Proceedings of International Conference on Social and Education Sciences

October 17-20, 2024 - Chicago, IL, USA

Editors

Prof. Dr. Valarie Akerson

Prof. Dr. Ozkan Akman

M. Lutfi Ciddi

istes Organization

www.iconses.net

www.iconses.net

Volume 1, Pages 1-196

Proceedings of International Conference on Social and Education Sciences

ISBN: 978-1-952092-72-5

Editors: Valarie Akerson, Ozkan Akman, & M. Lutfi Ciddi

Articles: 1-18

Conference: International Conference on Social and Education Sciences (IConSES)

Dates: October 17-20, 2024
Publication Date: December 31, 2024
Location: Chicago, IL, United States

Conference Chair(s):

Prof. Dr. Valarie Akerson, Indiana University, United States
Prof. Dr. Mack Shelley, Iowa State University, United States
Dr. Elizabeth (Betsy) Kersey, University of Northern Colorado, United States

The submissions are subject to a double-blind peer review process by at least two reviewers with expertise in the relevant subject area. The review policy is available at the conference web page: www.iconses.net

Presidents

Prof. Dr. Valarie Akerson, Indiana University, United States
Prof. Dr. Mack Shelley, Iowa State University, United States
Dr. Elizabeth (Betsy) Kersey, University of Northern Colorado, United States

Scientific Board

Valarie Akerson, Indiana University, United States
Mack Shelley, Iowa State University, United States
Elizabeth (Betsy) Kersey, University of Northern Colorado, United States
Brian Webster , Edinburgh Napier University, United Kingdom
Chandra Pratama Syaima, University of Lampung, Indonesia
Chris Plyley, University of the Virgin Islands, Virgin Islands
Christine Thomas, Georgia State University, United States
Claudiu Mereuta, Dunarea De Jos University of Galati, Romania
Dana Aizenkot, Ashkelon Academic College, Israel
El Takach Suzanne, Lebanese University, Lebanon
Farouk Bouhadiba, University of Oran 2, Algeria
Frank Angelo Pacala, Samar State University, Philippines
Hasse Møller, University College Copenhagen, Denmark
Hou-Chang Chiu, Fu-Jen Catholic University Hospital, Taiwan
Irena Markovska, Assen Zlatarov University, Bulgaria
Iwona Bodys-Cupak, Jagiellonian University, Poland
Jaya Bishnu Pradhan, Tribhuvan University, Nepal
Kassa Mickael, Addis Ababa University, Ethiopia
Kemmanat Mingsiritham, Sukhothai Thammathirat Open University, Thailand
Luis Mauricio Rodriguez Salazar, Instituto Politécnico Nacional, Mexico
Milan Kubiatko, Jan Evangelista Purkyně University, Czech Republic
Natela Doghonadze, International Black Sea University, Georgia
Neide Da Fonseca Parracho Sant'anna, Colegio Pedro II, Brazil
Ossi Autio, Univertsity of Helsinki, Finland
Patricia Moyer-Packenham, Utah State University, United States
Pierre Job, ICHEC, Belgium
Shenglei Pi, Guangzhou University, China
Silviya Kostova, The D.A. Tsenov Academy of Economics, Bulgaria
Sindorela Doli Kryeziu, University of Gjakova, Albania
Siti Sarawati Johar, Universiti Tun Hussein Onn Malaysia, Malaysia

Sodangi Umar, Federal University Gusau, Nigeria
Tryfon Mavropalias, University of Western Macedonia, Greece
Volodymyr Sulyma, Dnipropetrovsk Medical Academy, Ukraine

