiten Kitap.

Yıldırım, A. & Şimşek, H. (2008). *Qualitative Research Methods in Social Sciences* (6th Edition). Ankara: Seçkin Publishing.

Yüce Yörük EA, Varer Akpınar C. Global Climate Change Awareness of Students at a University, Osmangazi Journal of Medicine, 2023;45(4):471-479 Doi: 10.20515/otd.1278028

Linking Components of Aesthetic Experience with Aesthetic Information Processing

Szu-Tien Peng

National Cheng Kung University, Taiwan, https://orcid.org/0009-0003-6338-6764

Yu-Yu Chang

National Cheng Kung University, Taiwan, https://orcid.org/0000-0003-2458-0567

Abstract: In the context of experience economy, the significance of experiential quality in influencing decision-making has been underscored, with World Economic Forum (2019) reporting that 78% of millennials prioritise paying for desirable experiences over material purchases. This shift highlights the evolving consumption values and the central role of aesthetic experience in contemporary consumer behaviour. Despite the recognised importance of aesthetic experience, existing research has largely treated the components of aesthetic experience and models of aesthetic information processing as distinct areas of enquiry, revealing a critical gap in understanding how these domains interact. By integrating 9 aesthetic components identified in prior research with Five Stage Model of Aesthetic Information Processing proposed by Leder et al. (2004), a systematic literature analysis is carried out in this study, seeking to elucidate the sequence in which aesthetic elements are triggered within a cohesive processing framework. This paper aims to provide insights on mechanisms underlying aesthetic experience, and thereby contributes to academic discourse in cultural and creative industries, theoretical implications on study of aesthetics in consumer behaviour, and practical implications on enhancing consumer engagement.

Keywords: aesthetic experience, aesthetic information processing, components of aesthetic experience

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Introduction

"Experience" has been a dominant keyword from different perspectives in modern society, some of the commonly used terms include "user experience", "experience store", and "experience marketing". According to World Economic Forum (2019), "78% of millennials choose to spend money on a desirable experience over something material", suggesting that the value of experience has indeed increased, becoming one of the key determinants for one to consider when making decisions, which as well bring us to the era of experience economy (Pine II & Gilmore, 1998).

Along with the rising importance of experience, the term "aesthetic experience" has also gained its recognition overtime. The concept "aesthetic experience" can be dated back to the 18th century, aiming for a deep engagement with arts, elevation of real art over other cultural media, and a special form of contact with the world, etc. (Peacocke, 2023). Philosophers since then has made use of the idea aesthetic experience for diverse purposes, inclusive of but not limited to special forms of "cognitive contact" with the world, and arguments for personal or social importance of "sensibility" (Schiller 1795 [1989]; Peacocke, 2023).

Once considered a term far away from everyday experience, the concept "aesthetic" has now become a frequently raised term in our daily life. However, studies analysing the way individuals perceive aesthetic stimuli do not seem to align such circumstance, as stimuli provided in the accessed studies remain art-specific, with the possibility of their application to other fields noted merely in conclusion. There are studies exploring components of aesthetic experience, and there are studies investigating aesthetic information processing models, but studies integrating both can rarely be accessed. Therefore, this study is carried out to take a step and bridge the gap by making connections between the components of aesthetic experience and one of the aesthetic information processing models.

The following study will include background information explaining the gaining importance of aesthetic experience, literature review on components of aesthetic experience and information processing models, along with the ways components of aesthetic experience and the selected processing model are linked. By the end of this study, it is expected that a connection among components of aesthetic experience and the specified processing model be recognised, and potentially trigger further investigation or experiment ideas.

Background

Experience Economy

The progress of economy, as mentioned in Harvard Business Review in 2014 (Pine II & Gilmore, 1998), can be recapitulated in an evolution of four stages, "vestige of the agrarian economy", "goods-based industrial economy", "service economy", and eventually what we have entered, the "experience economy". In the stage of vestige of the agrarian economy, also recognised as commodity business (Mackman, 2020), one may prefer growing their own crops, buying raw ingredients, and start from scratch. The second stage "goods-based industrial economy" is an economic system having focus lay on the production and distribution of goods, which can also be linked to consumers buying ready-made ingredients instead of the raw ones. Moving on to the next stage as service came as an important and convenient option, service economy took place, providing consumers with an access to ready-made products along with available services, such as an outsourced event planning service. After being fulfilled by products and services demanded, a further expectation on an enjoyable experience then came into its presence, allowing consumers to seek for more, introducing a new chapter of "experience economy".

Common example referred to for the four stages identified is the evolution of birthday celebration arranging

process, provided in Harvard Business Review (Pine II & Gilmore, 1998). During the stage of vestige of the agrarian economy, moms made birthday cakes by harvesting their crops and mixing farm commodities, while in the goods-based industrial economy stage, moms turn to stores for premixed ingredients, expecting the process to be as simplified as possible. Later as service providing took place in the market, instead of making the cake in person, busy parents ordered cakes from bakeries and even reached out to outsourced celebrative services, wanting their kids to enjoy their best on their birthdays. Eventually, when elevating the quality of the whole experiencing process came as an option, activities such as escape room and trampolining became a part of the celebration, making birthday celebration a whole new type of experience.

Through the evolution, not only are we able to recognise the shift of focus consumers are looking for overtime, but can we notice the change of habits and roles— what people spend money on and a comparatively flexible role allocation in each household. Shown below (Figure 1) is the progression of economic value proposed by Pine II and Gilmore (1998) in Harvard Business Review, indicating that we have now headed towards differentiated competitive position with a premium pricing level, supported by a survey provided in Forbes that of almost 2,000 business professionals, customer experience is a top priority for the next five years for 46% of respondents, and that 86% of buyers would now pay a premium for a good experience (Rao, 2021).

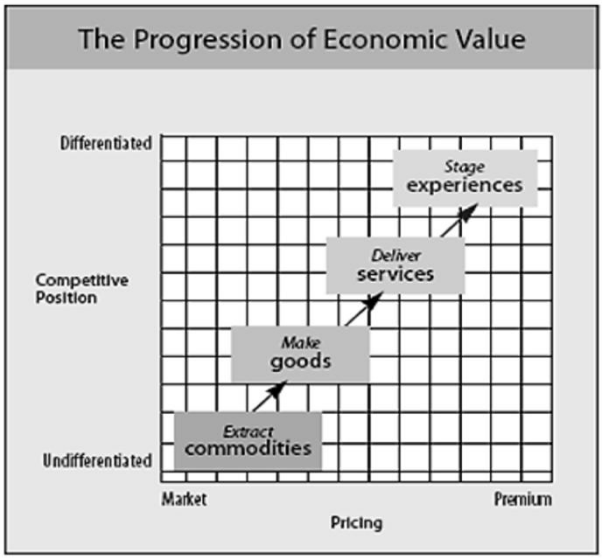


Figure 1. The Progression of Economic Value

Following the change of consumption value and habits, advertisements highlighting unique experiences may now take lead, take the “Share the Coke” campaign starting from Australia in 2011 as an example. After the campaign started, the brand sold “more than 250 million named bottles and cans in a nation of under 23 million people (The Coca-Cola Company, 2016).” Provided below are three advertisements (Figure 2, 3&4) with a slight difference of context for the campaign, with one sharing the beverage with a friend or a partner at the beach, another sharing the beverage with a group of friends during the gathering, and the other one highlighting the name. Serving as advertisements for the same campaign, the three contexts show not only how the “experience” of drinking coke

was integrated into the context of advertisements, but also the possibility that different context may arouse different intent for further purchase.

Figure 2. Share a Coke Campaign Advertisement-1 (Campaign Brief, 2020)

Figure 3. Share a Coke Campaign Advertisement-2 (Bodkin, 2013)

Figure 4. Share a Coke Campaign Advertisement-3 (The Coca-Cola Company, 2016)

Pine II and Gilmore (1998) once shared that, “experiences are a distinct economic offering, as different from services as services are from goods”. This helps distinguish service from experience and can also be observed from the success of “Share the Coke” campaign. Also listed in Mackman (2020) are four forms of experience proposed by Pine II and Gilmore, which are known to have been used by organisations to add experiential properties to their products, composed of entertainment, education, aesthetic, and escapism. Entertainment represents the interactivity with the experience, education refers to the acquisition of new skills, aesthetic is often linked to a sensory-rich environment, while escapism explains the phenomenon that provides consumers with a sense of escaping. Examples for the four forms raised are Disneyland for entertainment, the trend of learning free diving for education, sensory-rich environment provided by Starbucks for aesthetic, and computer games for escapism, with the figure provided (Figure 5), proposed by Pine and Gilmore (1998), explaining how the four forms proposed were categorised, using participation level as medium to the experience.

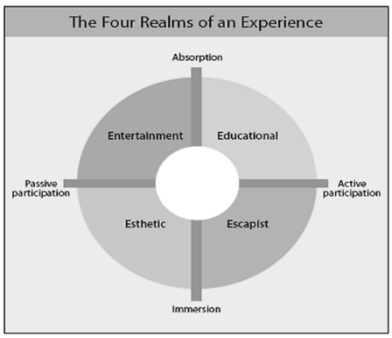


Figure 5. The Four Realms of an Experience

Aesthetic

Originated from an ancient Greek word "αἰσθητικός" (aisthētikós), the term "aesthetic" means "of or for perception by the senses, perceptive of things". Yet, the concept of aesthetic we understand today, often related to "the appreciation of beauty", was in fact further developed in the mid-18th century by Alexander Baumgarten, who defined aesthetic as "[a] criticism of taste" (Harper, 2022). Although Immanuel Kant later tried to reclaim the word as "science which treats of the conditions of sensuous perception", Walter Pater even broadened the meaning by describing the "l'art pour l'art" (translated as "art for art's sake") movement in the late 19th century with the term (Harper, 2022; Britannica, 2015), and Dewey described the term as "the quality of experience that is marked by harmony, fulfilment, and consummation (Leddy, et al., 2023)" in his own book, Baumgarten's definition still remained irreplaceable. Throughout the years, the definition of aesthetic has been interpreted in diverse wordings, but these meanings did not go too far from "perceiving sensory input".

Along with the definition of aesthetics, communicability of such sensory input has also been discussed. Among all, Kant and Proust held the most distinctive yet different points of view towards the communicability of beauty, hereby recognised as aesthetic judgment. Immanuel Kant, a German philosopher, in his publication "Critique of Judgment" argues that aesthetic judgments are not determined by concepts or rules, instead, they claim universal validity and demand agreements of others (Richard, 2012), namely universal agreements. Kant also claimed that there must be four key distinguishing features— disinterestedness, universality, necessity, and purposiveness without purpose. By claiming aesthetic judgments to be disinterested means they are not influenced by personal interest, and that judgments precede the pleasure or sensation. For being universal and necessary, aesthetic judgment is described by Kant to be an "intrinsic" process expecting others to agree with us, namely that judgment is not just an opinion but is expected to be valid for everyone. Finally, to be purposive without purpose, Kant stressed that beautiful objects should affect us as if they have a purpose, even though no particular purpose can be found (Burnham, n.d.).

Different from Kant claiming aesthetic judgment as a "reflective process (Tanke, 2017)" seeking for universal agreement, Marcel Proust, a French novelist and critic, in his publication "In Search of Lost Time" claimed that the experience of beauty requires certain "responsiveness and generosity" from the beholder, suggesting that aesthetic judgment is indeed a personal and subjective process responding to the perceived objects (Richard, 2012). Also, in "Communicability without Communication" (2017), Proust's perception of beauty is described as obligating spectators rather than extending demands, indicating that perceivers own their experiences instead of demanding agreements. The difference was made even clearer with the tension brought up, between hoping to find someone who share our pleasure and recognising that the result shall be frustrated and undercut (Tanke, 2017). In Proust's theory, the importance of "the past" was as well highlighted, believing that the essence of life and aesthetic experience represent the past within us, and that they are only accessible through involuntary memory triggered by certain sensations (Hogan, 1939). Also mentioned in Proust's theory is "communication with self", suggesting that the aesthetic experience is personal and may not be fully communicable to others, shall it be communicated, a medium is required, such as art (Hogan, 1939).

Different interpretations on aesthetic and its communicability have brought forward several discussions, some believe that perceiving aesthetic stimuli is rather private, while others believe that our perceptions always include the voice of others. Although never brought up in currently accessed studies, it shall also be worth investigating whether including others' voices has anything to do with what known as "social proof", which describes the tendency of individuals following others when making decisions (Interaction Design Foundation, 2016). Although communicability of aesthetic has been interpreted differently by different scholars, the contexts clarifying and explaining whether aesthetic is communicable did not seem overlapped, indicating that there could be a big chance for both communicable and uncommunicable aspects to coexist during information processing, no matter recognised at the processing moment or not, and this could be further noticed in the specified information processing model later.

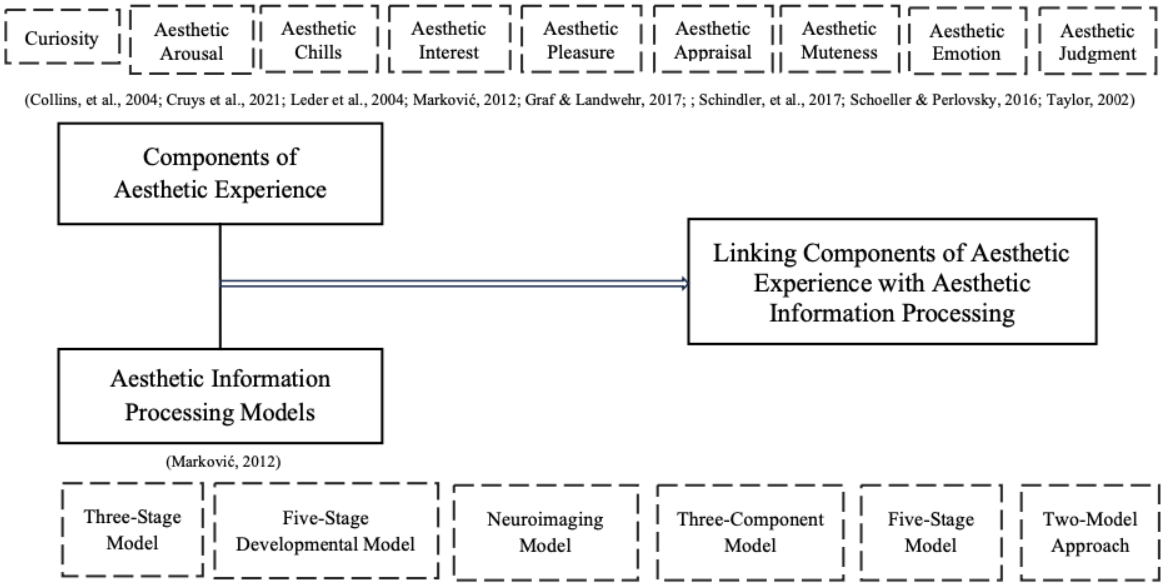
Aesthetic Experience

Starting with an emphasis on its function, the focus of "aesthetic experience" gradually intertwined with the interest in "form" during the 19th century. Back in the late 19th century, Alexander Baumgarten and Immanuel Kant were two of the most influential philosophers making significant contributions to the field of aesthetics. Baumgarten claimed that individuals take pleasure not only in the perfection of an object, but also in "being conscious of our own perfection of sensible cognition", while Kant supported the idea that individuals make "pure judgments of beauty" when one takes pleasure by perceiving the form of an object without conceptualising the functions (Peacocke, 2023). Yet, later in the mid-20th century, an influential twist struck with John Dewey's publication of "Art as Experience", emphasizing that aesthetic experience is itself a "unified, consummatory form with meaningful development" (Peacocke, 2023), which meanwhile justifies that an aesthetic experience can be experiences of any event or object offering "single quality that pervades the entire experience" (Cahn & Meskin, 2007; Peacocke, 2023), making the definition of the term complete and fulfilling as a whole.

As the concept aesthetic experience gained its recognition overtime, three clarified characteristics were developed, consisting of "fascination with aesthetic object" (also categorized into motivational, orientational, and attentive aspects), "appraisal of the symbolic reality of an object" (also described as cognitive, including semantic, symbolic, and imaginative aspects), and "strong feeling of unity with the object" (also described as affective) (Markovic´, 2012). Provided by Markovic´ in 2012, prior two of the provided three characteristics also represent "high arousal, high attention", and "high cognitive engagement" respectively, which may further be included as a part of analysis in this study. As a type of experience, aesthetic experience has also been linked to other phenomena. In Peacoke's (2023) study, he linked aesthetic experience with the concept "flow or optimal mental processing" proposed by Czikszentmihalyi (1975, 1990), "peak experience" by Maslow (1968), and" absorption" by Tellegan and Atkinson (1974), showing high involvements of senses and internal processing in this type of experience. Koestler (1970) even considered aesthetic experience a part of the framework of "creative processes emerging in art, science, humour, and playing" (Peacocke, 2023), pointing out the impact aesthetic experience may bring.

Literature Review

Table 1. Concept Map of the Study



Provided above is a concept map of this study. 9 components of aesthetic experience identified in different studies are noticed and considered applicable when fit into one of the aesthetic processing models after systematic literature analysis. So far in current studies, most components of aesthetic experience are discussed independently in multiple studies, and the aesthetic processing models are utilised mostly in the fields of arts. What noticed among the studies are that scholars consider it possible for the raised terms and models to be applied to realms other than modern arts, making the integration of aesthetic terms and the processing models an interesting experiment, which may possibly trigger further studies or experiments.

In the following parts, 9 components of aesthetic experience will be defined, followed by summary and discussions on key literatures supporting the development of this study, starting from the components of aesthetic experience to the selection of processing model.

Key Terminology

Curiosity

Curiosity is a metacognitive feeling directing individuals to the best opportunities for information gain. It is also a type of motivation inherent within information processing, which gauges expected information gain (Cruys et al., 2021).

Aesthetic Arousal

Aesthetic arousal is the activation level of the emotional experience. Induced by both pleasant and unpleasant stimuli, it amplifies the attention to provide additional energy for cognitive system (Markovic´, 2012).

Aesthetic Chills

Aesthetic chills, also known as frisson or psychogenic shivers, are psychophysiological responses to rewarding stimuli, which further trigger pleasurable state, sometimes along with goose bumps. Aesthetic chills are also inhibited by exposing perceiver to a meaningful prime prior to the chill-eliciting stimulation, which makes the aesthetic experience more pleasurable than a neutral or an incoherent one (Schoeller & Perlovsky, 2016).

Aesthetic Interest

Aesthetic interest is a positive aesthetic response elicited by disfluency reduction or reduction of difficulty in processing, involving controlled, or called deliberate, processing that allows perceivers to assign meaning or insight to initially disfluent stimuli (Graf & Landwehr, 2017).

Aesthetic Pleasure

Aesthetic pleasure is a "pleasurable subjective experience that is directed toward an object and not mediated by intervening reasoning" (Reber et al., 2004; Graf & Landwehr, 2017), triggered by the fluency or ease of processing an object, such as a picture or a design, and does not require controlled processing (Graf & Landwehr, 2017).

Aesthetic Appraisal

Aesthetic appraisal is a cognitive process interpreting symbolic and formal aspects of an aesthetic stimulus, which can be divided into two parallel levels: narrative (content) and form (style), and it generates aesthetic emotions. Specific cognitive and personality dispositions, such as expertise, creative thinking, and openness to experience, are required in aesthetic appraisal (Markovic´, 2012).

Aesthetic Muteness

Aesthetic muteness happens when perceivers fail to approach their experience from an aesthetic perspective, fail to recall aesthetic experience, or deny aesthetic experience, causing silence as response (Taylor, 2002).

Aesthetic Emotions

Aesthetic emotions arise when one perceives and evaluates a stimulus for its aesthetic appeal or virtues. Features

of aesthetic emotions include (1) what perceivers feel, rather than emotions that are represented or expressed by the stimulus, and (2) being elicited by intrinsic aesthetic appeal rather than an expectation to achieve personal goals (Schindler et al., 2017).

Aesthetic Judgment

Aesthetic judgment is a kind of judgment based on a feeling of pleasure or displeasure in response to something beautiful or ugly (Stanford Encyclopedia of Philosophy, 2003), serving as a cognitive-based response reflecting perceiver's understanding and interpretation of the artwork, along with one's taste and preferences. It can be influenced by various factors such as expertise, context, mood, and social processes (Leder et al., 2004).

Components of Aesthetic Experience

Curiosity

Current theories claim that our sense of curiosity is determined by the expected learning progress or information gain, and that we need a sense of curiosity to determine whether progress in learning or a waste of resources will take place. Therefore, the role of curiosity is clarified as "a type of motivation that is inherent within information processing" (Van de Cruys, S. et al., 2021), which can possibly be linked to the model provided later relating curiosity to the first stage of information processing.

Curiosity is also considered a metacognitive feeling directing individuals to the best opportunities for learning, since the evidence that the match between presented materials and perceiver's readiness to encode it ensure that one remains his or her "zone of proximal development (Vygotsky,1962)" (Van de Cruys, S. et al., 2021), indicating that it is highly possible for curiosity to be a key component within information processing to connect presented stimuli with one's existing database for further information processing.

The result of this study suggests that the effect of curiosity on memory depends on aha or curiosity relief, implying that curiosity makes people more interested in the stimuli if the following response matches or exceeds their expectations, making it more reasonable for curiosity to function in aesthetic information processing.

Aesthetic Pleasure & Aesthetic Interest

The study "Aesthetic Pleasure versus Aesthetic Interest: The Two Routes to Aesthetic Liking" provides a clear comparison on the process leading to aesthetic pleasure versus aesthetic interest by testing the PIA model provided by Graf and Landwehr (2017). Based on the model proposed, one will go through an automatic processing style to form aesthetic pleasure, which is considered stimulus-driven, along with a gut-level fluency check; while to form aesthetic interest, one will instead go through a controlled processing style, considered perceiver-driven, and disfluency reduction. As provided in the Pleasure-Interest Model of Aesthetic Liking (PIA Model) below (Figure 6), the process will be further clarified (Graf & Landwehr, 2017).

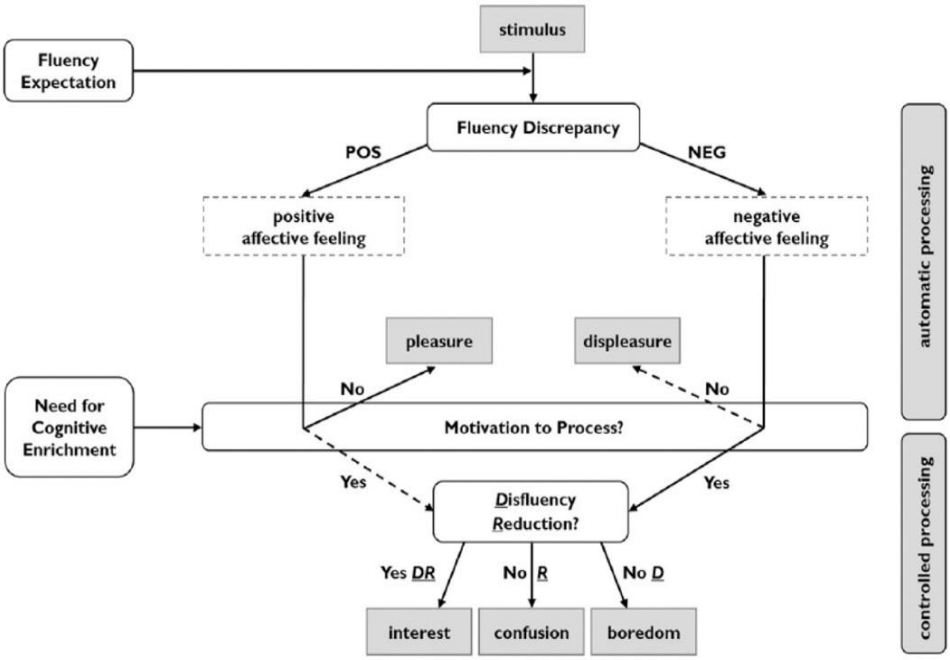


Figure 6. PIA Model

According to the model, perceiver will form fluency expectation after being exposed to a stimulus, leading to the categorisation of the stimulus as positive or negative based on fluency level. Also clarified in this study is that subjective fluency experience during the testing process was measured using a three-item questionnaire, including statements" (1) is difficult for me/comes naturally to me, (2) is exhausting for me/is easy for me, and (3) I perceive to be sluggish/I perceive to be smooth. (Graf & Landwehr, 2017)" In addition to clarifying how the fluency level be decided in the study, it shall also be noted that fluency discrepancy here serves as the determinant for aesthetic pleasure. Moving on to the next stage when perceiver forms a motivation to process the stimulus further, also considered when cognitive processing begins, "disfluency" takes place. Perceiver at this stage will continue to process the stimulus. During the process, if one's disfluency is reduced, interest may be formed, yet if disfluency isn't reduced, confusion or boredom may then take place.

Throughout the investigation process, two studies were conducted to test the PIA model. The first study focused on the clarification of the relationship between stimulus fluency and pleasure as well as interest, conducted through abstract art pictures with varying fluency levels (low, medium, and high) provided as stimuli, and manipulated processing style (automatic or controlled) to collect aesthetic response (pleasure or interest) from the participants (also described as 3x2x2 mixed experimental design), indicating in the end that pleasure increases from disfluent to fluent pictures, and that participants reduced a greater amount of disfluency in controlled processing condition.

The second study examined pleasure and interest as mediators between stimulus fluency and overall aesthetic liking response, using product designs (bikes, chairs, and lamps) with different typicality levels (low or high) as stimuli, with fitting or non-fitting context provided. The result suggested that pleasure fully mediates design

typicality and attractiveness, and that design typicality has a reduced impact on pleasure once participants engage in controlled processing, indicating that typicality arouses pleasure while atypicality arouses interest.

One of the limitations noticed in this study is that pleasure and interest are discussed as a result after being exposed to certain stimuli, yet in real-life scenarios, it is possible that a following decision be made, whether to purchase or take any action. At this point, it may then be possible as well that both pleasure and interest take part in affecting the final decision, and even more possible is that a certain balance between pleasure and interest, or say fluency and disfluency level, make the best incentive for consumers to purchase or take further action.

Aesthetic Information Processing Models

Aesthetic Information Processing is a psychological model that explains how perceivers experience and judge. Slobodan Markovic´ (2012) in his study, "Components of aesthetic experience: aesthetic fascination, aesthetic appraisal, and aesthetic emotion" provided six functional models for aesthetic information processing, with the commonality that most models start with stimulus input and end with decision making acknowledged. The six proposed models include Ognjenovi´c's (1991) three-stage model, Parsons' (1987) five-stage developmental model, Chatterjee's (2003) neuroimaging model, Nadal et al.'s (2008) three-component model, Leder et al.'s (2004) five-stage model, and Cupchik's (1994) two-model approach.

Table 2. Comparison on Six Functional Models

Model	Proposer	Appraisal Level	Features
Three-Stage Model	Ognjenovic´ (1991)	Narrative	(1) Symmetry (2) Complexity (3) Semantic Aspect of Object
Five-Stage Developmental Model	Parsons (1987)	Narrative	(1) Favouritism (2) Preference for Beauty & Explicit Realism (3) Expressiveness (4) Focus on Syllabus & Form (5) Autonomy
Neuroimaging Model	Chatterjee (2003)	X	Brain Regions (1) Visual Information Processing (2) Emotional Processing
Three-Component Model	Nadal et al. (2008)	Formal Composition	Brain Regions (1) Emotional Process (2) Cognitive Process
Five-Stage Model	Leder et al. (2004)	Narrative + Formal	(1) Perceptual Analyses (2) Implicit Memory Integration (3) Explicit Classification (4) Cognitive Mastering (5) Evaluation
Two-Model Approach	Cupchik (1994)	Emotional	(1) Reactive (2) Reflective

Compared below in Table 2 are the six models brought up by Markovic´ (2012), divided into different levels, with the prior two mentioned above as level of narrative, Nadal et al.'s three-component model as level of formal composition, Leder et al.'s five-stage model as both, and Cupchik's two-model approach as emotional. The level of narrative is focused on the thematic and symbolic meaning of artworks, including two sub-levels: story and symbolism; the level of formal composition is focused on stylistic form and the expression of artworks, inclusive of two sub-levels: perceptual associations and compositional regularities, while the emotional aspect is more focused on reactive and reflective responses.

Aside from functional models provided, the analyses in the study also showed that aesthetic experience was relatively independent from other aspects of the subjective experience of the paintings (Markovic´, 2012), justifying his own definition for aesthetic experience as being different from everyday experience. Among all factors, the one especially specified is "arousal". Markovic´'s (2012) analysis suggested that aesthetic experience has a moderate yet significant level of correlation with "arousal", tested along with the scales: interesting, complex, imaginative, etc. It is also stated that although aesthetic experience is often considered pleasurable, it can indeed be triggered by both attractive and aversive factors, pleasant and unpleasant paintings provided as examples in the passage.

Also discussed in the passage is aesthetic emotion. Different definitions and categorisation from different perspectives were provided as discussion, leading to a conclusion defining aesthetic emotions as feelings of unity and exceptional relationship with exposed objects. Markovic´ (2012) added afterwards that aesthetic emotions are induced by the appraisal of the form and content differently, with form often considered pleasurable, including symbolic structure and compositional regularities, while content considered both pleasurable and unpleasurable, such as the empathic feelings with characters generated.

A question, however, was brought up later in the passage that the proposed models were not specifically focused on the factors and mechanisms that are able to generate aesthetic experience as "an exceptional state of mind", suggesting a gap worth looking into, such as its applicability to real life scenarios when perceiving aesthetic stimuli. Eventually, Leder et al.'s (2004) five-stage model is specified as the core model to be analysed in this study, not only because it serves as the most comprehensive aesthetic information processing model, but because it clearly distinguishes perceptual and cognitive stage, indicating the completeness of processing.

Five Stage Model of Aesthetic Information Processing

Provided in Figure 7 is Five Stage Model of Aesthetic Information Processing, which was brought up previously and is further discussed in the study by Leder et al. (2004). The model helps answer the psychological processes underlying aesthetic experiences and judgments, consisting mainly of five stages: perceptual analyses, implicit memory integration, explicit classification, cognitive mastering, and evaluation, along with different external factors.

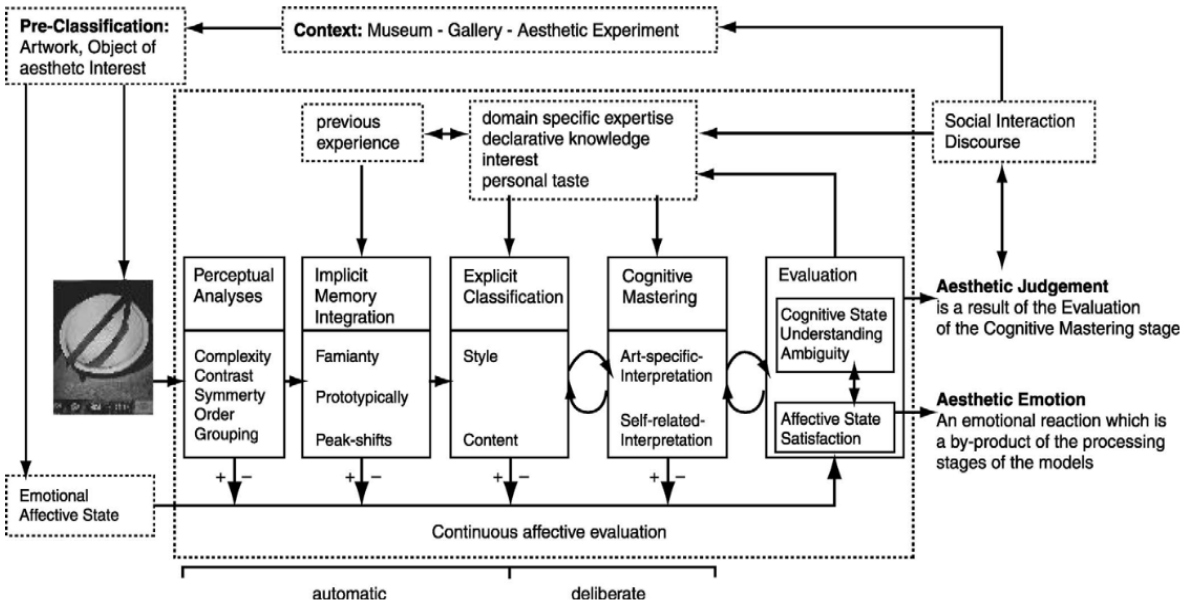


Figure 7. Five Stage Model of Aesthetic Information Processing

During the formation of this model, Leder et al. found out that aesthetic experiences involve both cognitive and affective components and can be influenced by factors such as personal preferences, context, and expertise throughout different stages of processing. After evaluation, two outcomes were identified, aesthetic judgments and aesthetic emotion, implying that the way people perceive, understand, and evaluate art as well as other aesthetic stimuli can possibly be tested and analysed.

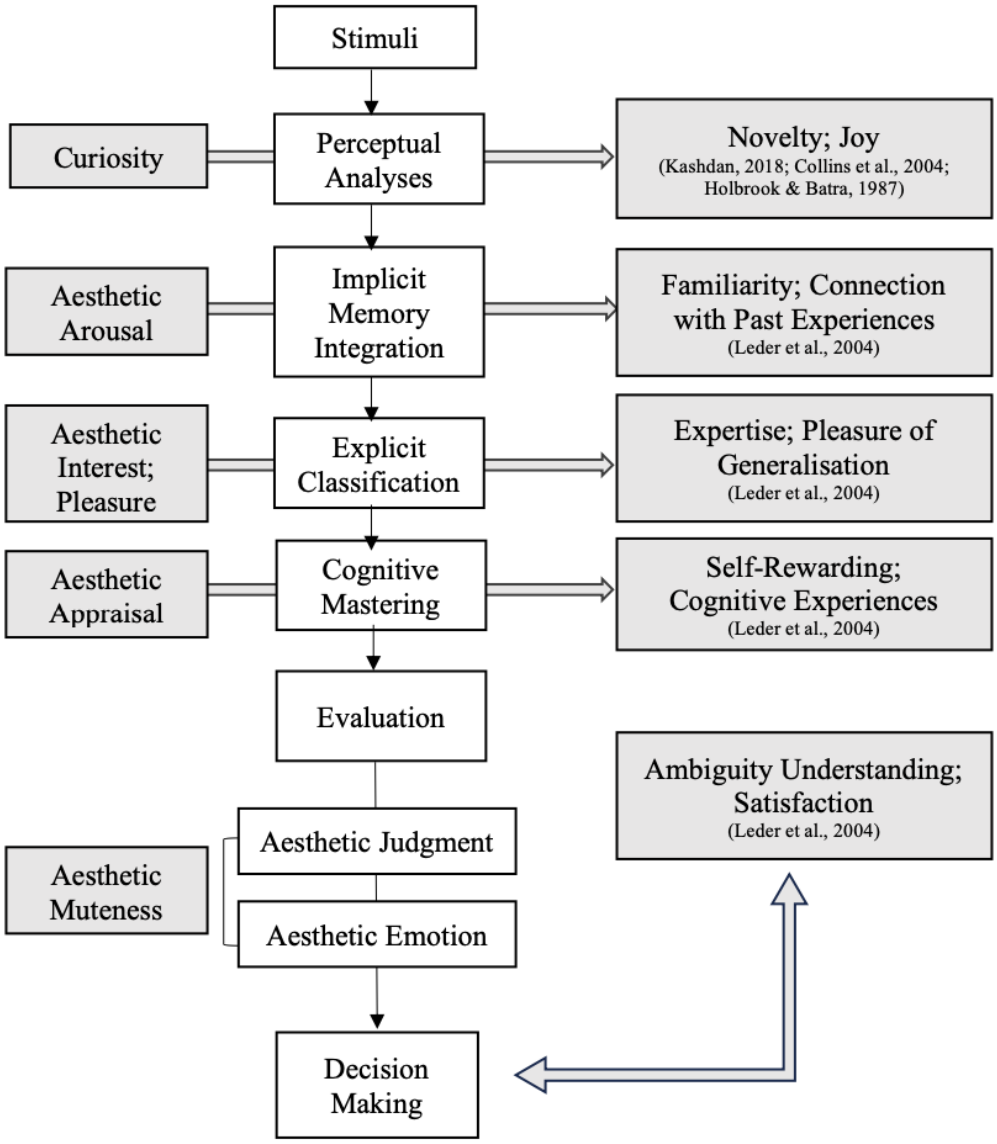
Further broken down into five stages in detail, the model proposed by Leder et al. (2004) operates under the definition that aesthetic experience is a "cognitive process accompanied by continuously upgrading affective states in each phase" (Leder et al., 2004). The first stage is perceptual analyses, involving "basic occipital visual processing", and "arousal potential" from visual stimulation; while the second stage, implicit memory integration, is an unconscious process related to individual's past experiences, and can be influenced by familiarity, prototypicality, as well as peak shifts— with familiarity reinforcing positive experience, prototypicality showing the representative of class, and peak shifts relating to stronger response toward exaggeration.

Starting from the third stage is a deliberate information processing mode, requiring effortful and conscious processing steps. Explicit classification is considered highly concerned with content, style, and one's expertise. In this stage, "pleasure of generalisation" was especially highlighted, as this cognitive process enables perceivers to recognise unfamiliar stimuli. Finally moving on to cognitive mastering and evaluation, which form a feedback loop and will continue permanently, the switch from activating reward centres to a sense of self rewarding is worth noticing. Noted as a question in the end of this study is the "interdependence between pleasure, interest, affective and cognitive judgments", making it worth the comparison with the piece of study by Graf and Landwehr (2017) differentiating the process of gaining pleasure and interest.

Implication of Literature Review

Elements from Five Stage Model of Aesthetic Information Processing are extracted to link with the components of aesthetic experience, with the exception of "novelty" and "joy", as triggers for the first stage of the model were not clarified in the passage. By integrating the processing model proposed by Leder et al. (2004) and components of aesthetic experience previously mentioned, it is expected that the processing stages be further matched with existing aesthetic terms, which at the same time identify the order of aesthetic components triggered during processing. Components of aesthetic experience and their corresponding steps to the processing model are provided below in Table 3, along with the key descriptive terms extracted from accessed studies as supporting information.

Table 3. Implication of Literature Review



Stage 01: Perceptual Analyses

The first stage of Five Stage Model of Aesthetic Information Processing is "perceptual analyses", including the recognition of complexity, contrast, symmetry, order, and grouping of the stimuli provided (Leder et al., 2004), also related to "curiosity" in this study. As stated previously, stimulation for the first stage is not clarified as much in the processing model proposed by Leder et al. (2004), therefore the key idea connecting curiosity with the first stage is inspired by "The Five Dimensions of Curiosity" proposed by Kashdan, T. B. (2018), and The Novelty Experiencing Scale (NES) brought up in Collins et al.'s (2004) study. Kashdan (2018) described curiosity as a reflection of our intrinsic motivation" to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" in Harvard Business Review, Collin et al. (2004) mentioned that "novelty seeking" and "sensation seeking" serve as two of the individual differences in tendencies toward exploratory behaviour, a behaviour triggered by curiosity, making "novelty" a suitable term to describe the level of curiosity, and also connected to the features of the first stage of information processing, the automatic processing of sensory stimulation. The second term joy is here related to "sensation seeking" (Collin et al., 2004), inspired by variables of "Scales and Dimensions of Advertising Content "and "Content Scales on Six Varimax-Rotated Principal Components" (Holbrook and Batra, 1987), again linking curiosity to the first stage of processing through sensory stimulations.

Stage 02: Implicit Memory Integration

The second stage of Five Stage Model of Aesthetic Information Processing (Leder et al., 2004) is "implicit memory integration", consisting of familiarity, prototypicality, and peak shift. Familiarity represents the exposure level to stimuli, and repetition may trigger positive aesthetic responses (Leder et al., 2004). Prototypicality shows the representative of class, namely the extent to which "an object is representative of a class of objects". Peak shifts describe a stronger response toward objects that exaggerate the properties of familiar objects. Similarities of the three components are that they belong to automatic processing mode, considered unconscious and effortless, and that they are triggered based on previous experiences. This stage is linked to aesthetic arousal and aesthetic chills, based on the shared features that they are all triggered by making connection with past experiences, with aesthetic arousal showing the activation and aesthetic chills showing the response after triggered by a stimulus. The level of familiarity and connection are especially pointed out to correlate with arousal level, as they are directly linked to one's past experiences.

Stage 03: Explicit Classification

The third stage of Five Stage Model of Aesthetic Information Processing (Leder et al., 2004) is "explicit classification", linked to the domain of specific expertise and knowledge on style and content, as well as pleasure of generalisation. In this stage, perceivers will move forward to deliberate information processing mode, considered conscious and effortful. By linking to domain of expertise means that one can now deliberate on stimuli consciously, verbalise one's taste, and declare the knowledge, leading to the pleasure of generalisation, through

recognising new or unfamiliar input. This stage is related to aesthetic pleasure and aesthetic interest as one's interpretation on stimuli now begins consciously. Based on the study by Graf and Landwehr (2017), aesthetic pleasure is triggered by fluency discrepancy, while aesthetic interest is triggered by disfluency reduction, both related to one's interpretation on the stimulus provided. Also shown in the study (Graf & Landwehr, 2017) is that aesthetic pleasure and aesthetic interest are triggered as automatic and controlled processing respectively, showing the commonality of the two components with the third stage of information processing model proposed by Leder et al. (2004), with the stage explicit classification triggered between the realm of automatic and deliberate processing.

Stage 04: Cognitive Mastering

The fourth stage of Five Stage Model of Aesthetic Information Processing (Leder et al., 2004) is "cognitive mastering", differentiating a stimulus into art-specific interpretation and self-related interpretation, and this stage is also where reward centres are activated. This stage forms a feedback-loop with evaluation, as "the results of the cognitive mastering stage are permanently evaluated (Leder et al., 2004)", and is linked to aesthetic appraisal in this study. Different from the last stage where one's interpretation begins, this stage of processing goes deeper into cognitive level based on the perceiver's expertise, making connection with the feature of appraisal, cognitive interpretation on the stimulus from narrative (content) and form (style) level.

Stage 05: Evaluation

The fifth stage of Five Stage Model of Aesthetic Information Processing (Leder et al., 2004) is "evaluation", serving as an "internal evidence measured" stage to conclude the whole experience as "cognitive state understanding ambiguity", leading to aesthetic judgment, or "affective state satisfaction", and causes aesthetic emotion. It is also claimed that in the category of understanding ambiguity, one might be triggered toward further processing, and that evaluation is indeed continuous, forming a feedback loop especially with cognitive mastering stage. As two of the components of aesthetic experience, aesthetic judgment and aesthetic emotion, are already brought up in the model, there is no need to link the two components with further supporting information. Yet, aesthetic muteness is brought up here as the third response after the information processing. As mentioned previously, aesthetic muteness happens when one responds with silence (Taylor, 2002). By adding the third response after evaluation, the whole processing model become more complete, especially when real-life scenarios are brought into discussion, as it is a fact that not everyone responds to a stimulus provided.

Conclusion

Most aesthetic information processing models and components of aesthetic experience are so far investigated independently and mostly applied to art appreciation fields (e.g. modern arts), forming an opportunity and a gap for further research on the integration, as well as aesthetic experiences with different input. In this study, 9

components of aesthetic experience are collected from different studies to match Five Stage Model of Aesthetic Information Processing proposed by Leder et.al (2004), forming an integrated processing structure and sequence specifically in aesthetic experience, which may potentially support future studies, as the aesthetic experience has gained its recognition nowadays.

Mentioned in the previous part of this study was Kant's and Proust's perspectives on the communicability of aesthetic, hinting that there could possibly be parts in an aesthetic experience that could be communicated and those that could not. This indication is further clarified through the integration of 9 components of aesthetic experience with an existing information processing model, and the analysis on Five Stage Model of Aesthetic Information Processing (Leder et.al, 2004), dividing the processing into affective and cognitive levels, or say automatic and deliberate processing modes. Through the integration and analysis, the happening and triggered sequence of the aesthetic elements are as well clarified, stimulating future investigations and experiments.

Among the accessed studies, scholars have proposed that aesthetic experience now does not merely take place in the field of arts, re-echoing the gap noticed that current research phase does not align the reality speaking of aesthetic. Leder et al. (2004) in their study assume that their aesthetic information processing model could possibly work similarly in other aesthetic experiences, and Markovic´ (2012) in his study claimed that further conceptualisation may focus on possible differences and similarities in "various forms of aesthetic experience", indicating another literature gap worth filling in in the future.

References

Bodkin, G. (2013). COCA COLA, Share a Coke. In. Retrieved from https://georgebodkin.com/COCA-COLA

Boetsch, I., Herr, J., & von Georgi, R. (2021). *Aesthetic Perception and Experience Scale (APES) - Development of an Inventory to measure dimensions of aesthetic ability independently of an aesthetic domain*. Retrieved from https://doi.org/10.13140/RG.2.2.30823.57765

Britannica, T. (2015). art for art's sake. In E. o. Encyclopaedia (Ed.). Encyclopedia Britannica.

Burnham, D. *Immanuel Kant: Aesthetics*. Retrieved from https://iep.utm.edu/kantaest/#H2

Collins, R. P., Litman, J. A., & Spielberger, C. D. (2004). The measurement of perceptual curiosity. *Personality and Individual Differences, 36*(5), 1127-1141. Retrieved from https://doi.org/https://doi.org/10.1016/S0191-8869(03)00205-8

Company, T. C.-C. (2016). *Share a Coke*. Retrieved from https://www.coca-cola.com/au/en/media-center/share-a-coke-how-the-groundbreaking-campaign-got-its-start-down-under

Gilmore, B. J. P. I. a. J. H. (1998). *Welcome to the Experience Economy*. Retrieved from https://hbr.org/1998/07/welcome-to-the-experience-economy

Graf, L. K. M., & Landwehr, J. R. (2017). Aesthetic Pleasure versus Aesthetic Interest: The Two Routes to Aesthetic Liking [Original Research]. *Frontiers in Psychology, 8*. Retrieved from https://doi.org/10.3389/fpsyg.2017.00015

Green, R. (2020). AUSSIES CAN 'TASTE THE FEELING' OF TV FAME WITH RETURN OF 'SHARE A

COKE' CAMPAIGN VIA OGILVY. In. Campaign Brief.

Harper, D. (2022). aesthetic (n.). In *Online Etymology Dictionary*. Retrieved from https://www.etymonline.com/word/aesthetic

Hogan, J. A. (1939). The Past Recaptured: Marcel Proust's Aesthetic Theory. *Ethics*, *49*(2), 187-203. Retrieved from http://www.jstor.org/stable/2988720

Holbrook, M. B., & Batra, R. (1987). Assessing the role of emotions as mediators of consumer responses to advertising. *The Journal of consumer research*, *14*(3), 404-420. Retrieved from https://doi.org/10.1086/209123

IxDF, I. D. F.-. (2016, June 3). *What is Social Proof?* Retrieved from https://www.interaction-design.org/literature/topics/social-proof

Jonathan Yaffe, A. M. D. M. (2019, Jan 7, 2019). *The experience economy is booming, but it must benefit everyone*. Retrieved from https://www.weforum.org/agenda/2019/01/the-experience-economy-is-booming-but-it-must-benefit-everyone/

KANT AND PROUST ON AESTHETIC PLEASURE. *Diacritics*, *45*(1), 76-92. Retrieved from https://www.jstor.org/stable/26776629

Kashdan, T. B., Disabato, D. J., Goodman, F. R., & Naughton, C. (2018). *The Five Dimensions of Curiosity*.

Harvard Business Review. Retrieved from https://hbr.org/2018/09/the-five-dimensions-of-curiosity

Leder, H., Belke, B., Oeberst, A., & Augustin, D. (2004). A model of aesthetic appreciation and aesthetic judgments. *The British journal of psychology*, *95*(4), 489-508. Retrieved from https://doi.org/10.1348/0007126042369811

Mackman, P. (2020). *What Is The Experience Economy?* Retrieved from https://mackman.co.uk/experience-economy/

Marković, S. (2012). Components of aesthetic experience: aesthetic fascination, aesthetic appraisal, and aesthetic emotion. *Iperception*, *3*(1), 1-17. Retrieved from https://doi.org/10.1068/i0450aap

Peacocke, A. (2023). Aesthetic Experience. In E. N. Z. a. U. Nodelman (Ed.), *The {Stanford} Encyclopedia of Philosophy* (Spring 2023 ed.): Metaphysics Research Lab, Stanford University.