Organizing Committee

Valarie Akerson, Indiana University, United States
Mack Shelley, Iowa State University, United States
Elizabeth (Betsy) Kersey, University of Northern Colorado, United States
Chris Plyley, University of the Virgin Islands, Virgin Islands
Dana Aizenkot, Ashkelon Academic College, Israel
Hou-Chang Chiu, Fu-Jen Catholic University Hospital, Taiwan
Iwona Bodys-Cupak, Jagiellonian University, Poland
Kristyna Balatova, University of Zilina, Slovakia
Omer Tayfur Ozturk, Necmettin Erbakan University, Turkey
Ossi Autio, Univertsity of Helsinki, Finland
Shenglei Pi, Guangzhou University, China
Siew Nyet Moi, Universiti Malaysia Sabah, Malaysia
Sodangi Umar, Federal University Gusau, Nigeria
Theodore Chadjipadelis, Aristotle University of Thessaloniki, Greece
Volodymyr Sulyma, Dnipropetrovsk Medical Academy, Ukraine
Patricia Moyer-Packenham, Utah State University, United States
Draga Vidakovic, Georgia State University, United States

Table of Contents

International Conference on Social and Education Sciences

www.iconses.net October 17-20, 2024 Chicago, IL, USA www.istes.org

Deliberation As the Foundation of Ethics in Higher Education Training: Foundations and Challenges

Jesús Enrique Beltrán Virgüez

Corporación Universitaria Minuto de Dios UNIMINURO, Colombia, https://orcid.org/0000-0003-3144-3720

Abstract: Deliberation as a necessary attitude in contemporary life seems to be specifically rooted in the early stages of education. However, as a primarily moral and evaluative stance, it is a powerful tool for shaping more reflective, critical, and proactive citizens. Furthermore, it establishes a way of engaging with knowledge, others, and, above all, oneself. In this sense, it is important to identify the foundations of deliberation to understand how its possibilities can be unfolded in higher education. It is crucial to recognize the challenges of this notion in the contemporary configuration of the world and the current university spirit. In this regard, through a phenomenological hermeneutic approach, deliberation is initially presented in light of Gadamer's concept of the fusion of horizons to ensure its contextualization along with Gracia's proposal. Consequently, understanding the dynamics of deliberation in the realm of higher education allows us to recognize its potential in shaping education and, at the same time, identify its challenges in the face of the current configuration of the university. Finally, deliberation is presented as a fundamental element in comprehensive education and in the ethical constitution of individuals, as well as in the formation of their character necessary to address the problems of contemporary life.

Keywords: deliberation, ethics, higher education, character

Citation: Beltran Virguez. J.E (2024). Deliberation as the foundation of ethics in higher education training: Foundations and challenges. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024--International Conference on Social and Education Sciences* (pp. 1-17), Chicago, IL, USA. ISTES.

Introduction

“The performance society, as an active society, is gradually turning into a doping society."

Byung-chul Han

Contemporary education faces numerous challenges that become increasingly complex as society evolves. Among the most relevant factors characterizing our era is the rapid advancement of technology, which impacts various areas of life. In particular, artificial intelligence has emerged as a central element that promises to integrate in multiple ways into the daily lives of current and future citizens (Mintz & Brodie, 2019). This development is accompanied by other technological innovations, such as big data and data science, high-level

tools that converge in the identification of new productivity-oriented scenarios, which, according to some perspectives, will improve people's quality of life, even at the cost of ceasing to be human (Harari, 2016). However, alongside these potential benefits, there also arise risks and challenges of various kinds, both social and ethical (Morozov, 2014).

Various thinkers, from the 20th and 21st centuries, have reflected on the relationship between education and social transformations. Since the Industrial Revolution and the rise of capitalism, education has been increasingly subordinated to the needs of the labor market. According to Foucault (1975), this process of instrumentalization has closely linked education to economic interests, prioritizing the training of individuals useful to the productive system over the comprehensive education of critical and ethical citizens. This trend has led to an education mainly focused on technical and job-related instruction, contributing to the erosion of traditional moral values, which in many cases have been replaced by an ethic centered on economic performance (Bauman, 2002).