Puolakka, T. L. K. (2021). *Dewey's Aesthetics*. Retrieved from https://plato.stanford.edu/entries/dewey-aesthetics/

Rao, S. (2021). *Winning In The Experience Economy*. Retrieved from https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2021/04/07/winning-in-the-experience-economy/?sh=6886b714224f

Schindler, I., Hosoya, G., Menninghaus, W., Beermann, U., Wagner, V., Eid, M., & Scherer, K. R. (2017). Measuring aesthetic emotions: A review of the literature and a new assessment tool. *PLOS ONE*, *12*(6), e0178899. Retrieved from https://doi.org/10.1371/journal.pone.0178899

Schoeller, F., & Perlovsky, L. (2016). Aesthetic Chills: Knowledge-Acquisition, Meaning-Making, and Aesthetic Emotions [Original Research]. *Frontiers in Psychology*, *7*. Retrieved from https://doi.org/10.3389/fpsyg.2016.01093

Tanke, J. (2017). COMMUNICABILITY WITHOUT COMMUNICATION

Taylor, S. S. (2002). Overcoming Aesthetic Muteness: Researching Organizational Members' Aesthetic

Experience. *Human Relations*, *55*(7), 821-840. Retrieved from https://doi.org/10.1177/0018726702055007542

Van de Cruys, S., Damiano, C., Boddez, Y., Król, M., Goetschalckx, L., & Wagemans, J. (2021). Visual affects: Linking curiosity, Aha-Erlebnis, and memory through information gain. *Cognition*, *212*, 104698. Retrieved from https://doi.org/https://doi.org/10.1016/j.cognition.2021.104698

Zangwill, N. (2003). *Aesthetic Judgment*. Stanford Encyclopedia of Philosophy. Retrieved from https://plato.stanford.edu/Archives/spr2004/entries/aesthetic-judgment/

Teachers' Belief in Technologies Applied in English as a Foreign Language Classroom

Yue Zhuo

Calvin University, USA, https://orcid.org/0009-006-6597-8220

Abstract: When teaching any foreign language, it is vital to simulate an environment where learners can interact in the language of instruction. In a global context, technology is considered an important tool to assist in teaching foreign languages. Although implementing technology has become more accessible in English as a Foreign Language (EFL) classroom, obstacles are still encountered in practical application. This research was employed a survey method to explore teachers' beliefs regarding the use of technology in EFL classrooms and the factors affecting its implementation in universities in a comparatively underdeveloped area in China. The situation regarding technology usage may differ from that in well-developed areas. The research attempts to find the answers to the questions address the following: Do EFL teachers report that technology is important in facilitating their teaching instruction? What factors influence teachers' beliefs regarding the integration of technology in the EFL classrooms? Which factors do EFL teachers consider as the most influential in using technology in the EFL classrooms? The findings could inform educational institutions the challenges of EFL teachers in using technologies, lead to improve the policies and training programs to better support teachers in utilizing technology effectively in language instruction; also inspire future research to search for innovative technologies for EEL classrooms.

Keywords: Teachers' belief, Technology integration, EFL classrooms

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Introduction

Integrating technology into teaching is becoming an inseparable part of effective teaching (Pierson, 2001). In classrooms, technologies can range from simple chalk writing on a blackboard to sophisticated multimedia presentations, online chatting, or interactive applications. Osborne and Hennessy (2003) listed several technology tools for teaching and learning, including data capture tools, multimedia software for simulations, publishing and presentation tools, digital recording equipment, computer projection technology, and computer-controlled microscopes etc. Furthermore, Garrett (1991) emphasizes that the integration of technology in teaching and learning is not a method; rather, it is a medium in which a variety of methods, approaches, and pedagogical philosophies may be implemented. This statement underscores the complexity of using technology in teaching;

therefore, there must be more careful consideration when applying technology in EFL classrooms.

Although technology integration is widely promoted in foreign language education, implementing technology to support teaching and learning is not without challenges (Salehi & Salehi, 2012). It is important to recognize that these problems can hinder technology implementation efforts (Ertmer, 1999). Therefore, identifying the factors associated with the level or type of activities teachers intend to use to incorporate technology into EFL teaching is crucial (Hutchison & Reinking, 2011). Ertmer (1999) refers to these influencing factors as barriers and categorizes them into two major groups: external barriers and internal barriers. The external barriers include limited availability of resources, lack of time, inadequate technical support, and technical problems. In contrast, internal barriers are related to teachers' beliefs about technology, such as resistance to change, low perception of technology's usefulness, and negative attitudes. Additionally, Al-Senaidi, Lin, & Poirot (2009) argue that there are close relationships between many of these identified barriers to technology use. Ertmer (1999) concurs, noting that factors influencing one barrier are likely to affect several others. For example, a lack of technical support can negatively influence teachers' perceptions of technology.

By 2020, all urban schools will have access to at least 100M broadband and all rural schools will have access to 10M broadband (China Education Resources, 2024). As such, in a relatively less developed area, the situation of technology usage for EFL instruction could be different with the well-developed areas. The purpose of this study is to explore teachers' belief in technologies that are applied in EFL classrooms and the factors affecting the use of technologies as an aid in the universities in comparatively less developed area in China.

Theory

The Theory of Planned Behavior (TPB, Ajzen, 1991) provides a basis for examining the cognitive foundations of behavioral decisions. In this theory, Ajzen (1991) explains that "a central factor in the theory of planned behavior is the individual's intention to perform a given behavior; these intentions are indications of how hard people are willing to try, and how much effort they are planning to exert, in order to perform the behavior" (p. 182). The theory assumes there are three conceptually independent determinants of intention: attitudes, subjective norms, and perceived behavioral control. Ajzen (1991) summarizes the relationship between these determinants into a rule: the more favorable the attitude and the subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger an individual's intention to perform the behavior under consideration will be.

Pierson (2001) points out that if a researcher wants to evaluate teachers' integration of technology in the classroom, he or she must understand that technology integration depends on teachers' beliefs, the availability of technologies, and teachers' expectations. Therefore, the Theory of Planned Behavior (TPB) is appropriate for identifying "the underlying cognitive bases for personal, normative, and situational constructs that influence teachers' intentions and, ultimately, their technology use" (Sugar et al., 2005, p. 332). Besides, the use of this

model enables us to develop links between teachers' beliefs and their use of technology.

Methods

Participants

This research was employed a survey method to explore teachers' beliefs regarding the use of technology in EFL classrooms and the factors affecting its implementation in universities in a comparatively underdeveloped area in China.

According to a 2022 report ("List of Chinese administrative divisions by GDP per capita", n.d.) among the total of 31 provinces and two special administrative regions in China, the GDP per capita in southwest provinces is positioned unfavorably. Consequently, educational investment in these provinces is lower than in other regions of China. Therefore, the current beliefs of teachers in the area regarding information and communication technology may differ from those in other comparatively developed areas in China.

The participants for this survey are drawn from EFL teachers at eight universities out of the universities in southwest China. The initial step involved contacting the department chairs of English Language Arts to seek their cooperation with the study. Upon their agreement to participate, randomly selected a sample of N=120 teachers from the faculty listings of each participating university. Following this, the selected teachers were sent a consent letter via email, requesting their participation in the study. All responses to the survey were anonymous. The survey was completed within one month.

Instrument

The participants completed emailed survey that consist of 57 5-point Likert-type items that ranged from Not at all, small extent, moderate extent, large extent and not applicable. For representing availability of technology and technical support, 10 multiple choices and an open-ended question are prepared respectively to obtain the most accurate information. These constructs (reported in Table 1) were derived from the research questions and Survey of Technology Use in Literacy and Language Arts (STULLA) (Hutchison & Reinking, 2011). Because the original survey was conducted in the setting of K1-K12, some items are not applicable. For example, "playing educational game online" might not be used in the college level teaching instruction in China. "PDA" as a multiple choice of the question "What types of technology are available to you at school?" may be little out of date. My overall items from multiple scales are designed to measure different constructs and modified them to fit this research context. Cronhach's alpha will be computed to determine internal consistency and validity.

For this survey, three scales were selected to address the research questions: extent of technology integration, perceived importance of technology integration, and perceived obstacles to technology integration. Additionally, items providing demographic data (e.g., gender, years of teaching, grade level taught) and inquiring about the

availability of technology and technical support were also included from the STULLA.

Since the survey will be conducted in EFL setting in China, all relevant items of the main were translated into Chinese. The translation survey will be proofread by a bilingual (English-Chinese) professor in reading and language arts to ensure the accordance with cultural custom and linguistic usage. Cronbach alphas for these scales based on responses from the EFL teachers will be calculated to indicate that the scales had acceptable internal consistency. The overall Cronbach's alpha for the scales is 0.925, with the individual constructs of extent, importance, and obstacles yielding alphas of 0.816, 0.930, and 0.901, respectively. Two open-ended questions were added to the research to obtain in depth qualitative data.

Table 1

Survey construct	Example item	Numbered items	Response format
Extent of technologies integration	To what extent do you present students in your typical reading or language arts class with online work that involves using computers or the Internet in the following ways?	18	Likert scale
Perceived importance of technologies	To what extent do you feel the following activities would be important to your literacy instruction, assuming they were available?	18	Likert scale
Obstacles to integration	Please indicate the extent to which you believe the following are obstacles to integrating technology into your literacy language arts instruction	21	Likert scale
Support for using technologies	What kind of technology support is available to you at school?	10	
Availability of technology	What kind of technology is available to you at school?	10	

Results

The study is analyzed by descriptive statistics through Likert-scale and multiple choices. Maximum likelihood exploratory factor analysis was conducted to examine the internal reliability of the survey and identify the underlying factor structure suggested by the pattern of response (Hutchison & Reinking, 2011). First, with the help of SPSS to check if there is missing data and outliner existed in the data file. Second, after fixing the data set and checking the normality of variance. The Kolmogorov-Smirnovm (KS) statistic was calculated to test normality because the sample size (N=120) is larger than 50. At the same time, checked the importance level to ensure that the significance is valued to continue the study. Third, to explore whether certain factors and constructs

that are related within each other.

The percentages of participants indicated that the availability of specific technologies was shown: the highest one is digital projector which was only accounted for 25%. The laptop for teachers just only 4%, more severe situation is, there is no laptop for student use in classroom. Internet connected computers in classroom only accounted for 18%. Generally, participated EFL teachers reported low availability technology usages. Therefore, this low degree of availability might influence teachers' extent, importance, and obstacle of technology integration in their EFL teaching instructions.

The research also conducted a factorial analysis of variance (ANOVA) to determine if different teaching level teachers' perceived importance level of integrating technology in teaching instruction is correlated with their teaching experience. ANOVA was conducted to assess availability of technologies (AVAILABILITY) effect on teachers' extent of integration technology (EXTENT), perceived importance (IMPORTANCE), and perceived obstacle (OBSTACLE) in integrating technology in teaching instruction. The significant level of the EXTENT, IMPORTANCE and OBSTACLE are 0.277, 0.41, and 0.341 respectively. Even though the construct of importance is less than .05, but it not greatly violated. Furthermore, the test of Homogeneity of Variances checked the assumption of homogeneity of covariance across the three constructs. The significant value of EXTENT, IMPORTANCE and OBSTACLE are 0.67, 0.28 and 0.34. These indicated there were no significant differences between the covariance matrices.

Investigation also made to analyze the factors in the survey are related to teachers' beliefs in technology integration in EFL classroom. The survey asked participants to report the availability of various technological applications in their classrooms. Participants checked the technological applications for them to use in their teaching instructions. It showed the availability of access of technology may affect technology integration in EFL instruction. Additionally, a path analysis was conducted by using Mplus7 software to find out the relations. The results showed the paths were not statistically significant in the model for purposed of comparing how various categories of teacher's belief related to teaching experience, grade, importance of technology integration, obstacle of technology integration and extent of technology integration. The path analysis indicated that teaching experience levels and teaching grade had no influence on their belief on technology integration. However, it showed the significant relation among perceived importance level of the technologies, the extent of integrating technology in EFL instruction and teachers' belief.

Discussion

This research provides some insights into how personal and institutional factors influence the integration of technology in EFL classrooms. The study highlighted the two-fold impact of both personal characteristics of teachers and the contextual factors within the educational institutions they are affiliated with. It is essential for developing strategies to enhance effective technology use in EFL education.

Personal Characteristics of Teachers

The personal characteristics of teachers, including their beliefs about technology, motivation to use technology, and their own technological competencies, play a significant role in how effectively they can integrate technologies into their teaching practices. Teachers who have positive beliefs about the effectiveness of technology in enhancing learning are more likely to adopt and integrate technologies in their classrooms. This finding aligns with existing research suggesting that personal attitudes towards technology can significantly affect a teacher's willingness and ability to incorporate technological innovations.

Institutional, External, and Internal Factors

On the institutional level, factors such as the availability of resources, administrative support, and the overall technological knowledge also critically influence technology integration. This study found that in universities and colleges where provide sufficient support, including access to modern technological tools and continuous professional development, teachers were likely to integrate technologies effectively in their teaching. This supports the notion that beyond personal willingness and capability, environmental and structural supports are crucial for successful technology integration.

The relationship between internal factors (such as teachers' beliefs and knowledge) and external factors (such as institutional support and resource availability) was evident in determining the extent and effectiveness of technology integration in EFL classrooms. Teachers often face barriers that can range from a lack of technical support to insufficient training, which can reduce their ability to use technology effectively.

Limitations

However, there are some limitations to this study. Although the research received normal and high-quality responses, the sample size (N=120) may be too small to generalize to the entire population of EFL teachers at the universities and colleges in southwest China. Additionally, despite the survey being carefully translated into Chinese in parallel with the original, there may still be alternative interpretations of the wording which could influence the understanding of the survey questions. Despite these limitations, the research may help analyze influential factors and provide teachers with a better understanding of how to facilitate technology use in EFL instruction.

Conclusion

This research has shed light on the integration of technologies in EFL classrooms within universities in China, examining both the characteristics of the educators who implement these tools and the institutional factors that support or obstruct such efforts. Key findings indicate that a range of technologies are actively being applied in

EFL settings, driven by both teacher beliefs and the availability of technological resources.

Moving forward, it is recommended that further research can be conducted with a larger sample size to confirm these findings and extend the generalizability. Additionally, continuous efforts to improve the translation accuracy of research instruments and the clarity of survey items will enhance the reliability of future studies.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211.

Al-Senaidi, S., Lin, L., & Poirot, J. (2009). Barriers to adopting technology for teaching and learning in Oman. *Computers & Education,53*(3), 575-590. doi:10.1016/j.compedu.2009.03.015.

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration.*Educational Technology Research and Development, 47*(4), 47-61. doi:10.1007/BF02299597.

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*(2), 423-435. doi:10.1016/j.compedu.2012.02.001.

Garret, N. (1991). Technology in the service of language learning: Trends and issues. *Modern Language Journal,* 75 (1):74-101.

Holland, R. G., Smith, A., Hasselback, R.J. & Payne,B. (2010). Survey responses: Mail versus email solicitations. *Journal of Business & Economics Research, 8*(4), 95-98.

Hutchison & Reinking. (2011). Teachers' perceptions of integrating information and communication technologies into literacy instruction: A national survey in the United States. *Reading Research Quarterly, 46*(4), 312.

Li, G. & Ni, X. (2011). Primary EFL teachers' technology use in China: Patterns and perceptions. *RELC Journal, 42*(1), 69-85.

"List of Chinese administrative divisions by GDP per capita." Wikipedia, 24 March 2024 updated, https://en.wikipedia.org/wiki/List_of_Chinese_administrative_divisions_by_GDP_per_capita

Osborne, J. & Hennessy, S. (2003). *Literature review in science education and the role of ICT: Promise, problems and future directions*. London: Futurelab.

Pierson, E.M. (2001). Technology integration practice as a function of pedagogical expertise. *Journal of Research on Technology in Education, 33*(4), 413.

Salehi, H, & Salehi, Z. (2012). Challenges for using ICT in education: Teachers' insights. *International Journal of e-Education, e-Business, e-Management and e-Learning,2*(1), 40. doi:10.7763/IJEEEE.2012.V2.78.

Some Economic Aspects during the Transition Period in Albania

Dr. Elda Gjergji
Center of Reseach and Development in Education, Faculty of Educational Sciences, University "Aleksander Xhuvani", Albania https://orcid.org/0000-0002-1807-0248

Mcs. Klodiana Gjergji (Avdolli)
Faculty of Medical and Technical Sciences, Department of Medical and Technical Specialties University "Aleksander Xhuvani", Albania

Abstract: Among the countries of Central and Eastern Europe, Albania is a suitable case for research on the issue of self-employment exit during the years of transition to democracy. This is for several reasons such as: the safe growth of self-employment during the early changes has been replaced by a 0 growth in 1997 in a negative growth in 1998, the transition period in Albania has been long and self-employment activities have been progressively liberalized in the 90s. This article is focused on providing a better understanding of the developments provided by self-employment, which is an indicator that is not shown in macroeconomic data. The reported number of self-employed persons is only an indicator about the number of departures and arrivals in the enterprise, where the annual and survival probability and the fate in the labor market of the departed remains unidentified. The literature of the transition economy has paid attention to the issues of entering the labor market as well as the ambitious character of self-employment. But issues of exiting the labor market have been little or no explored. Perhaps this carelessness is due to the short time interval of the beginning of the transformations. In addition, the lack of a study covering "late" change in relatively mature transition economies still remains a barrier to research. Furthermore, exploring the choice of exiting the labor market allows us to provide a picture of those who survive or exit this employment status. It also makes it possible to uncover explanations for their employment choices.

Keywords: transition, self-employment, democracy, economy.

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Introduction

Labor force issues and self-employment issues have attracted a lot of attention in the economic literature due to the ever-increasing patterns of employment and self-employment and especially the opportunities that are

associated with self-employment, such as being a "source of new jobs" and "an employment alternative". In the special context of Central and Eastern Europe, self-employment became a very important factor in the economic growth of employment in the private sector. Mass migration and population redistribution changed the structure of the working-age population and altered the balance in the labor market, which often led to increased unemployment. At the same time internal migration brought about a re-urbanization or overpopulation of the country which was accompanied by great social and economic changes. On the other hand, the political, social and economic changes during the ongoing transition in Albania brought about the birth, change and often the acceleration of demographic phenomena.

In early 1990s, Albania began making political and economic reforms by protecting the rights of its population, and improving the economy. During this period, the economic and social situation in Albania was very sensitive; from 1990 –1992 the economic situation continued to weaken, and in 1993 the firstresults of privatization were evident with some slight improvements in the economic level. (Gjergji. E, Gani.B, 2023). Nearly one in three Albanians or 917,000 were poor, while 500,000 were considered very poor. (Instat, 2019). This poverty is the result of many complex factors going back from the former system of governance adding other causes occurred during the transitional period. According to statistics, 29,6 % of the population was living in relatively poor conditions, while half of this group was considered extremely poor. The liberalization and privatization reforms in Albania led to the entire transformation of the national production structure. This process had a tremendous impact on the country's economic and social affairs. This complex situation came about partly as a result of the institutional failure. Social protection was among many aspects of socio-economic life where institutions failed to provide a solid frame for transitional reforms.

The rising problem

The problem of self-employment has been relatively neglected, yet it has received more consideration over the last decade. Some empirical research has been conducted using evidence from a few Western countries. Attention has focused on specific determinants of exit such as liquidity constraints (Holtz-Eakin, 1993), duration of self-employment and the importance of early employment status (Carrasco, 2006) and exit patterns with special focus on age and tenure (Evans and Leighton, 1989). The literature of the transition economy has paid attention to the issues of entering the labor market (Early and Sakova, 1999) as well as the ambitious character of self-employment (Early and Sakova, 1999 or Kollo and Vincze, 1999).

But issues of exiting the labor market have been little or no explored. Perhaps this carelessness is due to the short time interval of the beginning of the transformations. In addition, the lack of a study covering "late" change in relatively mature transition economies still remains a barrier to research.

Among the countries of Central and Eastern Europe, Albania is a suitable case for research on the exit of self-employment during the "recent" changes for these reasons:

- The safe growth of self-employment during the early changes has been replaced by a 0 growth in 1997 to a negative growth in 1998 (data published by INSTAT);
- The transition period in Albania has been long and self-employment activities have been progressively liberalized in the 90s;
- The other important reason is the analysis carried out with valid data about self-employment.

Working force population

The main factors influencing labor market processes are population growth and the age of the population. Population growth not only puts direct pressure on society's total resource base to support living standards but also requires that this increased number be absorbed into labor markets. Fluctuations in population growth generate different age structures in different periods of time, which means different dependency ratios or differences in the relationship between the working population and the non-working population. While the structure of the population evolves, labor markets must adapt to this evolution.

Table1. Structure of population

Variables		N	Mean
Group	1.	47	30.3
	2.	60	38.7
	3.	48	31.0
Age	18-21	150	96.8
	other	5	3.2
Gender	F	117	75.5
	M	38	24.5
Total		155	100

An economy facing an increase in the number of young people may find new entrants to the labor market difficult, due to the fact that it is difficult to achieve stabilization and compresses aggregate demand, thus generating short-term unemployment. In an effort to understand the role of labor markets in a given economy, we must look carefully at the categories of population growth, age structure, the latter and how it changes over time. In 1990 Albania had a population of 3.286 million inhabitants with an annual growth rate of about 2.01% for the period 1980-1990.

The rate of population growth was the result of a high birth rate throughout that period and a low death rate. Likewise, the average life expectancy was the highest and adult mortality among the lowest in Europe. This high growth rate was also influenced by the fact that emigration was completely negligible as a result of the complete closure of Albanian society.

Years	1991	1992	1993	1994	1995	1996
The total Population (000)	3.286	3.19	3.167	3.202	3.249	3.283
Birth	82125	75429	67730	72129	72081	68358
Death	18193	18026	17868	18342	18060	17600
Gross Birth Rate	25	23.7	21.4	22.6	22.2	5.4
Gross Death Rate	5.4	5.7	5.7	5.7	5.6	5.4
Average Population Growth	1.94	1.8	1.6	1.7	1.7	1.5

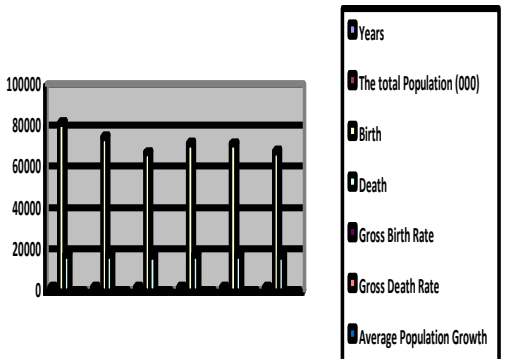

Table 2. Demographic indicators for the period 1990-1996

If we compare the relevant indicators of the average growth rate of the population of Europe and the world in this period, which were respectively 0.6% and 1.7%, it is clear that for Albania these indicators were several times higher than for the latter. From 1990 onwards, the Albanian population recognized new demographic phenomena that affected both the age structure of the population and the growth rates.

Method

The article brings into consideration the socio-economic effects of transition to democracy by mix methods based on empirical research as well as state reports and data. Data are taken from the Albanian Institute of Statistics (INSTAT). The methodology used is a reduced form of assessment of the decision to remain self-employed or to exit one of the three remaining employment situations. This will make it possible to determine not only the propensity to remain in self-employment and how it evolves in the transition, but also the fate of those who exit self-employment and enter the labor force into unemployment or into paid employment

Results

Employment promotion policies

The lack of jobs is also one of the main causes of poverty in the country. The lack of strategies for promoting employment, as well as the poor performance of the economy in general, cause a large part of people able to work

(about 38% of them) to be unemployed. The year 2005 is not expected to bring anything new, in terms of the number of new jobs. The Ministry of Labor and Social Affairs cannot make more than a few promises, which have become a bitter refrain for those who spend the day looking for a job.

Unemployment in frightening numbers, as well as the minimum income of the employed will continue to be the biggest wound of the Albanian economy for 2005. Economic policies seem to be incapable of increasing the level of wages for a living, which continues to become more expensive every day. Although the Bank of Albania report highlights a lower average level of prices in 2004 compared to 2003, this is not essential in an economy in which regression is more evident than progress. The lack of investments in priority sectors, as well as inflated trade and budget deficits continue to hold hostage the potential investments so desired in these transition years.

In the last analysis of the year, the Ministry of Labor and Social Affairs (MLA) has set as one of its main objectives the fight against undeclared work. Regarding the opening of new jobs and related projects, which are expected to be realized, the promises have been few, not to mention that they have failed so far. On the other hand, the government faced with an election year is not interested in undertaking, at least the initiative to carry out an increase in public investments. This political enterprise seems to have translated into the minimum wage increase of some education and health workers who would be more valuable for electoral gains.

Thus, the budget of the year, which we have just entered, does not take any step forward to close the main wound that has caused the migration and suffering of thousands of Albanians, but remains simply an electoral budget with a large fiscal burden.

Factors that worked in favor of small business startups

Many factors worked in favor of small business startups. Among the most important among them was the liberalization of the economy, especially those sectors that were oppressed during socialism. Indeed, unlike the favored sector of heavy industry, self-employment could flourish in oppressed sectors such as services and trade, etc. The way privatization was another factor that encouraged small business. Small-scale privatization was the first to be achieved not only in Albania but also in most transition economies.

At the same time, the return of confiscated assets in the form of securities could partially solve the problem of the liquidity obligation. The benefits of privatization in Albania are primarily aimed at the economic revitalization of the sectors themselves, but the creation of a competitive market for products and services in the sectors of special importance of the economy will directly give their effects and flourish in the auxiliary service sectors as well, small artisanal and agro-industrial production. This effect will be immediate in:

- reducing the prices of products for the market
- increasing the effectiveness of private business

- increasing the quality and speed of public services to consumers and the population
- promoting new initiatives
- the opening of new jobs

The benefits of privatization show the importance of this factor that works in favor of starting small and private businesses as well as in the opening of new jobs.
However, these important influencing factors for entering self-employment as they belonged to the transition slowly faded with the transition to the market economy. Since the beginning of the 1990s the situation had almost changed.

	1993	1994	1998	1996	1997
Pollution	3.167	3.302	3.249	3.283	3.324
Working age population	1.763	1.786	1.82	1.85	1.861
Labor forces	1.364	1.423	1.309	1.274	1.301
Participation in work in %	77	81	73	69	59.48
Employed	1.063	1.161	1.138	1.116	1.107
Registered unemployed	301	262	171	158	194
Unemployment rate in %	22	18	13	12	14.9

Table 3. Population and labor force (in thousands)

Inheritance could replace restitution and privatization, which was expected to occur on a less massive scale. Already self-employed persons, as well as those wishing to enter self-employment, had to face the usual problem of liquidity constraints. All those who were pushed into self-employment by the wave of transition must now either prepare themselves for the qualities of an enterprise and the capital needed for a market economy or look at another employment opportunity.

Conclusion

Albania is one of the countries with a young population. During the last ten years, the young generation has constituted approximately 15-20% of the country's population; this indicator is very high compared to the average indicators of other countries. But the place occupied by the young population in the general population and in the labor-force has been decreasing in recent years as a result of a number of factors whose action started at the end of the last decade. Thus, during the period of 1990 until now, there has been a negative rate of population growth. The reasons for which are seen in the decrease in the average number of children per family, the increase in the average age of marriage for both women and men, the introduction and use of family planning methods.

Fluctuations in the population growth category have generated different age structures with a tendency to increase the number of the population in the middle age structures, which means that the average age of the Albanian

population has increased, compared to the corresponding indicator before 1990.

The emigration indicator, which was completely negligible as a result of the complete closure of Albanian society, changed after 1990, bringing great changes, including the large emigration of the population in the reproductive age, since 83% are aged 19-40 against the total number of immigrants.

But anyway, the Albanian human potential has a young average age, about 30 years old, and in addition, a relatively high level of education. But it must be said that there are two contradictions in social developments during the last ten years, which continue today: while the age of the population was and is very young, the labor market offers were and remain limited, and second, while the school of education is high, in the labor market there are marked shortages for qualified jobs (there is a discrepancy between training and employment), which respond to demographic, educational and cultural developments.

Lately, Albania is increasingly embracing a circular economy, driven by its ambition to achieve sustainable economic growth, tackle persistent environmental challenges, and pursue regional and European Union (EU) integration.

References

Blanchflower, David and Andrew Oswald, (1998).“What Makes an Entrepreneur?,” Journal of Labor Economics 16 26-60.

Boeri, Tito, Michael C. Burda, and János Köllö, Mediating the Transition: Labour Markets in Central and Eastern Europe, (London: Institute for EastWest Studies, 1998).

Balcerowicz Laszec and Gelb Alan, (1994). Macropolicies in Transition to a Market Economy: A three-year perspective". Annual World Bank Conference on Development Economics. April 28-29, Washington D.C

Carrasco, J. A. (2006). Salarios relativos en España. Teoría, evolución y determinantes. Instituto de Estudios Fiscales, Madrid.

Constitution of the Republic of Albania. (1998). Tirana, Botimet Shqiptare.

Christopher.C, (1992). "The Journey to a Market Economy", in: "The Emergence of Market Economies in Eastern Europe". Clague C. and Rausser G.C. ed., Blackwell.

Earle, John S. and Zuzana Sakova, (2000). “Business Start-Ups or Disguised Unemployment? Evidence on the Character of Self-Employment from Transition Economics,” Labour Economics 7,: 575-601.

Earle, John S. and Zuzana Sakova, (1999). “Entrepreurship from Scratch: Lessons on the Entry Decision into Self- Employment from Transition Economies,” SITE, Stockholm School of Economics, http://www.hhs.se/site

EEA (2008), *Effectiveness of Environmental Taxes and Charges for Managing Sand, Gravel and Rock Extraction in Selected EU Countries*, EEA Report No. 2/2008, European Environment

Agency, Copenhagen, https://www.eea.europa.eu/publications/eea_report_2008_2 (accessed on 22 November 2023).

EIU (2022), What to Watch in the Western Balkans in 2023, Economist Intelligence Unit, London, https://viewpoint.eiu.com/analysis/article/422592625.

European Commission (2022). Albania 2022 Report, European Commission, Brussels, https://neighbourhood-enlargement.ec.europa.eu/system/files/2022- 10/Albania%20Report%202022.pdf.

Eurostat (2020). "Small and medium-sized enterprises: An overview", https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20200514-1 (1 December 2023).

Gjergji. E, Gani.B, (2023). *Social Policies In Post -Democratic Albania*, Turkish Online Journal of Qualitative Inquiry (TOJQI)Volume 14 (1), 331-340

Fischer, Bernd, (2010).Enver Hoxha dhe diktatura staliniste në Shqipëri. Instituti i Studimeve Ndërkombetare. Tiranë.

OECD (2021), "No net zero without SMEs: Exploring the key issues for greening SMEs and green entrepreneurship", *OECD SME and Entrepreneurship Papers*, No. 30, OECD Publishing, Paris, https://doi.org/10.1787/bab63915-en.

O'Leary, Christopher J., (1999)."Promoting Self Employment Among the Unemployed in Hungary and Poland," UpJohn Institute Staff Working Paper 99 055,http://www.upjohninst.org/publications/wp/9955wp.html

Hana.L, Telo. I, (2005).Tranzicioni ne Shqiperi: arritje dhe sfida. Akademia e Shkencave e Shqiperise.

Holtz-Eakin, Douglas, 1993. "State-specific estimates of state and local government capital," Regional Science and Urban Economics, Elsevier, vol. 23(2), pages 185-209.

Muço, M. and Salko, D.(1996) " Some Issues on the Development of Informal Financial Sector in Albania", paper presented at the Seminar " Hidden Barriers to Economic Growth in Balkan Peninsula" organized by the Balkan Network, 14 April 1996, at Annual Meeting of EBRD, Sofia, Bulgaria.

Sachs, J.D. and Shatz, H.J. (1996). "U.S. Trade with Developing Countries and Wage Inequality", American Economic Review, Vol. 86, p. 234-9.

Slaughter, M. (1999). "Globalisation and Wages: A Tale of Two Perspectives", World Economy, July.

Vincze, M. & Kollo, J. (1999). "Economic Transformation and the Return to Human Capital - The Case of Hungary, 1986-1996," Budapest Working Papers on the Labour Market 9907, Institute of Economics, Centre for Economic and Regional Studies.

World Bank (2020), *Realizing the Blue Economy Potential in Albania*, World Bank, Washington, DC, https://openknowledge.worldbank.org/server/api/core/bitstreams/0e31273d-a69e-523a-92ec-d49b483daa1c/content

Engineering Curriculum SDG Integration: CDIO Standard 3 Approach

Asaad Almssad

Karlstad University, Sweden, https://orcid.org/ 0000-0002-4536-9747

Amjad Almusaed

Jönköping University, Sweden, https://orcid.org/0000-0001-5814-2667

Ghaniyah Yasir Gbashi,

Baghdad University Ibn Rushed Education College, Iraq

Abstract: This article elucidates a nuanced methodology to embed the Sustainable Development Goals (SDGs) within engineering curricula, grounded in the tenets of the CDIO Standard 3 framework. Given the heightened emphasis on sustainability within contemporary industrial contexts, there is an imperative demand for engineers endowed with sophisticated technical understanding and an unwavering allegiance to sustainability paradigms. Venturing into this interstice, our research leverages a rigorous mixed-methods paradigm, meticulously analyzing prevalent engineering syllabi complemented by a profound literature review. The emergent pedagogical model adroitly amalgamates SDG tenets with engineering didactics, predicated upon a robust interdisciplinary foundation. Such a stratagem accentuates pragmatic problem-solving undergirded by ethical imperatives, equipping graduates to traverse intricate global dilemmas adeptly. The treatise delves into the inherent complexities of harmonizing profound technical depth with interdisciplinary breadth and the mutable nature of skills prerequisites. Additionally, it showcases seminal case studies that epitomize heightened student engagement and curriculum excellence through SDG integration. This discourse contributes to the sustainable education canon, proffering cogent insights for educators, curricular architects, and policy delineators. It culminates in advocating for an engineering-pedagogical paradigm where sustainability is innately interwoven, thereby priming emergent engineers to champion sustainable technological innovations.

Keywords: Sustainable Development Goals (SDGs), Engineering Education, CDIO Standard, Interdisciplinary Approach, Curriculum Innovation

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Introduction

Background and Objectives of the study

The imperative to integrate Sustainable Development Goals (SDGs) within engineering education curricula is driven by the escalating global demand for sustainability-focused technical education. This is underscored by the United Nations' recognition of the 2030 Agenda for Sustainable Development as a critical priority. It is imperative for academic institutions, particularly universities, to adopt these goals to align with the significant contemporary challenges confronting the educational sector (Ramirez-Mendoza, R.A. et al. 2020). The paper delineates a meticulous approach for embedding SDGs into the fabric of engineering education, leveraging the CDIO Standard 3 as a foundational framework. This method signifies a fundamental change in engineering education, where a solid dedication to sustainability principles enhances the conventional emphasis on technical skills. Engineering education is charged with the dual responsibility of endowing graduates with technical expertise and a deep understanding of sustainable development principles. Amidst burgeoning discourse surrounding the expanding role of engineers in realizing the Sustainable Development Goals (SDGs), there needs to be more consensus regarding the prioritization of competencies essential for equipping engineering students to address impending sustainability challenges effectively (Beagon, U. et al. 2023) , (Gordon, N. et al. 2023). This necessity arises from various worldwide concerns, such as climate change and limited resources, which call for engineers skilled in navigating intricate socio-environmental environments. The study outlined in this paper utilizes a mixed-methods approach, which includes a thorough examination of existing engineering syllabi and an extensive survey of relevant literature. This approach provides a comprehensive perspective on the status of engineering education regarding sustainability. The primary aim of this paper is to elucidate a systematic approach for the productive integration of Sustainable Development Goals (SDGs) into the engineering curriculum. This new paradigm is anchored in an interdisciplinary framework amalgamating extensive technical knowledge with an expanded understanding of environmental, social, and economic dimensions. Conversely, the traditional paradigm in engineering education predominantly cultivates professionals to adopt a Cartesian, reductionist approach to problem-solving, apt for addressing clearly defined issues with established methodologies and predictable results. Nevertheless, addressing sustainability challenges necessitates a divergent cognitive approach adept at managing uncertain scenarios, emergent properties, and incomplete information (Sigahi, T. F. et al. 2023). The development of such a model is intrinsically complex, necessitating a rethinking of engineering education paradigms to cultivate skills that are not just focused on problem-solving but also rooted in ethical considerations and global awareness. The article presents vivid case studies demonstrating SDGs' successful integration into engineering education. These examples provide tangible evidence of curricular innovation resulting in increased student involvement and educational effectiveness. These indicators show the capacity of an educational system that combines technical rigor with a strong foundation in sustainable development ideas. The essay focuses on balancing specialized knowledge with a broad understanding of several fields within engineering education. The changing skill demands in the field of engineering need a flexible curriculum that can adjust while maintaining its fundamental educational principles. This feature is especially relevant for educators, curriculum architects, and policymakers in engineering education since they play a crucial role in determining the direction of the subject. The article contributes

significantly to the discussion on sustainable education in engineering. This highlights the need for a pedagogical transformation in which sustainability is an inherent part of the learning process. The essay promotes incorporating sustainable practices into engineering education to provide engineers with the skills needed to lead in sustainable technology innovation. The transformation delineated in the essay is paramount for addressing the contemporary era's multifaceted global challenges. It articulates a comprehensive blueprint for a fundamental shift in engineering education. This field is perpetually in flux, adapting to the latest technological advancements and responding to the evolving demands of the engineering sector (Qadir, J. 2023).

Literature review

Incorporating Sustainable Development Goals (SDGs) into engineering curricula is widely acknowledged as a crucial component in current educational discussions. According to Ramirez-Mendoza et al. (2020), the United Nations has emphasized achieving the Sustainable Development Goals (SDGs) by 2030 as a top priority worldwide. Given the circumstances, it is crucial for academic institutions, especially universities, to synchronize their instructional frameworks with these aims. Alignment plays a vital role in tackling the complex difficulties now faced by education (Ramirez-Mendoza, R. et al, 2020). This approach is crucial in meeting the increasing worldwide need for sustainability. The article represents a notable advancement in this field, presenting a comprehensive approach to integrating SDG principles into the framework of engineering education without any disruptions. In contrast, Fallah Shayan N and colleagues argue in their 2022 publication that corporate social responsibility (CSR) categories should be integrated into the Sustainable Development Goals (SDGs) framework. They suggest that the SDGs, with their comprehensive and global agenda, already cover the domains of CSR (Fallah Shayan N. et al 2022). This method marks a significant change in educational paradigms based on the CDIO Standard 3 framework. The CDIO (Conception, Design, Implementation, and Operation) framework is distinguished by its focus on practical application and comprehensive pedagogy in engineering education. Lenin, N., Siva Kumar, M., and Selvakumar, G. (2023) note that many academic institutions globally have adopted the CDIO approach to cultivate graduates of exceptional quality (Lenin, N. et al 2023). This approach transcends the conventional emphasis on technical skills by earnestly advocating for sustainable methodologies. The urgency of integrating these elements is highlighted by current global challenges such as climate change, resource scarcity, and the relentless quest for sustainable solutions.

D'Orazio, P. (2023) observes that with the onset of the pandemic, there was an imperative shift in strategic focus toward immediate crisis management. This shift inadvertently relegated the importance of addressing climate risks and bolstered investments in high carbon emission industries, reinforcing the prevailing 'carbon bias' in global financial practices (D'Orazio, P. 2023). Within this refined framework, engineering education has transcended its traditional role of imparting technical knowledge. It now emphasizes cultivating engineers who profoundly understand sustainability and its implications. As delineated by Buriro, S. A. et al. (2023), this necessitates a curriculum that imparts technical understanding and instills a strong sense of responsibility toward environmental preservation and societal welfare. Higher education institutions are increasingly adopting pedagogical approaches

that meet the demands of practical learning in a continuously evolving society (Buriro, S. A.et al, 2023). Historically, shifting public consciousness, concerns, and attitudes through education has effectively addressed social, economic, and sustainable development challenges. The study employs a mixed-methods research approach, facilitating a thorough analysis of existing engineering curricula, complemented by an extensive review of pertinent literature. This dual-pronged methodology enables a comprehensive understanding of the current state of engineering education and its alignment with sustainable development principles. However, Luna, A. et al. (2023) contend that the Covid-19 pandemic necessitated a reexamination of the teacher-student dynamic, catalyzing the implementation of novel strategies to enhance student engagement, participation, academic achievement, and retention (Luna, A. et al, 2023). This study provides valuable insights into developing an educational framework that effectively combines the ideas of Sustainable Development Goals (SDGs) with the fundamental principles of engineering education. Sigahi, T. F., and Sznelwar, L. I. (2023) argue that the shift towards a sustainability-focused approach in engineering education depends on the dedication of university leaders and may be accelerated by implementing initiatives at different levels within the university structure (Sigahi, T. F., & Sznelwar, L. I. 2023). This technique is based on an interdisciplinary approach that combines specific technical knowledge with a comprehensive grasp of environmental, social, and economic aspects. This methodology is crucial for cultivating a complete educational experience, giving engineers the requisite abilities to tackle and solve the intricate sustainability concerns of the 21st century. Nevertheless, the creation of such a model is associated with certain intricacies. This undertaking requires a thorough reassessment of conventional engineering education models to develop skills that go beyond simple problem-solving and are firmly based on ethical values and global awareness. Cunningham, C. M., and Sneider, C. (2023) argue that Artificial Intelligence (AI) literacy is paramount in educational objectives. They highlight the need to enhance learners' AI-related knowledge, abilities, attitudes, and values in the 21st century.

(Cunningham, C. M., & Sneider, C. 2023). The article enhances its story by showcasing relevant case studies that exemplify the effective incorporation of SDGs into engineering courses. The study demonstrates innovative changes in the curriculum, resulting in increased student involvement and academic achievement, which may be attributed to the integration of Sustainable Development Goals (SDGs). These examples illustrate the significant influence of an educational system that combines strong technical expertise with a solid foundation in sustainable development ideas. In research done in 2023, Ortiz, G. et al. performed a thorough review of student involvement in a higher education program that emphasized challenge-based learning for sustainable innovation. From 2018 to 2023, 738 projects were submitted for the program. These projects covered several subjects like Carbon Capture, Alternative Energies, Citizen Monitoring, and Sustainable Mobility. These initiatives jointly highlight the initiative's inventive contributions to Climate Action (SDG 13) (Ortiz, G. et al., 2023). The discussion on engineering education focuses on the critical balance between specific technical skills and a wide range of interdisciplinary knowledge. This contrast arises due to the constantly changing skill requirements in the engineering field, which calls for an educational framework that is adaptable and firmly grounded in its fundamental principles. According to Crawley E. F. et al. (2011), modern engineering education teaches students various information, skills, and attitudes for becoming successful and competent engineers. The CDIO Syllabus encompasses a wide range of skills and knowledge (Crawley, E. F. et al. 2011). The program aims to provide

comprehensive and consistent educational goals for undergraduate engineering training. This component is crucial for educational practitioners, curriculum planners, and policy formulators in engineering education since they play a crucial role in shaping the direction of this academic discipline. The reviewed research paper significantly enhances the academic discussion on incorporating sustainability in engineering education. This highlights the need for a thorough reform in teaching methods, where ideas of sustainability are effortlessly integrated into the educational system. The paper argues that incorporating sustainable techniques into engineering education is crucial for preparing future engineers to lead developments in sustainable technologies. A crucial paradigm change is proposed to handle today's complex and diversified global concerns. In addition, the essay outlines a comprehensive approach for executing this revolutionary plan in engineering educational settings, providing an essential viewpoint to the discussion.

Method and Materials

A rigorous mixed-methods study methodology was used to investigate how engineering courses include Sustainable Development Goals (SDGs). The researchers purposefully chose this methodology, combining qualitative and quantitative aspects, to fully grasp the intricacies of curriculum design and its effects on education. A comprehensive review of engineering degree curricula was the first step in the research. To determine the level of SDG integration in these curricula, it was necessary to conduct an exhaustive review of course materials, instructional approaches, and evaluation tools. The data used in this research came from various scholarly sources, including course materials, syllabi, and papers outlining the curriculum (Carson, J. G. et al. 1992). Case studies from universities that have successfully included SDGs in their engineering curricula formed the backbone of the study. Deep SDG inclusion, innovative instructional approaches, and measurable effect on student educational results were the pillars around which the selection criteria rested. In addition, the study technique included surveying students, curriculum designers, and teachers and conducting structured interviews with these groups. The surveys offered a more comprehensive empirical foundation for evaluating the perceived efficacy of the SDG integrations, and the interviews helped to clarify the complexities of these processes (Carson, J. G. et al. 1992).

We focused our investigation on CDIO Standard 3, namely its function in easing the incorporation of SDGs. Educational institutions' implementation of this standard to promote integrated learning experiences, successfully combining academic knowledge with practical applications in sustainability, was the focus of this part of the research. The article used a two-pronged strategy for evaluating impacts. It used a variety of measures, including academic performance indicators, student feedback, and observational studies, to examine how SDG-integrated curriculum affected student learning and active involvement. At the same time, we asked the teachers responsible for creating and delivering these courses for their thoughts on what helped and what got in the way of incorporating the SDGs into their lessons. Protocols were established to guarantee the privacy and anonymity of all participants since ethical issues were of the utmost importance throughout the research. The research noted several flaws, such as that self-reported data is subjective and that case study selection might be biased. This study relied on this methodology to provide a solid investigation of how engineering schools might include SDGs in their curricula,

focusing on CDIO Standard 3.

Assessment of Current Engineering Curricula About SDG Integration

Many national and international organizations actively integrate sustainability and Sustainable Development Goals (SDGs) into their operational frameworks in response to worldwide climate calamities. Education systems are evolving to include sustainability at all levels. This initiative gathered momentum by adopting the Millennium Goals in 2000, with a significant boost during the 2012 United Nations Conference on Sustainable Development in Rio de Janeiro. The conference laid the foundation for a holistic strategy to tackle environmental, economic, and political issues via the Sustainable Development Goals (SDGs). The 2030 Agenda, comprising 17 objectives, addresses significant challenges such as climate change, environmental degradation, poverty, and inequality while fostering equity in society and the environment by 2030(Li, Y. et al., 2023) and integrating sustainable development objectives into higher education courses to promote sustainable civil engineering. The article "Sustainability" was published in volume 13, issue 16, and has the identification number 8967.

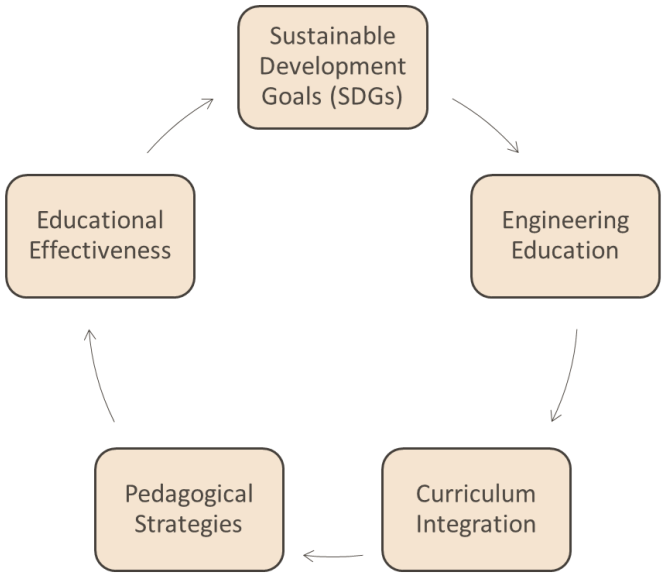

Figure 1. Incorporating Sustainable Development Goals into Engineering Education to Prepare Students for the Future.

It focuses on assessing the current state of engineering curricula at different institutions and their correlation with the Sustainable Development Goals (SDGs). To determine the extent to which sustainability concepts have been integrated into educational practices, it is necessary to analyze the current curriculum, teaching methodologies, and academic outcomes. This assessment identifies areas where Sustainable Development Goals (SDGs) should be more fully included in engineering education and lays the foundation for creating and improving educational frameworks. Integrating SDGs into the engineering curriculum is essential, using efficient teaching methods to

get the best academic results, as shown in Figure 1. This integration enhances engineering curricula, equipping students with vital skills and knowledge to contribute to sustainable development in their future professional capacities. The importance and necessity of incorporating Sustainable Development Goals (SDGs) into engineering courses cannot be emphasized enough. The integration mentioned is essential for developing a group of highly qualified workers proficient in dealing with the intricacies of a quickly changing and environmentally aware global environment. This will significantly contribute to sustainable growth.