In this context, it is crucial that education reclaim the space it has ceded to predominantly economic interests. Educational processes must be reoriented towards the training of critical, ethical, and cooperative citizens, capable of questioning models of human relationships based solely on economic value. As Byung-Chul Han (2017) notes, contemporary society, marked by fatigue and exhaustion resulting from constant performance demands, requires a deep reflection on the speed and purpose of our activities. In this sense, education should foster a deceleration of the pace of life, promoting spaces for dialogue, quality communication, and a reencounter with spiritual and human values that encourage a more balanced and fulfilling life.

Thus, education must not only serve the logic of the market but also recover its original function: the comprehensive formation of human beings capable of living in community, critically reflecting on their environment, and contributing to the construction of a more just and humane society (Nussbaum, 2010). This is the true challenge that education faces in the 21st century: to transcend the limits imposed by productivity and honor the idea of a formation that encompasses all dimensions of the human being. In this important task, deliberation becomes a collective exercise that contributes to the formation of individuals and societies that are much more reflective, capable of carrying out a self-driven and contextualized interpretation of the various situations that surround them, rather than merely adhering to a unidirectional interpretation that defines the utility and purpose of everything available (Marcuse, 2013).

Deliberation

Deliberation has been recognized as a key process for decision-making, from the times of the Greek philosophers to contemporary studies in cognitive psychology. Aristotle (2004), in particular, established the foundations of deliberation by stating that human rationality is the source of virtue (*aretē*) and prudence *(phronēsis*). For the Greek philosopher, virtue does not consist of following fixed rules but in finding the mean

between two vicious extremes. This is achieved through a process of prudent deliberation, where the individual evaluates particular circumstances to make the most appropriate decision, always oriented towards practical good (Hernández Velandia, 2023). Thus, deliberation is not only an ethical process but also a fundamental tool for resolving practical problems in situations where the future and the outcome are unclear, primarily a procedure that contributes to the achievement of a higher end, eudaimonia (Naranjo Gálvez, 2003), which is generally understood in tradition and accepted translations as happiness (Guariglia, 1997). Accordingly, deliberation cannot be reduced to an instrumental calculation tool disguised under the idea of progress or economic success, as it requires an analysis that allows for an understanding of the intentionality of a happy life from one's character.

In the contemporary context, where society is characterized by its fast pace and the fleetingness that defines our interactions, both with objects and other people, the modern world is marked by immediacy and neutrality, where everything seems ephemeral, and the value of things, relationships, and feelings is measured more by their duration than by their meaning or symbolism (Galicia, 2020). The ability to reflect and make prudent decisions not only facilitates confronting the challenges of an uncertain world but also helps reduce biases and errors that affect our judgment (Renn, 2004). Aristotle already highlighted the importance of this aspect, emphasizing that prudence does not apply solely to the universal but requires careful attention to the particular and the contingent. This process involves constant adaptation and evaluation of circumstances, leading to contextualized thinking and the construction of interpretations grounded in what surrounds us, its needs, and possibilities.

As Aristotle argues, deliberation is an active process of inquiry that rejects automatic or habit-based decision-making (Vigo, 2010). This approach remains fundamental today, especially in contexts such as education and the training of critical and reflective citizens. The ability to deliberate allows individuals to develop a deeper relationship with knowledge, society, and themselves, promoting a more conscious and responsible approach to decision-making. Deliberation contributes to a sensible rationality, as it enables an understanding of others and the context within the framework of appropriate good (Sorial, 2022).

By exploring the philosophical roots of deliberation and its practical application, it becomes evident how this process is essential not only for ethical reflection but also for decision-making that affects both the personal and collective levels. Thus, deliberation, far from being a passive act, presents itself as a dynamic mechanism that fosters a more critical and responsible interaction with the challenges previously mentioned. In this scenario, education plays a fundamental role, as the ability to respond to a world facing a crisis of moral values and coexistence levels defined by economic rules rather than vital or moral ones (Lynch, 2021), appears to represent an apparent abandonment not only of reason, prudence, and good but also of the foundational sensitivity of understanding.