Developing A Framework for SDG Integration Using CDIO Standard 3

It is widely acknowledged that including education for sustainable development (SD) in the engineering curriculum is necessary to enhance engineers' abilities to tackle sustainability concerns. A comprehensive and logical strategy is required to effectively address the necessity of Engineering Education for Sustainable Development (EESD) worldwide and guide research and implementation activities (Li, Y. et al., 2023). An essential aspect of this effort involves creating a structured approach for incorporating Sustainable Development Goals (SDGs) into engineering education. This is achieved by utilizing CDIO Standard 3, highlighting the importance of Integrated Learning Experiences (Bankel, J. et al., 2005). It promotes the integration of theoretical knowledge and practical applications that align with the principles of sustainable development. To use this strategy, it is essential to thoroughly grasp how sustainable development fits within academic frameworks, particularly by considering the CDIO Framework alongside the United Nations Sustainable Development Goals (UN SDGs). By embracing this sophisticated and comprehensive approach, engineering education contributes to developing professionals with technical expertise and the ability to navigate and contribute to a sustainable future. A supplement containing detailed guidance notes is necessary to clarify further how to interpret the twelve CDIO Core Standards in different pedagogical aspects, such as the learning environment, desired outcomes, integrated curriculum, experiential learning, assessment methods, program evaluation, and faculty development. This addition aims to improve the comprehension and implementation of these standards in an educational environment, promoting a more comprehensive and all-encompassing integration of sustainable development principles. This approach involves the creation of curricular components and academic tasks that not only address technical and engineering skills but also prioritize the principles of sustainable development. Through this approach, the framework guarantees that students acquire proficiency in their technical fields and cultivate a profound comprehension of how their endeavors influence society and the environment, aligning with the Sustainable Development Goals (SDGs) (Kioupi, V. 2021). The objective is to enable engineers with technical expertise and a strong sense of social and environmental responsibility. The successful implementation of this framework necessitates the collective endeavors of faculty members to adapt current courses and create novel ones, integrating material and projects that align with the Sustainable Development Goals (SDGs) and mirror actual global predicaments. The result would be a comprehensive and forward-thinking engineering program that aligns with global sustainability aspirations. Integrating Sustainable Development Goals (SDGs) into engineering education via CDIO Standard 3 signifies a revolutionary strategy for designing curriculum and teaching practices. This approach incorporates sustainability ideas directly into engineering curricula, guaranteeing that future engineers possess technical proficiency and a strong awareness of environmental and social issues.

The framework promotes a comprehensive educational experience integrating theoretical knowledge with practical implementation, specifically addressing worldwide concerns and sustainability goals. The efficacy of this integration is shown via inventive teaching methods and improvements to the curriculum, as seen in Figure 2. The graphic depiction emphasizes the interdependence of sustainable development principles in engineering education, emphasizing the crucial importance of integrated learning experiences in nurturing a new cohort of engineers prepared to address the intricacies of a sustainable future.

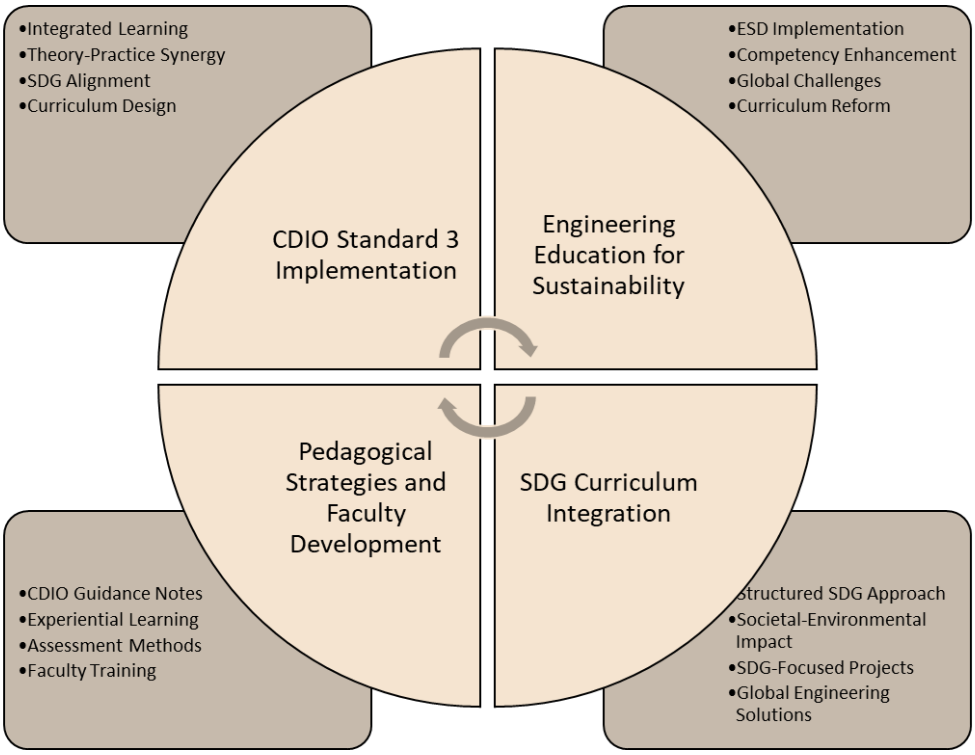

Figure 2. Examining the Incorporation of Sustainable Development Goals in Engineering Education: Assessing the Influence of CDIO Standard 3

Case Studies and Impact Analysis of Sdg-Integrated Engineering Education

It represents an academic project analyzing how engineering programs incorporate the Sustainable Development Goals (SDGs) into their curricula, specifically how the CDIO (Conceive-Design-Implement-Operate) framework is used (Namasivayam, S. et al., 2023). This in-depth analysis includes several case studies from different schools that have effectively implemented SDG integration into their engineering curricula. These case studies aim to demonstrate how SDG concepts may be used in engineering education via in-depth descriptions of modules, projects, or overall educational efforts. With an emphasis on how they relate to specific SDGs, each case study provides detailed curriculum documentation, pedagogical tactics, and new educational technologies or

collaborative techniques. An essential part of this study is that it allows for a practical view beyond academic paradigms by showing how sustainability concepts may be implemented in engineering education. Additionally, the impact study examines how these SDG-integrated curricula affect student learning outcomes, a crucial part of this academic investigation. Improving students' understanding of sustainability difficulties, their capacity to apply sustainable engineering solutions, and their development of competencies needed to solve global environmental and social crises are all part of this approach. Evaluating student involvement, learning efficacy, and the perceived relevance of sustainability education in their professional growth is carried out using empirical surveys, qualitative interviews, and analysis of academic performance data. This scholarly inquiry also provides an introspective examination of the difficulties and roadblocks experienced during integration. Contributing to a thorough knowledge of the challenges to successful SDG integration in engineering education, it provides a nuanced analysis of the difficulties, including logistical restrictions, faculty development needs, institutional opposition, and more.

Results And Discussion

Substantial results were obtained from the empirical inquiry of incorporating the Sustainable Development Goals (SDGs) into engineering courses led by the CDIO Standard 3 framework (Alarcon-Pereira, G.et al. 2023). Various case studies from different schools highlight the effectiveness of varying implementation tactics and creative changes to the curriculum. They included the development of targeted modules and projects that emphasized the smooth integration of academic understanding with real-world sustainability initiatives and were highly related to the SDGs. As shown in the case studies, students' participation and knowledge of sustainability concerns improved significantly due to this integration. Students demonstrated mastery of sustainable engineering solutions through their successful application in real-world scenarios, highlighting the development of crucial competencies necessary to address environmental and social issues on a global scale (Molderez, I., & Fonseca, E. 2018). Evidence supporting this came from surveys of actual students, in-depth qualitative interviews, and careful examination of measures of academic achievement. The impact study also clarified the difficulties of implementing the SDGs. Notable among them were institutional opposition to curriculum changes, needs for teacher development, and practical limitations. However, the overall effectiveness of incorporating SDGs into engineering curricula was apparent. The revised curriculum shifted the engineering education paradigm toward more progressive and all-encompassing practices. The results of this research highlight the need to use CDIO Standard 3 as a foundational framework for an organized technique to integrate SDGs. As a result, educators must work together to revise and develop new courses that address the SDGs while also reflecting real-world sustainability issues. The article concludes that engineering curricula must immediately include SDGs. Engineering schools may greatly aid in producing technically competent and socially and environmentally responsible professionals by embracing the CDIO Standard 3 framework. Educational institutions seeking to include sustainability in engineering curricula might use these results as a guide since they shed light on successful methods while drawing attention to possible obstacles to such revolutionary educational initiatives.

Conclusions

The research shows that including the Sustainable Development Goals (SDGs) into engineering curricula is crucial. Integrating sustainability into the engineering curriculum is doable. It improves the educational experience and effectiveness, according to the study's thorough examination of many case studies and the use of CDIO Standard 3. Firstly, the case studies show that engineering pedagogy has changed paradigm due to the effective implementation of SDGs. This change promotes a more comprehensive strategy integrating technical knowledge with social and environmental awareness beyond conventional technical education. The Sustainable Development Goals (SDGs) help train engineers to be experts in their professions and to think critically and creatively about how to solve the world's most pressing problems. Second, the research shows that sustainability may be best embedded via transdisciplinary and integrated learning. With its focus on combining theoretical knowledge with practical application, CDIO Standard 3 offers a strong foundation for accomplishing this integration. Students will thoroughly grasp sustainability challenges and how they pertain to engineering practice via this method. Institutional hurdles and the need for faculty development are two of the difficulties highlighted by the study as obstacles to SDG integration. For engineering education to progress and develop, it is essential to tackle these difficulties. According to the report, there must be a dedication to ongoing faculty development and curricular innovation to overcome these challenges.

References

Alarcon-Pereira, G.et al (2023). The evolution of sustainability in engineering education research: a longitudinal analysis through bibliometrics and the CDIO initiative. International Journal of Sustainability in Higher Education

Álvarez, I., Etxeberria, P., Alberdi, E., Pérez-Acebo, H., Eguia, I., & García, M. J. (2021).

Bankel, J., Berggren, K. F., Engström, M., Wiklund, I., Crawley, E. F., Soderholm, D. H., ... & Östlund, S. (2005). Benchmarking engineering curricula with the CDIO syllabus. International journal of engineering education, 21(1), 121-133

Beagon, U., Kövesi, K., Tabas, B., Nørgaard, B., Lehtinen, R., Bowe, B., ... & Spliid, C. M. (2023). What competencies are required to prepare engineering students for the challenges of the SDGs? European Journal of Engineering Education, 48(1), 1-23.

Buriro, S. A.et al, . (2023). Eco-Friendly Pedagogies For STEM Education: A Review. Journal of Namibian Studies: History Politics Culture, 34, 3018-3044

Carson, J. G., Chase, N. D., Gibson, S. U., & Hargrove, M. F. (1992). Literacy demands of the undergraduate curriculum. Literacy Research and Instruction, 31(4), 25-50

Carson, J. G., Chase, N. D., Gibson, S. U., & Hargrove, M. F. (1992). Literacy demands of the undergraduate curriculum. Literacy Research and Instruction, 31(4), 25-50

Crawley, E. F. et al., (2011). The CDIO syllabus v2. 0. An updated statement of goals for engineering education. In Proceedings of the 7th International CDIO Conference (Vol. 20, No. 23). Copenhagen: Technical

University of Denmark

Cunningham, C. M., & Sneider, C. (2023). Precollege engineering education. In Handbook of research on science education (pp. 960-992). Routledge

D'Orazio, P. (2023). Navigating financial stability through the dual challenges of climate change and pandemics. Current Opinion in Environmental Sustainability, 65, 101386

Fallah Shayan N, et al (2022), Sustainable Development Goals (SDGs) as a Framework for Corporate Social Responsibility (CSR). Sustainability. 2022; 14(3):1222. https://doi.org/10.3390/su14031222

Gordon, N., Kemerova, N., Bolsunovskaya, L., & Osipov, S. (2023). Sustainable Language Training for Engineering Students: Integrating Resource-Efficiency into the Course Content through the Educational Process. Education Sciences, 13(2), 176.

Kioupi, V. (2021). Sustainability education: A systemic framework for evaluating educational outcomes towards the Sustainable Development Goals

Lenin, N., Siva Kumar, M., & Selvakumar, G. (2023). Application of Conceive, Design, Implement and Operate (CDIO) Strategy for Developing Engineering Education in Indian Perspective. Journal of Education, 203(1), 41-48

Li, Y., Liao, T., & Li, J. (2023). Optimizing Higher Education for Sustainable Development through the Design and Implementation of the Global Engagement Program. Sustainability, 15(13), 10098

Luna, A. et al, (2023). Master-Pm: Addressing Remote Teaching Challenges In Project Management Through A Serious Game Approach. JISTEM-Journal of Information Systems and Technology Management, 20, e202320007

Molderez, I., & Fonseca, E. (2018). The efficacy of real-world experiences and service learning for fostering competencies for sustainable development in higher education. Journal of Cleaner Production, 172, 4397-4410

Namasivayam, Satesh, Abdulkareem Sh Mahdi Al-Obaidi, and Mohammad Hosseini Fouladi. "A Conceptual Curriculum Design Approach for Educating Engineers of and for the Future." Indonesian Journal of Science and Technology 8.3: 381-396

Ortiz, G. et al., (2023). Empowering Students for Climate Action: Xignux Challenge Initiative, Developing Sustainable Competences Fostering Educational Innovation. In 2023 World Engineering Education Forum-Global Engineering Deans Council (WEEF-GEDC) (pp. 1-6), IEEE

Qadir, J. (2023, May). Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education. In 2023 IEEE Global Engineering Education Conference (EDUCON) (pp. 1-9). IEEE

Ramirez-Mendoza, R. et al, . (2020). Incorporating the sustainable development goals in engineering education. International Journal on Interactive Design and Manufacturing (IJIDeM), 14, 739-745

Ramirez-Mendoza, R.A. et al. (2020). Incorporating sustainable development goals in engineering education. Int J Interact Des Manuf 14, 739–745 (2020). https://doi.org/10.1007/s12008-020-00661-0

Sigahi, T. F., & Sznelwar, L. I. (2023). From isolated actions to systemic transformations: Exploring innovative initiatives on engineering education for sustainable development in Brazil. Journal of Cleaner Production, 384, 135659

Sigahi, T. F., Rampasso, I. S., Anholon, R., & Sznelwar, L. I. (2023). Classical paradigms versus complexity

thinking in engineering education: an essential discussion in the education for sustainable development. International Journal of Sustainability in Higher Education, 24(1), 179-192

Redefining Engineering Education: The Transformative Role of Generative AI Technologies

Amjad Almusaed

Jönköping University, Sweden, https://orcid.org/0000-0001-5814-2667

Marisol Rico Cortez

Jönköping University, Sweden, orcid.org/0000-0003-3765-4019

Asaad Almssad

Karlstad University, Sweden, https://orcid.org/ 0000-0002-4536-9747

Abstract: AI is a rapidly advancing technology, especially in education. "Generative AI" is particularly notable for revolutionizing how we teach and learn, prompting a reevaluation of teacher training. Engineering education is at the forefront of pedagogical innovation, enhancing learning tools, and fostering a new educational mindset. This transition makes problem-solving more straightforward for teachers and encourages the revision of teaching methods, thus enhancing student-teacher relationships. Teaching space with AI integration transforms students into active learners, deeply involved in shaping their educational paths. This paper will explore the influence of generative AI on engineering education through a literature review, demonstrating how it contributes to more flexible, advanced, and engaging learning spaces. It will draw attention to the urgent need for educators to embrace and actively participate in these emerging dynamics. Specifically, the paper will focus on CDIO Standards 2 and 8, evaluating generative AI's impact on learning outcomes and promoting active learning. It aims to reveal how fertile AI can synchronize educational objectives with hands-on, collaborative student experiences.

Keywords: Generative AI, Engineering Education, Pedagogical Innovation, Active Learning, CDIO Standards

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Introduction

In a time characterized by rapid technological advancement, the field of education, particularly in the realm of

engineering, is poised for a significant and extensive change. According to Xing, B., Marwala, L., & Marwala, T. (2018), the Fourth Industrial Revolution is characterized by a complex integration of many technology fields (Xing, B. et al. 2018). This encompasses notable progress in cutting-edge robotics, artificial intelligence, nanotechnology, neurotechnology, data analytics, blockchain, cloud computing, biotechnology, the Internet of Things (IoT), and 3D printing. These advancements are not just little improvements; they signify a fundamental change, signaling significant consequences for engineering education's educational frameworks and methods. This development requires a reassessment and adjustment of educational practices to correspond with the emerging technology environment and its related requirements. The advent of artificial intelligence (AI) has accelerated the development of a new educational model, especially highlighting "Generative AI" as a significant catalyst for transformation. According to Bozkurt A. et al.,2023 using AI in Education (AIEd) presents advantages and difficulties, requiring a detailed comprehension of its effects. These issues arise from examining dominant narratives around AIEd, emphasizing the advancing skills of AI in carrying out duties formerly exclusive to human educators. With the continuous integration of AI in education, it is crucial to reassess and rethink the functions of technology and human instructors in an educational setting (Xing, B. et al. 2018). This reconsideration necessitates a proactive strategy, foreseeing the future path of AI's incorporation into the educational process and its consequences for instructional tactics. This study investigates the significant influence of Generative AI technologies on engineering education, known for its rigorous and dynamic characteristics. These improvements improve the range of tools educators can access and radically change established educational paradigms. According to Alenezi M (2023), higher education institutions are substantially changing their pedagogical approaches and operational processes. The transition is driven by several causes, including digitalization, e-learning, and adopting adaptable classroom formats and micro-credentials (Alenezi. 2022). Digital technologies provide a range of carefully selected tools designed for organized learning environments in higher education, helping students enhance their educational experiences. Furthermore, this research explores integrating digital learning as a crucial element of modern higher education. Further investigation is necessary to comprehend how higher education may adeptly manage digital change and tackle the problems presented by the fifth Industrial Revolution. The use of AI in educational environments signifies technological advancement and a fundamental change in fostering more participatory and learner-focused teaching methods. Sitthiworachart J, Joy M, King E, Sinclair J, and Foss J (2022) have seen an increasing fascination with active learning in Higher Education. In theory, technology can enhance active learning processes by making them more efficient. Nevertheless, the prevailing use of learning technology leans towards traditional approaches. Their results indicate that the Teaching Grid may be efficiently used for the professional growth of educators. This resource has been seen to inspire instructors to include technology in their future educational plans. They pinpoint five crucial characteristics that promote the progress of active learning (Sitthiworachart J. et al. 2022). Educators' impressions of their experiences indicate a desire to use technology more widely, a heightened awareness of its potential, and a readiness to adopt more dynamic, student-centered teaching methods. The main emphasis will be on ensuring that educational goals align with practical, cooperative activities for students, which is a vital component of contemporary engineering education. In this context, academic attention focuses on the thorough incorporation of CDIO Standards 2 and 8, which are significant in engineering education. Standard two specifically highlights the need to outline educational goals and objectives carefully and precisely. Tran, T. B., and Phan, T. H. (2022) have made noteworthy

contributions in emphasizing the need for adaptation and customization in contemporary higher education. Their academic research proposes the concept of 'curriculum agility' as a fundamental framework for engineering education, designed to effectively traverse and tackle the complex problems presented by social, environmental, and technological changes (Tran, T. B., & Phan, T. H. 2022). This notion promotes a curricular framework that is adaptable and sensitive to the constantly evolving needs of the modern world, ensuring that engineering education remains relevant. This standard is beyond mere compilations of acquired knowledge, including cultivating essential skills and mindsets. A complete framework must be developed to precisely delineate the skills and abilities students are expected to possess upon completing their academic journey (Bradley, E. et al. 2022). This framework ensures educational goals align with academic rigor and industry demands, enhancing the program's relevance and efficacy. Standard eight is crucial in engineering education as it highlights the need for active learning in fostering teaching methods that provide a more engaging and collaborative educational setting. Lombardi, D., and Shipley, T. F. (2022) have conducted a rigorous examination of the widespread use of active learning in undergraduate science, technology, engineering, and mathematics (STEM) education. Their study emphasizes that while active learning is widely used, it is understood and used differently across various demographics, academic groupings, and specialized STEM subjects (Lombardi, D. et al. 2021). The variety of interpretations and uses of active learning highlights its intricate and multidimensional character as an educational concept. Technology indicates the need for a more advanced and tailored strategy for integrating technology into the academic environment. This standard signifies a fundamental change from conventional instructional teaching techniques to more participatory and learner-focused pedagogical approaches. It includes a variety of creative methods, such as problem-based learning, collaborative projects, hands-on activities, and the integration of sophisticated technology tools, all to enhance the educational environment (Karan, E., & Brown, L. 2022). The main goal of this standard is to enhance the learning process by making it more immersive and collaborative, which will increase student involvement and enable a deeper understanding and practical application of the subject matter.

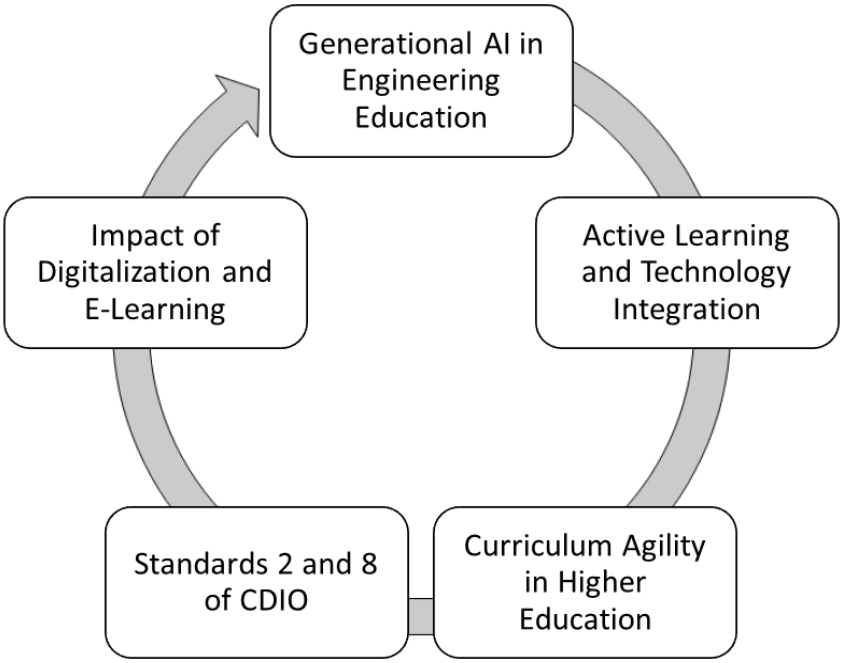

Figure 1. Interconnected Elements of Advancement in Engineering Education: The Central Role of Generative AI and Active Learning

This change improves the educational experience and conforms to academic demands and expectations. This paper highlights the urgent need for educators to embrace and actively engage in and contribute to the expanding educational landscape by examining the role of Generative AI in engineering education. The aim is to showcase the potential of AI in enhancing academic results and revolutionizing engineering pedagogy in the 21st century.

Materials and Methods

The study used an extensive literature analysis to comprehensively examine the present state of generative AI technologies in engineering education. This review included a comprehensive analysis of current academic publications, case studies, and empirical research, specifically looking at how fertile AI is used and how effective it is in educational environments. After thoroughly examining the literature, the researcher conducted a detailed analysis of the current engineering curriculum. This step was crucial in identifying possible locations for incorporating generative AI techniques. The study included an assessment of educational goals, the structural makeup of curricula, and the need for specific AI-focused courses, resulting in a thorough comprehension of the current educational frameworks. The study highlighted the need to collaborate across disciplines to understand and use generative AI's multidisciplinary aspects fully. This research investigated the potential of generative AI to facilitate the integration of several engineering disciplines, leading to an improved learning experience and promoting a comprehensive educational approach. The methodological approach emphasized addressing ethical concerns related to the use of AI in education. This included a meticulous analysis of the ethical dilemmas presented by generative AI, including apprehensions over prejudice, data confidentiality, and its wider ramifications on the job market. Moreover, the research will examine several case studies using generative AI technologies in engineering education. This enabled an empirical evaluation of the actual implementations of

these technologies and their influence on improving learning results. The study process also included a crucial element of collaborating with industry partners. The objective of this partnership was to synchronize educational tactics with industrial prerequisites, guaranteeing that the curriculum stays relevant and adaptable to the changing needs of the workforce. Ultimately, the research included feedback mechanisms from students actively participating in AI-enhanced learning settings. This feedback played a crucial role in assessing the efficacy of generative AI technologies in enhancing the educational experience and promoting a more captivating and dynamic learning environment.

Integrating Generative Ai into The Engineering Curriculum

Adapting Engineering Education: Integrating Generative Ai for Industry Relevance

Academics are interested in generative AI in conventional engineering education. Qadir, J. (2023) states that engineering education adapts to new technology and industrial demands. The ChatGPT conversational bot shows how generative AI improves this problem (Qadir, J. 2023). This inclusion advances schooling to stay up with technology and engineering education. Machine learning, deep learning, and neural networks are part of generative AI, which may alter engineering sectors. Deep learning, machine learning, and artificial intelligence components are currently a vital technology of the Fourth Industrial Revolution (4IR), also known as Industry 4.0, according to Sarker (2021). Due to its improved data learning capabilities from artificial neural networks (ANN), DL technology has become a major computer topic (Sarker, I. H. 2021). Having several uses emphasizes its value in today's modern environment. Academic institutions must scientifically evaluate various methods to integrate new technology into engineering curricula. Allioui, H., and Mourdi, Y. (2023) underline that AI integration marks the start of a new era of digital service reliability, supply chain efficiency, and rapid access to critical data and analytics. The pedagogical challenges of bringing generative AI into engineering education are discussed (Allioui, H., & Mourdi, Y. 2023). The effects on teaching, curriculum, and education are examined.

Development of Educational Programs and Specialized Instruction

Incorporating generative AI into traditional engineering education requires a meticulous curriculum alignment with AI-focused principles. Kim J. et al. (2023) have conducted a thorough analysis of the rapid advancement of artificial intelligence, specifically focusing on adaptable systems such as generative AI and the resulting psychological consequences. They emphasize the need for a comprehensive approach to address and reduce worries caused by the widespread use of AI technology (Kim, J. et al. 2023). This approach necessitates a thorough examination of both the scientific progress and the psychological consequences linked to the fast development of AI in educational settings. To align engineering education with generative AI, it is essential to carefully assess educational goals, curriculum structure, and academic prerequisites. This will ensure that students possess the fundamental knowledge necessary for applying AI. Furthermore, it is crucial to prioritize the creation and execution of specialized AI courses. Tedre M. et al. (2021) emphasize that in recent decades, there have been several real-world uses of machine learning, demonstrating the effectiveness of AI-driven approaches in diverse

fields of computer science. The growing integration of machine learning into higher education programs exemplifies this pattern. (Tedre, M., Tet al. 2021). These AI courses should provide a thorough understanding of AI's theoretical and practical components, including the fundamental algorithms, deep learning structures, optimization techniques, and ethical issues in AI. The objective is to provide students with a comprehensive comprehension and practical proficiency in generative AI technology.

Cooperative and Ethical Methods

Facilitating multidisciplinary cooperation is crucial since generative AI transcends specific areas and significantly influences other technological domains. Ooi, K. B. et al. (2023) affirm academically that productive artificial intelligence (AI) has garnered substantial attention in both individual and organizational domains since its birth (Ooi, K. B. et al. 2023). The increased focus on this phenomenon is credited to its capacity to bring about significant and far-reaching transformations in several aspects of life, comparable in magnitude and influence to the changes caused by the emergence of the Internet and smartphones. This insight highlights the need to use a variety of disciplines to comprehend and use generative AI technologies in different industries. Promoting collaboration among students from many engineering fields enhances their holistic understanding of the interdisciplinary effects of AI. This approach may be improved by starting multidisciplinary joint initiatives and participating in rigorous research efforts. Pedro, F., Subosa, M., Rivas, A., and Valverde, P. (2019) explore the academic discussion around the increasing involvement of AI in education, namely in creating innovative teaching and learning methods that are now being tested in various educational environments. The authors thoroughly analyze the necessary conditions for incorporating AI into education, including the need for modern infrastructure and a vibrant environment for creativity. At the same time, they also tackle the urgent issues surrounding the availability of AI technology in underdeveloped countries. Their research raises significant concerns regarding the importance of AI in addressing the digital gap in underdeveloped places, therefore examining the possibility of AI as a tool for achieving educational equality (Pedro, F. et al. 2019). Moreover, it is argued that establishing synergies with the industry sector is essential for enhancing the practical aspects of AI education. These partnerships are crucial in aligning the educational framework with the modern industrial environment's suitable needs and changing requirements. As a result, students are equipped with academic knowledge and practical skills in AI technologies. Furthermore, ethical concerns have significant significance. Engineering curricula should include extensive discussions and coursework on the ethical considerations of artificial intelligence, focusing on reducing bias and fostering the creation of morally sound AI systems (Walz, A., & Firth-Butterfield, K. 2019). This ensures that students have both technical proficiency and a profound comprehension of the ethical implications of AI implementations. Introducing generative AI technologies to traditional engineering schools requires careful planning and academic rigor. Academic institutions can integrate generative AI into engineering education by coordinating the curriculum, offering specialized AI courses, encouraging cross-disciplinary collaboration, involving industry partners, facilitating capstone projects, emphasizing ethics, and prioritizing ongoing learning. This combination prepares students to solve AI-driven technical issues and makes them proficient and ethically responsible engineers. Scholarly research on generative AI is a critical first step in linking conventional engineering education with AI's revolutionary possibilities.

Enhancing Innovation Through Interdisciplinary Collaboration

Interdisciplinary cooperation shifts academic and professional paradigms by acknowledging the limits of walled knowledge and the power of combining disparate fields (Dwivedi, Y. K. et al. 2023). This perspective suggests that the complex and diverse character of modern situations goes beyond the ability of individual discipline frameworks to explain and solve them. As a result, the relevance of multidisciplinary cooperation has dramatically increased in both academic and professional domains. This kind of collaboration requires merging many approaches, theoretical frameworks, and perspectives from different academic fields. MacLeod, Merz, Mäki, and Nagatsu (2019) argue that interdisciplinarity (ID) has influenced modern scientific investigation and research policy. This model is often praised as an exemplary representation of innovative, creative, and socially significant research methods covering various disciplines, including the natural and social sciences and the humanities (MacLeod, M. et al. 2019). This viewpoint highlights the increasing agreement among academics about using multidisciplinary methods to understand and tackle the intricate nature of current global problems. Environmental science studies and solves environmental issues using biology, chemistry, physics, geography, and social sciences. Interdisciplinary teams solve complex problems better.

Climate change and technological innovation need multidisciplinary solutions. Bringing together experts from diverse fields helps solve these problems. Interdisciplinary collaboration promotes education. It promotes holistic and integrated learning and research by encouraging students and scholars to investigate beyond their specialty. This diverse perspective enhances their intellectual experience and equips them to solve problems in a complex global environment. Effective interdisciplinary collaboration is hard. Crossing disciplinary languages, methods, and epistemological assumptions is necessary. Interdisciplinary collaboration needs institutions to invest in transdisciplinary situations. A multidisciplinary curriculum, faculty collaboration, and interdisciplinary research may be required. Today's academia and industry need multidisciplinary cooperation. It tackles challenging problems, enhances research, and enhances education. Interdisciplinary collaboration may boost creativity, problem-solving, and education despite its drawbacks.

Revolutionizing Interdisciplinary Collaboration: The Impact of Generative AI in Engineering and Beyond

Generative AI significantly alters interdisciplinary cooperation, especially in sectors such as engineering, with a dramatic revolutionary effect. Its proficiency in synthesizing, interpreting, and producing complex data patterns makes it crucial for promoting interdisciplinary creativity and collaboration. Rane, N., Choudhary, S., and Rane, J. (2023) explore the impact of AI models on the design process in architectural engineering. These methods optimize the exchange of ideas, iterations, and collaboration across design teams, providing a more efficient method for fostering innovation (Rane, N. et al. 2023). In addition, the authors examine the prominent role of generative AI in the domains of representation and visualization, emphasizing its capacity to generate intricate and realistic visual encounters. Generative AI connects engineers and professionals from different fields. The technology's ability to handle and extrapolate large amounts of information helps engineers simplify complex

technological ideas. Non-engineering professionals in social sciences and healthcare need this translational skill to effectively engage with engineering data and provide their unique views to technical initiatives. Additionally, generative AI has novel problem-solving potential. Combining and analyzing data across fields allows AI algorithms to find answers that conventional, discipline-specific techniques lack. This method thoroughly explains complicated situations and inventive, integrated solutions (Hanington, B., & Martin, B. 2019).

AI may be used in environmental engineering to combine climatology, urban planning, and social sciences to create sustainable, socially responsive urban infrastructure. Generative AI's predictive modeling and scenario simulation are crucial for strategic planning and decision-making. Engineers working on many projects may use AI to simulate varied situations using transdisciplinary data. This improves risk assessment, strategic foresight, and decision-making. Additionally, generative AI democratizes engineering expertise. It bridges knowledge gaps by giving professionals from diverse backgrounds AI tools that include engineering concepts. It promotes inclusive, collaborative problem-solving in resource-limited environments with scarce specialized expertise (Aderinto, N. et al. 2023). Finally, generative AI is essential to education, especially in multidisciplinary learning. Students are prepared for collaborative, complex work situations using AI technologies that include cross-disciplinary knowledge.

Interdisciplinary Synergy in AI Applications: Overcoming Complex Engineering Challenges

The manuscript delves into a scholarly exploration of various case studies, underscoring the pivotal significance of interdisciplinary teams in successfully applying Artificial Intelligence (AI) technologies to surmount intricate engineering challenges. These studies include a wide range of areas, such as the advancement of self-driving cars, the surveillance and safeguarding of environmental systems, the upkeep and enhancement of infrastructure, and the creation and administration of healthcare facilities (Javed, A. R. et al. 2022). Every case study is a cooperative endeavor that includes various professions, such as mechanical and software engineers, data scientists, AI specialists, environmental engineers, and healthcare practitioners. The central motif in these research works is the deliberate use of Artificial Intelligence (AI) technology. This involves using machine learning algorithms for real-time decision-making and object identification, applying AI-powered prediction models to analyze the environment and infrastructure, and implementing optimization algorithms to administer educational facilities effectively. Yang and colleagues suggest the development of an environmentally friendly cloud data center platform in their 2018 research. Their objective is to create a scheduling control engine and verify the feasibility of this framework (Yang J.et al. 2018). For instance, in autonomous vehicle development, AI has played a crucial role in improving safety features, minimizing human mistakes, and progressing autonomous navigation technology. AI models have been used in environmental monitoring to assess data gathered from satellites and sensors. This application has resulted in more accurate forecasts of weather patterns, pollution levels, and ecosystem changes. This has thus enabled the implementation of more efficient environmental conservation initiatives. AI-driven predictive maintenance models in the field of infrastructure have resulted in substantial cost reductions, prolonged the lifetime of critical infrastructure, and mitigated the likelihood of catastrophic breakdowns (Olawale, M. A.et al. 2023). Artificial intelligence (AI) in facility management within the healthcare

industry has improved the quality of patient care and operational effectiveness. This showcases the capacity of AI to enhance the delivery of services in vital public health infrastructures. These case studies demonstrate the significant potential of combining several disciplines and using AI technology to solve intricate engineering challenges effectively. Combining various skills and new technology is now widely acknowledged as a critical factor in driving innovation and improving efficiency in modern engineering problems.

Enhanced Ethical and Societal Considerations

The central motif in these research works is the deliberate use of Artificial Intelligence (AI) technology. This involves using machine learning algorithms for real-time decision-making and object identification, applying AI-powered prediction models to analyze the environment and infrastructure, and implementing optimization algorithms to administer educational facilities effectively. Yang and colleagues suggest the development of an environmentally friendly cloud data center platform in their 2018 research. Their objective is to create a scheduling control engine and verify the feasibility of this framework (Qadir, J. 2023, May). This educational integration aims to provide future engineers with the technical expertise to use advanced technologies and thoroughly comprehend the ethical and social frameworks required for their responsible use. An essential aspect of this educational framework is teaching ethical issues about artificial intelligence. It entails providing education on the ethical principles and regulatory standards that govern AI technology, equipping students to effectively handle the ethical challenges they may face in their professional pursuits. The incorporation of appropriate AI use is an essential element of this program. It involves instructing students on the inherent limits and possible hazards of AI technologies, advocating for best practices in developing and implementing AI, and cultivating an understanding of these technology's effects on different stakeholders. In addition, the program thoroughly explores the broader social consequences of incorporating generative AI into engineering methods. This research contains critical examinations of how AI algorithms might perpetuate existent social prejudices or infringe upon individual privacy rights, along with evaluating effective solutions for reducing these dangers. One important subject discussed in this instructional framework is the possibility of job loss resulting from developments in AI technology. In contrast, according to Alam (2021), AI and its associated technical advancements would render some professions obsolete, eliminating the need for conventional teaching approaches. Simultaneously, other occupations will see substantial changes, requiring updating educational resources. Moreover, the rise of novel professions will need inventive pedagogical methods. Within academic procedures, artificial intelligence (AI) will catalyze change and be a facilitator, fundamentally transforming the characteristics and allocation of work. (Alam, A. 2021).

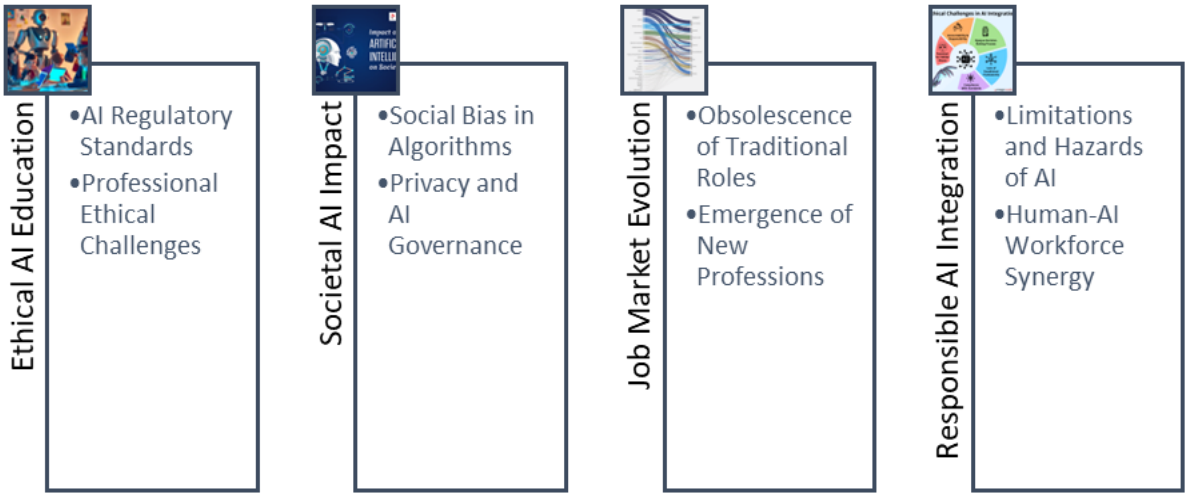

Figure 2. Key Pillars of Ethical and Societal Considerations in AI-Integrated Engineering Education

The simultaneous nature of this job emphasizes the need for a sophisticated comprehension of the influence of AI in the educational industry. The curriculum addresses this matter by equipping students with the ability to understand and negotiate the changing job market, emphasizing the role of AI as a tool that enhances human work rather than replacing it. This educational method seeks to elucidate how engineers might contribute to a harmonious coexistence of artificial intelligence and human labor in the future workforce. Incorporating ethical and societal factors into engineering education is crucial for developing a cohort of engineers with technical expertise in implementing AI technologies and a profound awareness of their professional conduct's ethical and societal aspects. This comprehensive educational approach assures that the future trajectory of engineering relates to concepts of moral responsibility and social conscientiousness, hence creating a balanced and mindful evolution in AI technology.

Findings and Discussion

The research shows impressive progress in incorporating generative AI into engineering education. Integrating technologies like ChatGPT is essential to matching educational frameworks with engineering industry needs. The curriculum covers AI's theoretical and practical elements, including generative AI technology classes. The research emphasizes the importance of generative AI in transdisciplinary cooperation and innovation. Generative AI's capacity to handle complicated data patterns has helped foster innovation and collaboration in many fields. Multidisciplinary approaches have successfully solved complex technical problems and analyzed AI's effects in various fields. Generational AI has increased ethical and societal issues in engineering education. The curriculum changes emphasize moral concepts that govern AI and its social impacts, such as biases, privacy problems, and employment displacement. Curriculum transformation and pedagogical change are required to include generative AI in engineering courses. This modification requires debating technical skill versus morality. The report suggests rethinking existing training approaches to meet the engineering industry's dynamic nature and complicated ethical

issues. The role of generative AI in interdisciplinary cooperation is worth discussing. The technology's ability to integrate technical and non-engineering disciplines has opened new innovative avenues. This collaborative strategy promotes classroom learning and reflects the interconnectedness of current engineering challenges. Dealing with ethical and social issues The rising emphasis on ethical and social ramifications in engineering education due to AI technology emphasizes critical discourse. Data privacy, prejudice, and AI systems' moral development and deployment must be addressed. The dramatic influence of AI on labor markets and the role of engineers in a changing job environment are also important topics. The findings and comments in this study demonstrate the impact of generative AI on engineering education. Future engineers must be prepared for the difficulties of the current world by switching to a transdisciplinary and socially conscious curriculum. This transition creates problems and possibilities for creative, inclusive, and ethical engineering education.

Conclusions

Upon analyzing the implications and contributions of this study on the transformational impact of generative AI in engineering education, it is evident that the incorporation of these technologies brings about a substantial change in educational practices. This study has extensively investigated the potential of generative artificial intelligence (AI) to completely transform educational methods. It emphasizes the technology's ability to develop learning environments that are more flexible, sophisticated, and interactive. It highlights the crucial importance of generative AI in improving the effectiveness of teaching methods and the learning experiences of engineering students. This article makes a valuable contribution to the wider discussion on educational innovation, specifically in the field of engineering, from an academic standpoint. The text offers a comprehensive examination of how generative AI might be utilized to promote active learning, facilitate multidisciplinary cooperation, and connect educational objectives with the practical, collaborative experiences that are crucial for contemporary engineering education. The research highlights the significance of incorporating practical engineering problems into the curriculum, specifically concentrating on CDIO Standards 2 and 8. This approach aims to equip students with the necessary skills to traverse the intricacies of the modern engineering field. Moreover, the article emphasizes the need for educators to take a proactive approach to incorporating AI technology. This involves evaluating educational objectives, curriculum development, and teaching methods to ensure they align with the changing technical breakthroughs and the multidisciplinary character of engineering challenges. The research highlights the need to address ethical concerns in the utilization of AI. It recommends the creation of a curriculum that not only teaches technical skills but also promotes ethical thinking and social responsibility among upcoming engineers. To summarize, the examination of generative AI's impact on reshaping engineering education uncovers its capacity for profound change and the difficulties linked to its incorporation. This paper establishes a fundamental structure for future research and discourse on maximizing the utilization of generative AI in educational environments, highlighting the crucial equilibrium between technical progress and ethical deliberations. This research emphasizes the significance of ongoing adaptation and the active participation of educators and institutions in embracing technological changes to improve the quality and relevance of engineering education in the 21st century.

References

Aderinto, N., Olatunji, D., Abdulbasit, M., & Edun, M. (2023). The essential role of neuroimaging in diagnosing and managing cerebrovascular disease in Africa: a review. Annals of Medicine, 55(2), 2251490

Alam, A. 2021. Possibilities and apprehensions in the landscape of artificial intelligence in education. In 2021 International Conference on Computational Intelligence and Computing Applications (ICCICA) (pp. 1-8). IEEE

Alenezi M. Digital Learning and Digital Institution in Higher Education. Education Sciences. 2023; 13(1):88. https://doi.org/10.3390/educsci13010088

Allioui, H., & Mourdi, Y. (2023). Unleashing the potential of AI: Investigating cutting-edge technologies that are transforming businesses. International Journal of Computer Engineering and Data Science (IJCEDS), 3(2), 1-12

Bozkurt, A., Xiao, J., Lambert, S., Pazurek, A., Crompton, H., Koseoglu, S., ... & Jandrić, P. (2023). Speculative futures on ChatGPT and generative artificial intelligence (AI): A collective reflection from the educational landscape. Asian Journal of Distance Education, 18(1)

Bradley, E. J., Board, L., Archer, D., & Morgans, M. (2022). Presenting the case for implementing entrustable professional activities (EPA) in Sport and Exercise Sciences teaching: Application and alignment to develop student competencies. Journal of Hospitality, Leisure, Sport & Tourism Education, 31, 100376

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., ... & Wright, R. (2023). "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges, and implications of generative conversational AI for research, practice, and policy. International Journal of Information Management, 71, 102642

Hanington, B., & Martin, B. (2019). Universal design methods expanded and revised: 125 Ways to research complex problems, develop innovative ideas, and design effective solutions. Rockport publishers

Javed, A. R., Shahzad, F., your Rehman, S., Zikria, Y. B., Razzak, I., Jalil, Z., & Xu, G. (2022). Future intelligent cities: Requirements, emerging technologies, applications, challenges, and future aspects. Cities, 129, 103794

Karan, E., & Brown, L. (2022). Enhancing Student's Problem-Solving Skills through Project-Based Learning. Journal of Problem-Based Learning in Higher Education, 10(1), 74-87

Kim, J. et al . (2023). AI Anxiety: A Comprehensive Analysis of Psychological Factors and Interventions. Available at SSRN 4573394

Lombardi, D., Shipley, T. F., Astronomy Team, Biology Team, Chemistry Team, Engineering Team, Geography Team, Geoscience Team, and Physics Team. (2021). The curious construct of active learning. Psychological Science in the Public Interest, 22(1), 8-43

MacLeod, M., Merz, M., Mäki, U., & Nagatsu, M. (2019). Investigating interdisciplinary practice: Methodological challenges (introduction). Perspectives on Science, 27(4), 545-552

Olawale, M. A., Ayeh, A. A., Adekola, F. O., Precious, A. S., Joshua, A. O., & Timothy, O. (2023). A Review on

the Intersection of Artificial Intelligence on Building Resilient Infrastructure, Promoting Inclusive and Sustainable Industrialization and Fostering Innovation. Int. J. Eng. Modern Technol, 9(3), 1-31.

Ooi, K. B. et al. (2023). The potential of Generative Artificial Intelligence across disciplines: perspectives and future directions. Journal of Computer Information Systems, 1-32

Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development

Qadir, J. (2023, May). Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education. In 2023 IEEE Global Engineering Education Conference (EDUCON) (pp. 1-9). IEEE

Qadir, J. (2023, May). Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education. In 2023 IEEE Global Engineering Education Conference (EDUCON) (pp. 1-9). IEEE

Rane, N., Choudhary, S., & Rane, J. (2023). Integrating ChatGPT, Bard, and leading-edge generative artificial intelligence in architectural design and engineering: applications, framework, and challenges

Sarker, I. H. (2021). Deep learning: a comprehensive overview of techniques, taxonomy, applications, and research directions. SN Computer Science, 2(6), 420

Sitthiworachart J, Joy M, King E, Sinclair J, Foss J. Technology-Supported Active Learning in a Flexible Teaching Space. Education Sciences. 2022; 12(9):634. https://doi.org/10.3390/educsci12090634

Tedre, M., Tet al . (2021). Teaching machine learning in K–12 classroom: Pedagogical and technological trajectories for artificial intelligence education. IEEE Access, 9, 110558-110572

Tran, T. B., & Phan, T. H. (2022). Development of CDIO-Based Programs from the Teacher Training Perspective. International Journal of Learning, Teaching and Educational Research, 21(5), 204-219

Walz, A., & Firth-Butterfield, K. (2019). Implementing ethics into artificial intelligence: a contribution, from a legal perspective to the development of an AI governance regime. Duke L. & Tech. Rev., 18, 176

Xing, B., Marwala, L., & Marwala, T. (2018). Adopt fast, adapt quick: Adaptive approaches in the South African context (pp. 171-206). Springer Singapore

Yang J.et al. . (2018). AI-powered green cloud and data center. IEEE Access, 7, 4195-4203

A Review on the Place and Importance of Digital Stories in Education

Assoc. Prof. Dr. Mesut Bulut
Atatürk University, Türkiye, https://orcid.org/0000-0002-0733-0964

Assoc. Prof. Dr. Abdulkadir Kırbaş
Atatürk University, Türkiye, https://orcid.org//0000-0001-9846-0256

Abstract: Digital stories play an important role in the rapidly evolving digital world. These stories, which are digitally reimagined copies of classic stories, use textual, auditory, and visual cues to try to influence the audience. Images, movies, animations, sound effects, and music are examples of these components. Interactive elements in digital storytelling encourage audience participation throughout the story, creating a more intimate and dynamic experience. Digital stories are also useful for marketing products and services, strengthening corporate identity, and establishing an emotional connection with customers. They are an important component of brands' communication strategies. With the spread of mobile and internet technology, large audiences can now quickly access digital stories. In addition, it gives artists and writers the chance to communicate with a wider readership and audience. Digital platforms allow stories to be presented in a variety of media, breaking down traditional barriers and providing more room for creative expression. Therefore, because they are striking, interactive, and easily accessible, digital stories have a wide range of applications in communication and entertainment in the constantly evolving cultural and technical environment. In this study, where a qualitative research method was used, the place and importance of digital stories in education were examined in light of data obtained through a literature review and document review. As a result of the research, digital stories, which fulfill important functions in education, are one of the indispensable basic elements of educational activities, especially with scientific and technological developments, play an important role in education as a modern version of traditional storytelling, encourage students' participation, transform learning processes, and encourage creative thinking. It was determined as a result of the literature review that it also helps improve language proficiency by encouraging language skills.