From the Aristotelian perspective, deliberation has been a central concept in the development of human thought,

following diverse paths throughout history, addressing areas such as education, politics, ethics, and more recently, bioethics. This concept has been fundamental in generating methods that enable more reflective decision-making based on the ability to analyze, recall situations, identify involved actors, and foresee the effects of the decisions made. One of the contemporary thinkers who has excelled in exploring and developing the concept of deliberation is the Spanish philosopher Diego Gracia, who has successfully applied this method in various contexts, particularly in the clinical and bioethical fields (Sanchini et al., 2020). The relevance of his approach lies not only in its practical application but also in its capacity to serve as a key tool in pedagogical and instructional design, enabling deeper and more reflective learning. However, before understanding its applications, it is necessary to thoroughly explore the fundamental principles and pillars of deliberation according to Gracia.

For Diego Gracia (2023), deliberation is an inherent process of human nature. It is not an activity exclusive to the field of ethics but a biological necessity that drives individuals to project their actions and transform their environment. According to him, to deliberate is a fundamental condition for the development of any human project, as it is through deliberation that human beings transform their natural surroundings into a cultural and humanized environment. This transformation process is carried out through the use of intelligence, which allows one to anticipate consequences and project actions. Gracia (2014) emphasizes that human beings do not act automatically in all their actions; rather, deliberate acts are those that involve prior reflection and conscious decision-making. Through this process, human actions are ensured not only to respond to an immediate need but also to be directed towards higher goals that promote the humanization of the environment.

In his approach, Gracia (2019) distinguishes three fundamental pillars of deliberation, corresponding to the phases of the human project. The first phase is cognitive, involving the rational analysis of facts. At this stage, relevant facts for the project are identified, leading to the issuance of so-called “factual judgments.” These judgments are based on knowledge and experience regarding the present facts and similar situations. The second phase is emotional or evaluative, which is not cognitive in nature but is based on the emotional assessment of facts. Here arise “value judgments,” which allow for the valuation of facts and the projection of their transformation. This is the most complex moment to understand, as values, though subjective, guide decisions and give meaning to projects. In this stage, values are superimposed on facts and become the predicate that defines how those facts should be transformed. The third phase is practical or operational, where the project is concretized, and what has been deliberated is executed. At this point, "duty judgments" are issued, representing the will to act and implement the project, adding value to reality by transforming facts into something better.

For Diego Gracia (2023), deliberation is not merely an intellectual process but also a moral act that involves responsibility. In deliberating, human beings not only project and transform but also assume responsibility for their decisions and the outcomes derived from them. This responsibility involves accountability, both to oneself and others, ensuring that decisions made are not arbitrary but always seek to maximize the realization of values (Pintor-Ramos, 2020). In this sense, ethics, according to Gracia, is based on the realization of values, and

deliberation is the means by which these values are optimally realized.

For Diego Gracia (2023), deliberation is not only an intellectual process but also a moral act that involves responsibility. When human beings deliberate, they not only project and transform but also assume the responsibility for their decisions and the results that arise from them. This responsibility implies responding both to oneself and to others, ensuring that the decisions made are not arbitrary but always seek to maximize the realization of values (Pintor-Ramos, 2020). In this sense, ethics, according to Gracia, is based on the realization of values, and deliberation is the means by which these values are optimally realized.

Furthermore, Diego Gracia (2023) introduces an intersubjective vision of values, arguing that they are neither completely objective nor completely subjective, but rather reasonable. Values, in his concept, are the result of a reasoning process that involves both intelligence and feelings. This intersubjectivity is expressed in the ability to engage in dialogue and debate with others about the best ways to realize values in specific situations. Deliberation, therefore, is not only an individual process but also a social one, as values are constructed and managed collectively through dialogue and discussion (Shaffer & Longo, 2023).

In summary, Diego Gracia (2023) conceives deliberation as an integral process that unites intelligence, feelings, and will to transform reality in a conscious and humanizing manner. Through deliberation, human beings not only project their actions but also assume the moral responsibility for their decisions, always seeking the best way to realize values. This approach, which combines cognitive, emotional, and practical aspects, makes deliberation a fundamental tool in various fields, from bioethics to pedagogy, offering a solid structure for decision-making and the transformation of the social and cultural environment.

Ultimately, deliberation reveals itself as a hermeneutic process of facticity or praxis, as it implies interpreting and giving meaning to the specific situations in which the human being is immersed. This process is not merely theoretical or abstract but is deeply rooted in lived experience, where facts, values, and actions intertwine to form a deeper understanding of reality. In deliberating, the individual not only reflects on what they should do but also interprets their own circumstance, their possibilities, and the effects of their decisions in a specific context. In this sense, deliberation becomes a practical act of interpretation that guides action toward a meaningful transformation of reality, situating the human being in an active and responsible relationship with the world around them.

The Fusion of Horizons in Gadamerian Hermeneutics

Hans-Georg Gadamer stands as a key figure in the tradition of philosophical hermeneutics, whose approach has profoundly influenced the way the process of interpretation is understood. In his main work, *Truth and Method* (1960), Gadamer challenges the traditional conception of hermeneutics as a technical method for interpreting texts, proposing instead a broader and more philosophical understanding of the hermeneutic phenomenon.

According to Gadamer, understanding is not simply about reconstructing the author's intentions but is a dynamic and dialogical process in which the horizons of meaning of the interpreter and the text—or the other—meet and mutually transform. This encounter is known as the "fusion of horizons" (*Horizontverschmelzung*), a central concept in his theory.

The influence of Martin Heidegger on Gadamer's thought is crucial for understanding the basis of his hermeneutics. Gadamer, as a disciple of Heidegger, adopted and expanded several ideas from his mentor, especially the notion that understanding is not merely an intellectual act but a fundamental way of being in the world (*Dasein*). Heidegger, in his work *Being and Time* (1927), argued that all interpretation is conditioned by temporality and by the prejudices the interpreter brings with them, which Gadamer takes up to develop his concept of the fusion of horizons. Like Heidegger, Gadamer rejects the separation between subject and object in the act of understanding, emphasizing the participatory and dialogical nature of this process. In this way, Gadamerian hermeneutics deepens Heidegger's critique of objectivism and transforms it into a theory of interaction between traditions and cultural horizons (Vessey, 2021).

The fusion of horizons emphasizes that every act of understanding is contextual and takes place from a specific historical and cultural perspective. When engaging in dialogue with the past, the interpreter not only understands a text or a tradition but is also transformed by them. In this way, Gadamer overcomes the subject-object dichotomy and underscores that understanding is an event that occurs in the encounter between diverse horizons. This hermeneutic process involves openness to the other and a willingness to be affected by what is different (Vergara Henríquez, 2008).

In Gadamer's work, dialogue is considered fundamental to understanding. It is not merely the transmission of information but a transformation of the participants through interaction. In this sense, understanding is not a rational agreement on an absolute truth but a shared process of seeking meaning in which individual horizons are expanded (Vergara Henríquez, 2008). The importance of this notion lies in its relevance not only for the interpretation of texts but also for the human and social sciences, which seek to understand human experience in all its diversity.

Authors such as Martha Nussbaum (1990) and Paul Ricoeur (1992) have developed these ideas, highlighting the ethical and communicative dimension of Gadamerian hermeneutics, where respect for otherness and the recognition of one's own prejudices are essential for authentic dialogue. Thus, Gadamer's hermeneutics remains a crucial framework for understanding the dynamics between tradition, dialogue, and transformation in the act of understanding.