Keywords: Education, digital stories, importance, review

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Introduction

In recent years, with rapid technological developments, information is globalizing, the way people communicate with each other, their environments, and communication tools are changing, and the scope is expanding. New

media causes radical changes in the field of communication and education (Onursoy, 2018; Ozturk, 2023). Therefore, today's rapid development of technology is reflected in classroom activities as a diversification of methods, techniques, and teaching materials. In this context, digital stories are defined as narratives that emerge by combining various multimedia tools such as audio, visual, and video (Becit İşçitürk, 2021). Stories have long been valuable teaching tools in language teaching because they both encourage participation and reflect everyday life. Stories, which are written and oral cultural products, have entered the digital field as a result of developments in communication technologies (Kurudayıoğlu & Bal, 2014). Digital storytelling is a version of traditional storytelling modernized by technology. This method, which is widely used in educational processes, plays an important role at all levels of education, from pre-school to higher education (Sur & Çelik, 2023).

Concept of Digital Story and Digital Storytelling

Telling stories to the next generation is a means to preserve customs, history, and heritage. People still use new digital media technologies to tell stories today. A "digital story" is a narrative that combines contemporary technology with personal anecdotes or firsthand experiences. A digital tale can alternatively be understood as a synthesis of contemporary multimedia technologies and conventional storytelling techniques (Normann, 2011). Throughout human history and social development, storytelling has been utilized to transmit knowledge and values because it is an organic and efficient communication and information transmission strategy (Smeda et al., 2014). Storytelling is older than written materials, and as technology develops, digital storytelling has taken its place. Education stakeholders' information gathering, problem-solving abilities, and collaborative attitudes are impacted by digital storytelling (Çetin, 2021).

Media and digital technology play a significant role in our daily lives. Computers and mobile devices have made it simpler to access the internet. This scenario demonstrates the growing significance of the digital sphere (Özen, 2023). Digital storytelling is "a modern expression of the ancient art of storytelling," according to the Digital Storytelling Association (The Digital Storytelling Association, 2011). Although there are different definitions for digital storytelling, most definitions involve the use of multimedia tools, audio, video, graphics, and animation (Smeda et al., 2014). Digital stories can be utilized as instructional, motivational, or demonstration tools, depending on the subject's integrity. They can also be used to convey imagined or real-life human experiences (Robin, 2008a).

Digital Stories and Education

As a result of advances in information and communication technologies, learning-teaching processes have changed and successful results have been achieved in learning outcomes by integrating these technologies. However, it is very important to prioritize teaching techniques when using Information and Communication Technologies (ICTs) for information and communication. Because the effective integration of these elements largely depends on the use of contemporary teaching materials and methods. Digital stories are an excellent source

of teaching materials and methods (Yılmaz et al., 2017). Moving stories to the digital space has simplified product accessibility, making it easier to access the developed content from all over the world (Özerbaş & Öztürk, 2017). Digital stories are a unique technological tool and help teachers use technology in the classroom by leveraging user input. Essentially, it allows computer users to use traditional storytelling techniques to become creative storytellers. This method involves researching a chosen topic, writing a script, and creating a compelling narrative. The music is then blended with a variety of media formats, including video clips, computer-generated text, recorded audio, and graphics. As a result, the output can be recorded on a DVD, published on a website, or played on computers (Robin, 2008a).

New approaches to education and learning are emerging as a result of advances in computer science. One of the areas that offers a new approach to educating people is digital storytelling (Van Gils, 2005). A particularly useful technological tool for combining, decoding, and processing written language with visual images is digital storytelling. By having students create original digital stories, teachers not only engage students in the material but can also help facilitate discussions about the topics covered in the stories and simplify difficult or abstract material. A digital story with lots of multimedia encourages students and makes them more willing to learn new concepts. Digital stories generated by instructors can be utilized to expand on lessons that already exist into a more comprehensive unit, encourage discussion of subjects addressed in a story, and help students better understand abstract or conceptual material (Robin, 2008b).

Teachers think that in the twenty-first century, technology may play a significant role in helping the younger generation meet their learning objectives. Students learn better when technology is used in the classroom, and many teachers use multimedia resources to teach a range of disciplines. Students encounter more engaged learning in the classroom and learn how to use technology to turn data into information. As a result, the practice of using technology in education has extended to many schools in the modern day. Digital storytelling is a crucial multimedia tool that improves the motivation and organization of instruction (Alismail, 2015).

Digital storytelling refers to stories presented and consumed using digital tools. These stories often have networked forms of participation or interaction and can be accessed through various digital platforms (Anadolu, 2019). Digital storytelling requires the combination of traditional and innovative technological elements with contemporary students' familiarity with technology. First-person narration and individual content form the basis of this genre and play an important role in projects with young people (Tucker, 2006). Recently, digital storytelling has become a vital teaching tool in the field of education. High-level abilities including problem-solving, teamwork, critical thinking, writing, effective communication, digital literacy, technology utilization, and learning realization are fostered in pupils. It is consistent with the constructivist method by definition (Şahin, 2021). Robin (2008a) asserts that teachers should use digital storytelling to enhance students' learning. This is made possible by encouraging students to arrange and convey their ideas and comprehensions in a distinctive and significant way. As a result, using this method, students can work in groups to produce digital stories that will enhance their communication abilities.

With the help of basic multimedia tools, educators and students can create their own stories by integrating audio, graphics, and video in digital stories (Cakir, 2019). Upon examining the research that employ these stories for educational objectives, it becomes evident that they are utilized across all educational levels, ranging from preschool to tertiary education (Becit İşçitürk, 2021).

Digital storytelling applications that encourage fun and active participation help students gain real-world experience, encourage the development of various abilities by allowing them to work on the product, improve their technological and visual skills, and provide interesting learning opportunities (Kocaman-Karoğlu, 2016). Digital storytelling is now a powerful teaching tool that both educators and students can use (Robin, 2006). In recent years, new technologies have begun to be widely used in education systems around the world to help educators benefit from the advantages of the digital world. New technologies have generally had a positive impact on education because they have allowed teachers to improve the quality of teaching by expanding their knowledge and skill sets. Research shows that incorporating these technologies increases student motivation, achievement, and engagement. However, there are many challenges facing education systems; one is to raise student engagement levels to improve academic outcomes. Digital storytelling is one of the creative educational approaches that can be used to engage students in meaningful and deep learning. Therefore, the use of innovative pedagogical models is becoming increasingly vital (Smeda et al., 2014).

Digital storytelling through the use of artificial intelligence and graphics has a significant impact on education. The use of digital storytelling in education is becoming more attractive due to ongoing developments in these technologies. For students, digital storytelling has benefits such as variety, personalization, persuasiveness, and realism. Researchers and educators recognize that digital storytelling offers new opportunities and think it can be an effective teaching tool. However, close cooperation with educators is very important to maintain the balance between fun and learning (Van Gils, 2005).

Digital storytelling employs a creative and innovative approach. Using this approach, we can identify and draw attention to issues that are regularly overlooked or ignored. Using digital technology in the classroom, this method can improve students' language proficiency and increase their engagement with visual media (Rodríguez et al., 2021).

A more technologically sophisticated version of conventional storytelling is called digital storytelling. This method, which is widely used in instructional processes, has a big impact on education from early childhood education to higher education. Recent research has examined the advantages of digital storytelling in education (Sur & Çelik, 2023).

It is commonly known in the literature that digital stories are an effective teaching tool for a range of subjects and cutting-edge methods. (zen, 2023). The results of Bahşi & Sis'e's study from 2023 demonstrated that digital storytelling greatly enhanced visually impaired students' listening skills. According to Çelik (2021), digital storytelling is regarded as an important teaching tool since it may provide students with meaningful experiences

that they can relate to in their daily lives. Sümer and Çetin's (2018) study examined the efficiency and efficacy of conventional and digital storytelling. The results demonstrated that employing digital storytelling was more effective and enhanced the participants' listening comprehension abilities.

Purpose of the research

A digital story is seen to be a useful teaching tool that blends the best aspects of modern communication technologies with historical storytelling customs. These stories use text, audio, and visual elements to pique audiences' interest on digital platforms. Due to the rapid development of the digital world, digital stories are gaining importance. Therefore, digital stories can be defined as forms of classic stories adapted to the online environment, aiming to influence the audience. The main purpose of this research is to determine the place and importance of digital stories in education. Based on the data obtained through literature review and document review, it is aimed to reveal the place and importance of digital stories in education. In particular, it is thought that there is a need for research that reveals the importance, potential, and impact of digital stories in education.

Method

This research, based on a literature review, is qualitative research. This research aims to reveal the place and importance of digital stories in education. Document analysis was used as a qualitative research method in the study. Document review includes the analysis of the facts planned to be investigated and written and visual materials containing information about these facts. Documents are important sources of information used in qualitative research. In this type of research, the researcher can obtain the data he needs without the need for observation or interviews. In this sense, document review contributes to the researcher in terms of saving time and money (Yıldırım & Şimşek, 2008:187-188).

Conclusion

A literature review on the role and impact of digital stories in education shows that digital stories are an increasingly important tool in education. Digital stories, when combined with digital communication technologies of the traditional storytelling tradition, provide many benefits to learning-teaching processes. These stories use a combination of text, audio, and visual elements to engage audiences on digital platforms.

Digital stories are increasingly used in education. Digital stories enhance students' learning experience by combining traditional storytelling traditions with modern communication technologies, enrich learning by using various media technologies, and increase students' participation in class. This enables students not only to learn information but also to comprehend and internalize it, making learning more meaningful.

By combining various types of media such as graphics, audio, videos, and interactive elements, digital stories

capture the learner's attention and make learning more engaging. In this way, students are motivated to learn more and encouraged to learn in depth. Digital storytelling also helps students develop their reflective abilities. In this way, students develop critical thinking skills by using mental processes such as analyzing events in stories, understanding the emotions of characters, and evaluating the theme of the story. Stories improve students' problem-solving and decision-making skills.

Digital storytelling is a versatile tool for education. It offers teachers a variety of teaching strategies to improve students' learning experience. However, educators need to improve their knowledge and skills in digital storytelling. In general, the rapid development of the digital world has caused digital storytelling to become increasingly important in education. Educators must use this method effectively to improve student's learning experiences and support contemporary teaching techniques. However, teachers must ensure students' balance between entertainment and learning and develop their skills in using technology effectively. As a result, more research can be done on the role and impact of digital storytelling in education. As a result, more qualitative, quantitative, and mixed methods research can be conducted to ensure the role and effective use of digital storytelling in education.

References

Alismail, H. A. (2015). Integrate digital storytelling in education. *Journal of Education and Practice*, *6*(9), 126-129.

Anadolu, B. (2019). Dijital hikâye anlatıcılığı bağlamında yapay zekânın sinemaya etkisi: Sunspring ve It's No Game filmlerinin analizi [The impact of artificial intelligence on cinema in the context of digital storytelling: An analysis of sunspring and it's no game]. *Erciyes İletişim Dergisi, (1),* 39-56.

Bahşi, N. & Sis, N. (2023). Dijital hikâye anlatımının görme yetersizliği bulunan öğrencilerin dinleme becerisine etkisi[The effect of digital storytelling on listening skills of students with visually deficiency]. *RumeliDE Dil ve Edebiyat Araştırmaları Dergisi,* (32), 212-227. DOI: 10.29000/rumelide.1253141.

Becit İşçitürk, G. (2021). Yabancı dil öğretiminde dijital hikâye kullanımına ilişkin öğretmen adaylarının görüşleri [Viewpoints of pre-service on the use of digital story in foreign language teaching]. *Kapadokya Eğitim Dergisi, 2*(2),32-39.

Cakir, E., Ozturk, M.S., Unal, M. (2019). Interpainting as a Creating Method in Digital Illustration: Reinterpretations from Movie Scenes. *Science, Education, Art and Technology Journal (SEAT Journal), 3*(2), 78-88.

Çelik, T. (2021). Dijital hikâye araçları kullanımı yetkinliği ölçeği (DHAKYÖ): Ölçek geliştirme çalışması [Digital story tools usage competence scale (dstucs): A scale development study]. *Uluslararası Türkçe Edebiyat Kültür Eğitim (TEKE) Dergisi, 10*(4), 1580-1597.

Çetin, E. (2021). Digital storytelling in teacher education and its effect on the digital literacy of pre-service teachers. *Thinking Skills and Creativity,* 39, 100760. 1-9, https://doi.org/10.1016/j.tsc.2020.100760n

Kocaman-Karoğlu, A. (2016). Okul öncesi eğitimde teknoloji entegrasyonu: Dijital hikâye anlatımı üzerine

öğretmen görüşleri [Teachers' opinions about digital storytelling in preschool education]. *Turkish Online Journal of Qualitative Inquiry*, *7*(1), 175-205.

Kurudayıoğlu, M., & Bal, M. (2014). Ana dili eğitiminde dijital hikâye anlatımlarının kullanımı[The usage of digital storytelling in mother language education]. *Sakarya Üniversitesi Eğitim Fakültesi Dergisi*, (28), 74-95.

Normann, A. (2011). *Digital storytelling in second language learning: A qualitative study on students' reflections on potentials for learning*. (Unpublished master's thesis). Norwegian University of Science and Technology, Trondheim-Norwegian.

Onursoy, S. (2018). Üniversite gençliğinin dijital okuryazarlık düzeyleri: Anadolu Üniversitesi öğrencileri üzerine bir araştırma [Digital literacy levels of university youth: A research on the students of Anadolu University]. *Gümüşhane Üniversitesi İletişim Fakültesi Elektronik Dergisi, 6*(2), 989-1013.

Ozturk, O.T. (2023). Examination of 21st Century Skills and Technological Competences of Students of Fine Arts Faculty. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 11*(1), 115-132. https://doi.org/10.46328/ijemst.2931

Özen, N. E. (2023). Türkçe dersleri için dijital hikâye[Digital storytelling for Turkish lesson]. *Avrasya Dil Eğiti mi ve Araştırmaları Dergisi, 7*(2), 1-14.

Özerbaş, M. A., & Öztürk, Y. (2017). Türkçe dersinde dijital hikâye kullanımının akademik başarı, motivasyon ve kalıcılık üzerinde etkisi[The effect of digital story usage on academic success, motivation and permanentity in Turkish course]. *Tübav Bilim Dergisi*, *10*(2), 102-110.

Robin, B. (2006). The educational uses of digital storytelling. In C. Crawford, R. Carlsen, K. McFerrin, J. Price, R. Weber & D. Willis (Eds.), *Proceedings of SITE 2006--Society for Information Technology & Teacher Education International Conference* (pp. 709-716). Orlando, Florida, USA: Association for the Advancement of Computing in Education (AACE). Retrieved March 14, 2024 from https://www.learntechlib.org/primary/p/22129/.

Robin, B. (2008). Digital storytelling: A powerful technology tool for the 21st century classroom. The College of Education and Human Ecology, The Ohio State University, 47(3), 220-228. doi: http://dx.doi.org/10.1080/00405840802153916

Robin, B. (2008b). The effective uses of digital storytelling as a teaching and learning tool. Hand-book of research on teaching literacy through the communicative and visual arts (Vol. 2).New York: Lawrence Erlbaum Associates.

Rodríguez,C.L., García-Jiménez,M., Massó-Guijarro, B.,&Cruz González, C. (2021). Digital Storytelling in education: A systematic review of the literature. *Review of European Studies,13*(2), 13-25.

Smeda, N., Dakich, E., & Sharda, N. (2014). The effectiveness of digital storytelling in the classrooms: A comprehensive study. *Smart Learning Environments*, *1*, 1-21. DOI 10.1186/s40561-014-0006-3

Sur, E., ve Çelik, H. (18-20 Mayıs 2023). *Dijital öyküleme üzerine yapılan araştırmaların bibliyometrik analizi[Bibliometric analysis of research on digital storing]*. IX. Uluslararası TURKCESS Eğitim ve Sosyal Bilimler Kongresi 18-20 Mayıs 2023 / İstanbul.

Sümer, S., & Çetin, M. E. (2018). Zihinsel yetersizliği olan bireylerin dinlediklerini anlama düzeyleri üzerinde geleneksel hikâye okuma ve dijital hikâye kullanımının etkililik ve verimliliklerinin karşılaştırılması

[Comparison of the effectiveness and productivity of the use of digital stories and conventional listening in listening comprehension on individuals with intellectual disabilities]. *Education Sciences*, *13*(1), 44-55.

Şahin, N. (2021). Dijital hikâye uygulamalarının öğrencilerin motivasyonları üzerindeki etkisinin bazı moderatör değişkenler açısından incelenmesi: Meta analiz çalışması[Investigation of the effect of digital story activities on students' motivations in terms of some moderator variables: Meta-analysis study]. *Selçuk Üniversitesi Edebiyat Fakültesi Dergisi*, (46), 119-138.

The Digital Storytelling Association (2011).The center for digital storytelling. http://electronicportfolios.com/digistory/

Tucker, G. (2006). First person singular: The power of digital storytelling. *Screen Education*, (42), 54-57.

Van Gils, F. (2005, February). Potential applications of digital storytelling in education. In *3rd twente student conference on IT* (Vol. 7, No. 7).

Yıldırım, A. & Şimşek, H. (2008). *Sosyal bilimlerde nitel araştırma yöntemleri*. Seçkin Yayıncılık.

Yılmaz, Y., Üstündağ, M. T., & Güneş, E. (2017). Öğretim materyali olarak dijital hikâye geliştirme aşamalarının ve araçlarının incelenmesi[Investigation of digital story development stages and tools as teaching materials]. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 17* (3), 1621-1640.

The Prevalence of Smartphone Addiction among a Group of Turkish University Students

Mustafa Koc
Suleyman Demirel University, Türkiye, https://orcid.org/0000-0002-3276-7172

Rabia Pala
Suleyman Demirel University, Türkiye, https://orcid.org/0009-0006-8943-5925

Abstract: Smartphones working like a computer are much more than just classic mobile or cell phones used to communicate as they offer all the possibilities of computer and internet technology in our palms. By means of features they have and new applications developed every day, smartphones are used for a wide variety of purposes including but not limited to communicate with others, access to internet, use social networks, take and share photos and videos, shopping, play games, navigation and so on. Although they have the potential to improve people's daily life, work and education, excessive and uncontrolled use might bring addictive behaviors. This study aimed to explore the prevalence of smartphone addiction among a group of Turkish university students. The study was designed as a survey research within the quantitative research paradigm. Participants were 101 university students studying at major state university in Türkiye. Data were collected through a questionnaire form including Turkish version of the Smartphone Addiction Scale-Short Version. The results indicated that participants' mean scores were very close to the cut-off points for smartphone addiction. Individual analysis of scores indicated that almost half of the male and female participants were at risk of addictive behavior. The prevalence of smartphone addiction was not dependent on participants' gender and age.

Keywords: Smartphone addiction, University students, Gender, Age, Survey

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Introduction

Addiction is the state of being conditioned to something or being dependent on that thing. It can be defined as an irrepressible and constant desire for an object, person or being (Ay, 2013). Addictions are usually examined in two groups as substance addictions (e.g., alcohol, cigarettes, drugs) and behavioral addictions (e.g., gambling, shopping, internet use). Although the latest version Diagnostic and Statistical Manual of Mental Disorders (DSM-V) published by American Psychiatric Association (APA) defined 10 different substances related and only gambling and gaming as the non-substance related addictive disorders, different behavioral activities are also

discussed and investigated within the context of addiction in the current literature (Sayan Karahan, 2023). Behavioral addiction can be defined as the occurrence of a behavior at repeated intervals and as a result, the individual experiences physical, psychological and social problems (Beziroğlu, 2018).

Among the behavioral addictions, those involving human-machine interaction including but not limited to computer, internet, smartphone usage are also known as technological or online addictions (Günüç, 2009; Tarhan & Nurmedov, 2011). Smartphones working like a computer are much more than just classic mobile or cell phones used to communicate as they offer all the possibilities of computer and internet technology in our palms. By means of features they have and new applications developed every day, smartphones are used for a wide variety of purposes including but not limited to communicate with others, access to internet, use social networks, take and share photos and videos, shopping, play games, navigation and so on. Although they have the potential to improve people's daily life (Cakir et al., 2019; Ozturk, 2023), work and education, excessive and uncontrolled use might bring many negative consequences by affecting interpersonal relationships, physical and mental health, and general functionality (Park & Lee, 2012). Compulsive use of smart phones, which are portable, provide constant internet access and are constantly accessible through social communication services, may make individuals prone to addiction (Noyan, Enez Darçın, Nurmedov, Yılmaz and Dilbaz, 2015).

According to the 2017 data of the "Global Mobile User Research" conducted by the Deloitte (2017), smartphone access in Turkiye has increased to 92%. Mobile users in Türkiye check their mobile phone screen an average of 78 times a day, that is, every 13 minutes. 66% of the research participants admit that they use their phones more than necessary, and 50% of this group state that they try to limit the time they use their mobile phones (Deloitte, 2017). The fact that young people use the internet and smartphone the most in Türkiye makes them a risky group in terms of related addictions. Such a high rate of smartphone usage leads to public concerns and calls for an investigation of whether this usage is a habit, impulse disorder or addiction (Minaz & Çetinkaya Bozkurt, 2017). With this in mind, this study aimed to explore the prevalence of smartphone addiction among a group of Turkish university students.

Method

This descriptive study, which aims to determine the smartphone addiction status of university students, was conducted with the survey model within the quantitative research methods. Using sampling methods, quantitative data collection and statistical analysis techniques, the survey model aims to explore and explain the research topic by asking participants questions about their beliefs, opinions, characteristics, and past or present behaviors (Kuş, 2012).

The target population of the study composed of students enrolled in a undergraduate programs in Suleyman Demirel University in Türkiye. The university was one of the major state higher education institutions located in the western part of the country. In quantitative research, the population, which includes a larger number of

individuals, events and phenomena, is usually reduced to small and workable sized samples via specific sampling strategies (Neuman, 2007). Since this study was a graduation project of the second author, who was a last year student in a B.Sc. degree, convenience sampling was employed in order to overcome time, energy and budget constraints. This sampling strategy allows researchers to use individuals who are easy to reach, readily available and want to participate in the research. The second author visited classrooms, students' canteens and dormitories and talked with the students who were there at that moment about this research and administered a questionnaire to volunteer students who wanted to participate. Therefore, the sample of the study was made up of 101 university students who voluntarily completed the questionnaire form. Of the participants, 53 (53%) were female and 48 (48%) were male. Most of the participants (83%) were between the age of 19-22 while the actual age ranged from 18 to 25 with a mean age of 20.51 (SD=1.59).