Method

Hermeneutic phenomenology, as a research approach, offers a profound scope by allowing the exploration of

human experience through the interpretation of meanings. By focusing on the description of what is directly presented to intuition, it goes beyond traditional theoretical constructions, favoring a more authentic and direct understanding of phenomena. This approach not only seeks to capture lived experiences in their purest form but also acknowledges that all experience is, in a certain way, interpreted. In the realm of research, hermeneutic phenomenology allows for addressing the complexity of social, cultural, and ethical contexts by considering that understanding the world is not an objective process but an interpretive act influenced by the researcher's perceptions and preconceptions. Thus, this perspective invites researchers to delve into the underlying meanings that emerge from human experiences, recognizing that interpretation is an inevitable and enriching process (Domingo Moratalla, 2017). This broadens the scope of phenomenological analysis, making it possible not only to describe what is perceived but also to understand how subjects attribute meaning to their experiences, thereby allowing a deeper understanding of the studied reality.

The proposed methodology is framed within a hermeneutic phenomenological approach (Ayala Carabajo, 2008), which is suitable for investigating the nature of deliberation as a moral and evaluative attitude in the context of higher education. This approach enables the interpretation of experiences and meanings associated with deliberation from the perspective of the subjects involved, emphasizing a deep understanding of the phenomena through dialogue and the interaction between horizons of meaning, as Gadamer proposes. Thus, the research process focuses on how deliberation is constructed and experienced in higher education, examining both its philosophical foundations and its practical application in this environment.

Regarding the type of research, it is a qualitative and exploratory study, with a descriptive and comprehensive scope (Bernal Torres, 2011). This approach allows not only to describe the dynamics of deliberation within the university but also to understand its ethical and formative implications in shaping the character and development of the student. Through theoretical analysis, the study seeks to identify existing practices, current challenges, and opportunities for effectively integrating deliberation into the university context, recognizing its potential to address contemporary challenges in the holistic education of students.

Results

Ethical Formation and Deliberation

Contemporary ethical formation and deliberation should be understood as a dynamic process that responds to both social demands and the challenges posed by the educational and political context. Unlike a prescriptive and rigid ethics, designed to sustain an economic model through a form of totalitarianism applied to human behavior, deliberation proposes an emergent and contextual ethics. This ethics is nourished by the specific conditions in which the individual is immersed, allowing for a more flexible and adaptive approach (Domingo Moratalla, 2017). In this regard, Diego Gracia, following the Aristotelian tradition, argues that ethics cannot be reduced to simple apodictic norms but must be rooted in a deliberative process that acknowledges the inherent uncertainty in decision-making within complex situations.

According to Gracia (2023), deliberation becomes the fundamental intellectual procedure for confronting this uncertainty. It is a practical process that does not seek absolute truth but rather prudence, understood as the ability to make sound decisions under uncertain conditions. In this process, practical reasoning gains prominence, as it allows decisions to be based on a dialectical analysis of the factors at play, integrating diverse perspectives. Aristotle already emphasized the importance of broadening analysis through collective deliberation, which adds a dialogical and collaborative dimension to the decision-making process.

In the educational sphere, deliberation promotes a practical ethical formation that transcends mere instruction in pre-established norms or principles. Its goal is to develop in students the ability to critically evaluate the contexts and factors that influence prudent decision-making (Pintor-Ramos, 2020). This approach contrasts with predominant educational plans, which tend to prioritize individual competence over reflective dialogue. The challenge is further intensified by the growing influence of artificial intelligence and the rise of remote and virtual education programs, which often deviate from a model of formation based on deliberation and prudence. Instead of fostering critical analysis and practical dialogue, pre-defined or purely rhetorical content is often favored. Current curricular designs lead to student learning being supported by activities evaluated in theoretical terms or through case studies that, although useful, do not always faithfully reflect the complexities of the real world. This limited approach underscores the need to integrate ethical deliberation at all educational levels, not only in higher education, to form individuals capable of making prudent decisions in real contexts, rather than merely relying on assumptions or abstract theoretical frameworks (Georges-Auguste, 2014).

As Gracia (2019) points out, deliberation requires not only knowledge and experience but also skills and attitudes that must be developed from the earliest stages of education. Intellectual humility and openness to dialogue are essential for deliberation to become a formative and transformative process. Ultimately, deliberation is a hermeneutic process of praxis, where the interpretation of circumstances and reflection on actions intertwine to guide ethical and prudent decisions in a world full of uncertainties.

Affective-Based Deliberation

In the educational field, training within the horizon of deliberation requires a solid affective foundation, as a genuine construction of thought is impossible without an ontological dimension that includes emotions. From Heidegger's perspective (2022), the notion of mood (*Stimmung*) is fundamental to human existence, as it reflects how the being is "attuned" affectively to the world. In this sense, emotions are not external elements to the deliberative process but are intrinsic to how reality is understood and confronted. Affectivity is not merely a complement to rationality; it constitutes the very condition of possibility for reflective thinking to emerge and develop.

This approach directly connects to deliberation in the educational context, where the formation of critical and

reflective citizens cannot be reduced to the mere transmission of knowledge or logical argumentation (Georges-Auguste, 2014). Instead, deliberation demands an affective openness that enables the recognition and integration of different perspectives, facilitating the fusion of horizons as described by Gadamer. Therefore, education must promote an environment where emotions such as empathy, compassion, and a sense of justice are actively cultivated, as they provide valuable guidance for decision-making and participation in ethical and social dialogues.

Throughout history, affectivity has been underestimated in many theories centered on rationality (Gazmuri Barros, 2022). However, philosophers like Aristotle already acknowledged that emotions play a crucial role in practical deliberation. *Phronēsis* or prudence, which is key to moral judgment, involves not only a rational component but also an appropriate emotional disposition (Abizadeh, 2002). In the educational context, training in deliberation also means fostering the ability to manage emotions so that they contribute to a deeper and more humanized understanding of ethical situations.

Contemporary authors such as Martha Nussbaum (2003) and Antonio Damasio (2019) have emphasized the relevance of emotions in moral decision-making, and this approach is essential for present-day education. Affectivity not only guides the evaluation of situations but also motivates active participation in deliberative processes, both individually and collectively. In this sense, affectivity in deliberation should not be seen as an interference with reason but as a fundamental framework that allows for openness to others and the transformation of one's own horizons. This facilitates an education that is based on character building and the formation of individuals capable of facing the challenges of contemporary life with a comprehensive understanding of reality.

Challenges in Virtual Education and AI

Virtual education, which has seen exponential growth, particularly in Latin America (Varas-Meza et al., 2020), presents a series of challenges surrounding key elements of the educational process, such as holistic education, ethics, and the recognition of others. Within this context, a central concern emerges: is it possible to foster deliberation within the framework of virtual education, understood as an ethical and practical exercise? Deliberation, traditionally associated with face-to-face interaction, appears to be threatened by the lack of physical presence and diminished affectivity that characterize virtual classes. This raises the question of how deliberation can survive, or even thrive, in an environment where physical distancing is the norm (De Brasi & Gutierrez, 2020).

One of the primary challenges to deliberation in virtual education is the absence of in-person encounters, which are essential for building affective relationships and fostering authentic communication. In a physical classroom, direct exchange facilitates spontaneous dialogue, empathy, and the creation of a space where ideas can be ethically challenged. However, in the virtual setting, such interactions are mediated by screens, and students often experience an emotional disconnection that can hinder deep dialogue and shared reflection (Turkle, 2016).

Overcoming this barrier requires rethinking how to create virtual spaces where emotions and interactions are equally meaningful, thus fostering deliberation.

Another key challenge is related to the asynchronous autonomy that characterizes many virtual education programs. While this model offers flexibility by allowing students to work at their own pace, it also limits opportunities for real-time deliberation (Anderson & Dron, 2011). Deliberation, as a process requiring continuous and reflective exchange, can be impeded by the differing paces of participants and the lack of simultaneous interaction, which restricts immediate feedback and the perception of otherness and emotional connection between participants. This asynchronous autonomy results in uneven learning rhythms and reduced levels of interaction, potentially leading to fragmented and less effective deliberation.