Research data were collected through a questionnaire form consisting of two parts. The first part included some questions revealing participants' demographic information (e.g., gender, age). The second one involved the Turkish version of the Smartphone Addiction Scale-Short Version (SAS-SV) originally developed in Korean context by Kwon, Kim, Cho and Yang (2013) and adapted into Turkish context to be used on university students by Noyan et al. (2015). The SAS-SV has a single-factor construct and consists of 10 items (Table 1) scored on a 6-point Likert-type scale where 1=strongly disagree and 6=strongly agree. Item scores are summed to make a composite variable. The total scores vary between 10 and 60, and it is evaluated that the risk of smartphone addiction increases as the score obtained from the scale increases. The SAS-SV is valid and reliable tool to assess relevant characteristics such as tolerance, withdrawal and impairment of functionality, which are necessary to diagnose smartphone addiction. Noyan et al. (2015) examined its factorial structure through exploratory factor analysis and reached a single-factor solution with 46.3% total variance being explained and calculated Cronbach internal consistency coefficient as .87. In the present study, a confirmatory factor analysis was conducted to validate the SAS-SV for this study sample. The original single-factor model well fit the data (Chi-square=41.92, df=31, $p>.05$, Chi-square/df=1.35, SRMR=.059, RMSEA=.059, TLI=.95, CFI=.96) with all standardized item factor loadings being statistically significant and meaningful in size ranging from .55 to .72 ($p<.01$). Cronbach alpha coefficient was calculated as .84 for the 10 items. These psychometric findings indicated that the SAS-SV produced valid and reliable measures for this study.

Results

Descriptive statistics for participants' item and total scores obtained from the SAS-SV were calculated and presented in Table 1. The most prevalent symptoms of smartphone addiction included as "I use my smartphone for longer than I intended" (Mean=3.93, SD=1.48), "I cannot stop using my smartphone even though it disrupts my daily life" (Mean=3.56, SD=1.69) and "I have difficulty focusing on my lessons, doing my homework and completing my work because of using my smartphone" (Mean=3.41, SD=1.71). The total score ranged from 10 to 60 with a mean score of 31.98 (SD=9.87). As can be seen from Table 2, the skewness and kurtosis values for all item and total scores were lower than |3| and |10| respectively, indicating that the scores were normally

distributed (Kline, 2005). The standard deviation values designated that the data were narrowly dispersed, suggesting that participants' scores were closely clustered around their means.

Table 1. Descriptive Statistics of Participants' Scores from the SAS-SV

Item	Min	Max	Mean	SD	Skewness	Kurtosis
I miss my planned work due to using my smartphone.	1	6	3.27	1.50	.02	-.95
I have difficulty focusing on my lessons, doing my homework and completing my work because of using my smartphone.	1	6	3.41	1.52	.10	-.92
I feel pain in my wrist or neck due to using a smartphone.	1	6	3.14	1.71	.32	-1.14
I cannot stand not having my smartphone with me.	1	6	3.33	1.68	.22	-1.20
I become impatient and irritable when I do not have my smartphone with me.	1	6	2.78	1.51	.57	-.59
Even if I do not use my smartphone, I keep it on my mind.	1	6	3.34	1.56	.08	-1.08
I cannot stop using my smartphone even though it disrupts my daily life.	1	6	3.56	1.69	-.06	-1.26
In order not to miss people's conversations on Twitter or Facebook, I constantly check my smartphone.	1	6	2.32	1.36	.88	-.14
I use my smartphone for longer than I intended.	1	6	3.93	1.48	-.29	-.90
People around me say that I use my smartphone too much.	1	6	2.91	1.50	.39	-.84
Total (composite variable)	10	60	31.98	9.87	.25	.05

Kwon et al. (2013) determined the cut-off scores for addictive level as 31 for males and 33 for females in the original study. In this study, the mean score was 31.19 (SD=10.27) for males and 32.70 (SD=9.53) for females. The frequency analysis demonstrated that 21 male participants had higher scores than 31 (prevalence rate=43%) whereas 26 female participants had higher scores than 33 (prevalence rate=49%).

An independent samples t-test was conducted to examine whether the total score from the SAS-SV differed across the gender and the findings were given in Table 2. The skewness values, .63 for males and -.13 for females, were lower than threshold value of |1| demonstrating that the assumption of normal distribution was met. The Levene test was not significant and thus showed that the variance of scores for males and female could be assumed equal ($F=.13$, $p>.05$). The t-test value ($t=.77$, $df=99$, $p>.05$) showed that there was no significant difference in scores for males (Mean=31.19, SD=10.27) and females (Mean=32.70, SD=9.53).

Table 2. Comparison of SAS-SV Total Scores across Gender

Gender	N	Mean	SD	Skewness	Kurtosis	t	p
Male	48	31.19	10.27	.63	.57	.77	.45
Female	53	32.70	9.53	-.13	-.18		

Since the participating students' both age and SAS-SV total scores were measured as continuous variables, Pearson product-moment correlation coefficient was calculated to explore the relationship between the two. The results revealed that participants' SAS-SV total score was not significantly associated with their age both for

males (r=.07, p>.05) and females (r=-.24, p>.05). Regardless of their gender, the correlation was not significant either (r=-.09, p>.05).

Conclusion

The study indicates that participants' mean scores from the SAS-SV are very close to the cut-off points for smartphone addiction. Individual analysis of scores suggests that almost half of the male and female participants were at risk of addictive behavior. The most prevalent symptoms in the study sample are tolerance, withdrawal and impairment in daily life functionality, which are the main characteristics of behavioral addiction. Since there have been no clinical study on the smartphone addiction in Turkish population with regards to SAS-SV, this study used the cut-off scores determined in Korean population, which may not be appropriate for Turkish context. Nevertheless, the mean score is close the midpoint of the SAS-SV, suggesting the existence of moderate level of addiction on average. This shows that the risk of smartphone addiction in university students should be taken into consideration. The study also concludes that the prevalence of smartphone addiction in Turkish university students is not dependent on gender and age. This implies that students of all genders and ages might develop addictive behavior towards smartphone usage. With the development of mobile technology and the increasing convenience it provides, the level of addiction might gradually increase. In order to prevent this addiction, young users should be informed about the addiction risks and encouraged to do face to face social activities and interactions.

References

Ay, S. (2013). *İletişim araçları kullanımının yarattığı bağımlılığın sosyal izolasyon üzerindeki etkisi cep telefonu kullanıcıları üzerinde bir araştırma*. İzmir: Bilgi Teknolojileri ve İletişim Kurumu.

Beziroglu, M. (2018). *Kompulsif satın alma, bilişsel duygu düzenleme ve davranışsal inhibisyon, davranışsal aktivasyon sistemleri arasındaki ilişkiler*. (Unpublished master thesis). Maltepe University, Turkey.

Cakir, E., Ozturk, M.S., Unal, M. (2019). Interpainting as a Creating Method in Digital Illustration: Reinterpretations from Movie Scenes. *Science, Education, Art and Technology Journal (SEAT Journal), 3*(2), 78-88.

Christensen, L. B. Johnson, B. R., & Turner, L. A. (2015). Araştırma yöntemleri: Desen ve analiz (A. Aypay, Trans.). Ankara: Anı Yayıncılık.

Deloitte, (2017). Dijitalleşen hayatımızda mobil teknolojilerin yeri. Deloitte Global Mobil Kullanıcı Anketi 2017: Türkiye Yönetici Özeti. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/tr/documents/technology-media-telecommunications/deloitte_gmcs_2017.pdf

Günüç, S. (2009). İnternet bağımlılık ölçeğinin geliştirilmesi ve bazı demografik değişkenler ile internet bağımlılığı arasındaki ilişkilerin incelenmesi. (Unpublished master thesis). Yüzüncü Yıl University, Turkey.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press.

Kuş, E. (2012). *Nicel-nitel araştırma teknikleri: Sosyal bilimlerde araştırma teknikleri, nicel mi nitel mi?* Ankara:

Anı Yayıncılık.

Kwon, M., Kim, D. J., Cho, H., & Yang, S. (2013). The smartphone addiction scale: development and validation of a short version for adolescents. *Plos One, 8*(12), e83558.

Minaz, A., & Çetinkaya Bozkurt, Ö. Ç. (2017). Üniversite öğrencilerinin akilli telefon bağımlılık düzeylerinin ve kullanım amaçlarının farklı değişkenler açısından incelenmesi. *Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 9*(21), 268-286.

Neuman, L. W. (2007). *Basics of social research qualitative and quantitative approaches*. Boston: Pearson Education.

Noyan, C. O., Enez Darçın, A. E., Nurmedov, S., Yilmaz, O., & Dilbaz, N. (2015). Akilli Telefon Bağımlılığı Ölçeğinin Kısa Formunun üniversite örgencilerinde Türkçe geçerlilik ve güvenilirlik çalışması. *Anadolu Psikiyatri Dergisi, 16*(Özel Sayı), 73-81.

Ozturk, O.T. (2023). Examination of 21st Century Skills and Technological Competences of Students of Fine Arts Faculty. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 11*(1), 115-132. https://doi.org/10.46328/ijemst.2931

Park, N., & Lee, H. (2012). Social implications of smartphone use: Korean college students' smartphone use and psychological well-being. *Cyberpsychology, Behavior, and Social Networking, 15*, 491-497.

Sayan Karahan, A. (2023). Davranışsal bağımlılıklara yönelik müdahalelere ilişkin bir derleme. *AYNA Klinik Psikoloji Dergisi, 10*(3), 356-375.

Tarhan, N., & Nurmedov, S. (2011). *Bağımlılık*. İstanbul: Timaş Yayınları.

A Case Study of Problems Experienced by Mother Teachers with Babies Aged 0-3 Years Old

Mustafa Koc
Suleyman Demirel University, Türkiye, https://orcid.org/0000-0002-3276-7172

Betul Boztepe
Suleyman Demirel University, Türkiye, https://orcid.org/0009-0004-6136-6660

Abstract: There are many roles that women play in their lives. The most important of these roles is being a mother. The mother has to deal with other roles and responsibilities in her life. She wants to be successful in her working life, have healthy communication with her baby, and fulfill her responsibilities for the needs of her home. It causes some problems and stress for the mother teacher if she has to work when her baby needs her the most. Employing a qualitative research approach, this case study aimed to determine the problems experienced by mother teachers who have babies aged 0-3 years old. The research was carried out with 15 voluntary teachers who taught various subjects in secondary education in Türkiye and had at least one child whose age was lower than 3 years old. The data were collected with a semi-structured interview form and analyzed using descriptive analysis method. The majority of the participating teachers stated that they felt guilty when they could not take care of their babies due to their teaching workloads. The problems experienced by the participants focused on the following issues: not being able to devote the necessary time to their babies and witness their special moments, difficulty in entrusting their babies to someone else, breastfeeding difficulties, skipping housework, tiredness, and insufficient sleep. Participants highlighted the inadequacy of legal maternity leave given for pregnancy, birth, and baby care. On the other hand, they stated that the school administration provided them with flexibility especially regarding the course schedule.

Keywords: Teachers, Mothers, Baby care, Problems, Case study

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Introduction

Life imposes different meanings and roles for each person. Perhaps, the most important of these for women is being a mother. Becoming a mother is an important turning point in every woman's life and brings with it many inevitable changes in her life. Women grasp the awareness of being a mother with the experiences they live from

day to day. In our society, the most important expectancy from mothers is to be a "good mother". According to the related literature, a good mother is expected to lead a child-centered life, to be intensely devoted to her babies, to be self-sacrificing, and to spend more time on her babies than on herself (Bassin, Honey & Kaplan, 1996; Johnston & Swanson, 2006; O'Reilly, 2010). These expectations make the situation even more difficult for working mothers.

Today, women enter working life for various reasons such as contributing to the family budget, raising their living standards, gaining respect in society, meeting new people and socializing. However, working women, especially married women with children, face with some problems. Of these difficulties, woman's inability to take adequate care of her home and babies, lack of communication with her babies, difficulties at work, and the feeling of not being able to do anything are the most crucial ones and they have great effect on good motherhood (Lewis, 1991; Yavuzer, 2000, 2010). Moreover, the life of a working mother at home may also cause some obstacles in her work life. For example, even if the mother's baby does not sleep at home until the morning, she needs to get back to work dynamically the next day, despite her fatigue. A mother who is tired with all the responsibilities of her child or has an argument with her spouse may have a negative impact on her colleagues or her job. Many reasons like these make it difficult for a woman to be both a mother, a wife, and a woman who wants to do her job properly. This two-way interaction is conceptualized as work-family conflict in the relevant literature (Poelmans, 2005).

As in the throughout the world, there have been research studies on working mothers and the difficulties they face in our country, Türkiye. For instance, Çakır (2002) examined the problems in the working mother's relationships with her husband, her child, and her close social circle and the effect of the mother's education level on her family interaction. She administered a survey on randomly selected working mothers from different ages, occupational groups, and socioeconomic levels. Her findings suggest that as the education level of a working mother increases, she can devote more time to her husband, home and children and provide more peace and balance in family relationships. Gökdemirel, Bozkurt, Gökçay ve Bulut (2008) investigated the experiences of working mothers regarding breastfeeding their babies and the related impact of employer attitudes. They interviewed 10 mothers whose children were followed in the child clinic of a university hospital. Their findings indicated that mothers were willing to breastfeed, but this required personal efforts and the legal basis supporting this was not adequately applicable and auditable. Similarly, Çeçe (2011) examined the breastfeeding characteristics of working mothers and determined the factors affecting breastfeeding. Collecting data from 120 mothers over 18 years of age and with a baby aged 12-24 months, she found that the duration of breastfeeding is longer for women whose education level are higher, whose babies are girls and who are supported in their workplaces for breast milking and storing. Using a sample of 326 working mothers whose children receiving education from a pre-school to high school, Açıkgöz (2014) demonstrated that family-work conflicts were negatively associated with problem-focused, emotion-focused and non-functional coping strategies. In another study conducted on 342 working mothers, Eryaşar (2017) concluded that working mothers' feelings of guilt related to work and the work-family conflict they experience were significant predictors of their psychological health.

The aforementioned studies focused on different occupational groups. There is no adequate research evidence

specifically germane to teaching profession. This study aimed to determine the problems experienced both in family and works by mother teachers who have babies aged 0-3 years old. Teaching is a profession that requires having scientific, social and pedagogical qualifications related to education, being an expert in the field, and using knowledge and skills in all educational fields. Teacher is the person who constantly interacts with the students, implements the educational programs, manages the teaching, and evaluates the teaching and the students (Tösten, 2011). Since the teaching profession is inherently different from other professions, it is difficult to compensate for mistakes made during teaching (Özbek, Kahyaoğlu & Özgen, 2007). Therefore, identifying and eliminating the problems experienced by mother teachers is important for their professional success.

Method

We designed this research as a case study model, which is among the qualitative research methods. A case study is a methodological approach that involves in-depth examination of a bounded case (e.g. system, situation, object, or subject) using multiple data collection to systematically gather information about how that case functions and operates (Chmiliar, 2010). Using a purposeful sampling in accordance with the scope of the study, we formed the study group (i.e., informants/participants) with 15 voluntary teachers who taught various subjects in secondary education in Türkiye and had at least one child whose age was lower than 3 years old. The data were collected with a semi-structured interview form and analyzed using descriptive analysis method. There were 11 open-ended interview questions formulated focusing on such issues as what it means to be a working mother, its challenges in terms of relationships with family members and family responsibilities, and workplace benefits and legal rights.

Results

We asked the participants what being a mother means to them and what the most important changes in their lives are after having children. They defined being a mother as responsibility (60%), love (40%) and sacrifice (27%). One participant answered, "*Motherhood is being a hero of compassion…it is being able to be enough even when you don't have the strength.*" She talked about how mothers, heroes of compassion, still have the strength to take care of their babies despite all their tiredness. Most participants (60%) explained that the most important change in life after becoming a mother was the responsibility placed upon them. A teacher said, *"Being a mother is a wonderful feeling for me. It was the biggest thing I ever dreamed of. The biggest change in me after becoming a mother was the responsibilities that came upon me. Thinking about him every moment, making sure he is okay every moment. These are the most important…"* Almost half (47%) emphasized that their lives were restricted after having children. One expressed, *"Being a mother is the best feeling in the world. But inevitably, your life is suddenly restricted. For example, watching a TV series or a movie at home in the evening is a dream for us right now."* Some (33%) stated that their sleep patterns changed completely after having a child and that they had to cope with insomnia. They also stated that they started to think child-oriented and even started to approach their students more protectively. One participant expressed her thoughts on this issue as follows:

"Becoming a mother has of course changed my perspective. It changed my perspective on students. It

enabled me to think in more detail, to look at my students like a mother, and to be more protective. This was one of the most important changes for me after having a child."

As far as the challenges of being a working mother were concerned, almost half of the participants (40%) referred to not being able to be with their babies or witnessing their special moments. Inability to assume all responsibilities regarding the baby's education was one of the main concerns. One teacher stated, "*You could not grow or raise your child the way you want. You do your best in the remaining time of your study, but education does not fully belong to you. His grandmother is looking after my baby now. I do not spend enough time with him. For example, when my son started walking, I did not see him first, but his grandmother did*." One fifth of them stated that it was very difficult to entrust their babies to someone else when they went to work, so their minds remained on their babies while at work. A few complained that they could not spend long and productive time with their baby because they were working (spent most of their time at school). Some stated that they had difficulty coping with insomnia and fatigue due to both taking care of the baby and going to work. Below are the representative comments on these issues:

"The feeling of entrusting your child to someone else is difficult. It is really difficult not to be with your baby during his beautiful and special times. On the other hand, I cannot spare time for myself due to household chores and my social life, and I cannot do any of my work properly. This is sad for me too, of course."

"I have a hard time devoting enough time to my baby. I cannot spend productive hours, such as the morning hours, with my baby."

"My patience has worn thin. I feel tired when I go home. I have migraine. So, if I have a headache, I try to rest a little, get over the pain, and then take care of my baby. Otherwise, my patience and tolerance for her becomes less."

Another issue that the participants had problems with was breastfeeding. Some of them stated that because they could not breastfeed their baby when necessary, their baby got cold from the breast and got used to the formula. Others said that they were tired because they were rushing back and forth home.

About one fourth of the participating teachers (28%) said that it would be possible for a working mother to successfully fulfill her responsibilities both at work and at home by sacrificing some things. One teacher elaborated this by saying, "*You have to give up something. For example, I do not do housework very regularly, actually I cannot do it. I only play with my children at home, take care of them, and cook if I can. My mother-in-law helps with other chores at home, such as laundry and dishes.*" Some (21%) stated that it would be possible for a working mother to successfully fulfill her responsibilities both at work and at home with the support of her spouse. One participant expressed, "*She [working mother] needs to have a supportive spouse with her because it would be difficult to handle everything alone. She loses her patience and becomes depressed. Perhaps she may get angry at her child due to tiredness and her patience is exhausted. But if her husband supports her, she can*

succeed."

A little more than half of the teachers (53%) mentioned that they had problems with their family relationships because of working. The problems mentioned included inadequate time for family, fatigue and aggression, skipping housework, and changing or cancelling plans for family events. The majority of the participating teachers (87%) stated that they sometimes felt guilty or remorse when they could not take care of their babies due to their teaching workloads. Some exemplary comments included:

> *"There are times when my daughter rebels mostly because I cannot pay enough attention to my children. I'm trying to compensate for this by spending the holidays to the fullest."*
>
> *"When I come home tired, I do not want to do anything. I can be aggressive and unfortunately this also reflects on my husband and children."*
>
> *"For example, I may not have been able to prepare dinner or I may have missed some work related to my home."*
>
> *"Since my field is kindergarten, I get very tired at school and my tolerance limit can be reached. At home, I sometimes scold my daughters for this reason. But I immediately realize the situation, apologize and try to win their hearts."*
>
> *"If there is a parent meeting or I am extremely tired, my family plans for the evening can be postponed."*

Almost all the teachers (93%) thought that the legal maternity leave given was not sufficient. Some of those who think so stated that two months after birth is a very short period of time during which the baby mostly needs a mother. The participants collectively emphasized that the baby should be with its mother more and therefore the maternity leave should be extended.

> *"This is a very short time for the baby, who has been with his mother in the womb for 9 months, to suddenly get used to a world that is completely foreign to him/her after he/she is born."*
>
> *"Maternity leave is not enough. That is why I took extra 1 year of unpaid leave for both of my babies."*
>
> *"I would like it to be at least between 2 and 4 years, so that more compassionate individuals who grow up with their mothers would grow up."*
>
> *"I think it should be extended for at least 6 months because babies need breast milk for the first 6 months. Thus there needs to be permission until we switch to supplementary food."*

When asked about the help and support of the school administration, they stated that the school administration provided them with flexibility especially regarding the course schedule. One teacher expressed, "*For example,*

course schedules can be adjusted according to me. My first 2 hours in the morning are free. I can take care of my children, we have breakfast together, I change their clothes. I do not have to rush in the morning." Some commented on the permission given by the administration in necessary situations. One said, "*When I ask for permission, the management gives it, and there is no problem with that. I believe mother teachers should be able to get 2 years paid leave after birth so that work and family balance is easily achieved."*

Conclusion

Life is an adventure full of struggles for every person. Women live this adventure at full speed because of the many roles women play in their lives. The most important of these roles is being a mother. A woman who is a mother also desires to be successful in other roles in her life. She wants to be successful in her working life, to have healthy communication with her baby, and to fully fulfill all her responsibilities for the needs of her home. For this, she faces many difficulties and needs support. This study examined the problems experienced by mother teachers who have babies aged 0-3 years old in Türkiye. It shows that participating teachers fell guilty when they are not able to take care of their babies due to their teaching workloads. Their frequent problems consist of not being able to devote the necessary time to their babies and witness their special moments, difficulty in entrusting their babies to someone else, breastfeeding difficulties, skipping housework, tiredness, and insufficient sleep. The findings highlight the inadequacy of legal maternity leave given for pregnancy, birth, and baby care. These problems negatively affect the work and family life of mother teachers and thus they should be minimized. The regulations and plans implemented at the workplace should affect the mother teachers positively. As the problems decrease, the mother teachers will be happier in both her teaching and family life and will continue to raise better students.

References

Açıkgöz, B. (2014). Çalışan annelerde başa çıkma stratejilerinin iş-aile çatışması üzerindeki etkileri. (Unpublished doctoral thesis). Bülent Ecevit University, Türkiye.

Bassin, D., Honey, M. & Kaplan, M. M. (1996). *Representations of motherhood*. New Haven, CT: Yale University Press.

Chmiliar, I. (2010). Multiple-case designs. In A. J. Mills, G. Eurepas & E. Wiebe (Eds.), *Encyclopedia of case study research* (pp 582-583). USA: Sage Publications.

Çakır, N. (2002). Çalışan annenin aile içi problemleri. (Unpublished master thesis). Sakarya University, Türkiye.

Çeçe, Ö. (2011). Çalışan annelerin emzirme özelliklerinin incelenmesi. (Unpublished master thesis). Dokuz Eylül University, Türkiye.

Eryaşar, Ş. (2017). Çalışan anneler örnekleminde iş-aile çatışması ve psikolojik sağlık arasındaki ilişkide, pişmanlık ve işe bağlı suçluluk duygularının rolü. (Unpublished master thesis). Bahçeşehir University, Türkiye.

Gökdemirel, S., Bozkurt, G., Gökçay, G., & Bulut, A. (2008). Çalışan annelerin emzirme sürecinde yaşadıkları.

Çocuk Dergisi, 8(4), 221-234.

Johnston, D. D., & Swanson, D. H. (2006). Constructing the "good mother": The experience of mothering ideologies by work status. *Sex Roles, 54*(7-8), 509-519.

Lewis, S. (1991). Motherhood and employment: The impact of social and organizational values. A. Phoenix, A. Woollett and E. Lloyd (Eds.), *Motherhood: meanings, practices and ideologies* (pp. 195-215). London: Sage Publications.

O'Reilly, A. (2010). *Encyclopedia of motherhood*. Thousand Oaks, CA: Sage Publications.

Özbek, R., Kahyaoğlu, M., & Özgen, N. (2007). Öğretmen adaylarının öğretmenlik mesleğine yönelik görüşlerinin değerlendirilmesi. *Sosyal Bilimler Dergisi, 9*(2), 221-232.

Poelmans, S. (2005). *Work and family: An international research perspective*. New Jersey: Lawrence Earlbaum.

Tösten, R. (2011*).* İlköğretim öğretmenlerinin Kamu Personeli Seçme Sınavına (KPSS) yönelik görüşlerinin belirlenmesi: Kars ili örneği. (Unpublished master thesis). Kafkas University, Türkiye.

Yavuzer, H. (2000). *Çocuk psikolojisi*. İstanbul: Remzi Kitabevi.

Yavuzer, H. (2010). *Ana-baba ve çocuk*. İstanbul: Remzi Kitabevi.

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