To address these challenges, it is essential to design virtual environments that intentionally promote deliberation (Salmon, 2013). Simply transferring educational content to the digital space is insufficient; it is crucial to create structured interactive spaces that encourage students to actively engage in ethical and reflective debates. This can be achieved through the use of discussion forums, live virtual seminars, and collaborative activities that foster dialogue, empathy, and the exchange of diverse perspectives (Rovai, 2002). Furthermore, instructors must act as facilitators who create an atmosphere conducive to ethical and constructive deliberation, overcoming the inherent limitations of the virtual format and ensuring that ethical training is not relegated to a secondary role in this new context (Salmon, 2013).

In conclusion, virtual education should not be seen as an insurmountable obstacle to deliberation but as an opportunity to rethink how dialogue and ethical reflection can be promoted in a digital environment. Although the lack of physical interaction and asynchronous autonomy pose significant challenges, these can be overcome by creating virtual spaces that integrate deliberation and affectivity. The key lies in designing educational experiences that focus not only on knowledge transmission but also on building affective relationships and ethical engagement among students, ensuring that deliberation remains a central component of comprehensive education, even in the virtual realm.

Instructional Design and Diego Gracia's Method

Diego Gracia's deliberation method offers an effective framework that can be applied to instructional design in both in-person and virtual education, through an approach that follows its three fundamental phases: cognitive, emotional, and practical. These phases ensure that the teaching-learning process not only focuses on the acquisition of theoretical knowledge but also on the development of critical, evaluative, and operational skills that connect theory with reality and concrete actions. However, in the age of advanced technology, a significant challenge arises: ensuring that these spaces for deliberation and learning are not easily supplanted by automated systems, such as artificial intelligence, which may lack the ethical and emotional depth required for genuine deliberation and the construction of affectivity.

Cognitive (Intellectual) Phase

In this initial phase, instructional design must focus on identifying and presenting key facts and concepts relevant to the course content. This phase corresponds to what Gracia calls "judgments of fact," where intelligence and knowledge are used to understand the fundamental aspects of a topic. In in-person education, this phase is implemented through lectures, reading activities, and discussions where students explore and debate the facts. In virtual settings, multimedia resources, discussion forums, and interactive platforms enable students to access information and engage in online debates, ensuring they comprehend the material critically.
It is essential that instructional design in this phase facilitates in-depth analysis that goes beyond the mere transmission of information. While advanced technologies can aid in content distribution and access, the educational environment must promote authentic human interaction, where contextual understanding and critical reflection are generated—elements that a machine cannot provide. The challenge lies in designing spaces that invite curiosity and inquiry, preserving the uniqueness of human thought.

Emotional (Evaluative) Phase

The second phase of Gracia's method emphasizes the importance of reflecting on and evaluating facts from an ethical and emotional perspective. Here, "value judgments" are constructed, allowing students to assess the significance of facts in relation to a specific context and their own values. This evaluative component cannot be reduced to algorithms that calculate predefined responses; it requires interaction that fosters empathy, affectivity, and the recognition of otherness, which are key factors for legitimate and authentic deliberation.

In in-person education, this phase may include debates, case studies, and simulations where students discuss the facts and evaluate them in light of the course objectives and the personal transformations they seek to achieve. In the virtual environment, it is equally necessary to create genuine interaction spaces that encourage empathy and mutual understanding. Platforms must go beyond merely being communication channels; they should be designed to facilitate exchanges that build meaningful connections between participants, preventing technology from replacing the emotional richness of human interactions. In this way, the value of deliberation as an act involving both the mind and heart is preserved, which is essential for the student's comprehensive ethical development.

Practical (Operational) Phase

Finally, in the practical phase of Gracia's deliberation method, instructional design should focus on the application of what has been learned, transforming knowledge into valuable and concrete actions. This stage involves generating “judgments of duty,” where students make decisions and carry out actions based on the values they have developed. In in-person education, this phase may involve field projects, experimental activities, or the execution of practical projects that transform theory into action.

For the practical phase to be effective in virtual environments, it is crucial to design simulations, collaborative online projects, and practical activities that allow students to apply their knowledge to real or hypothetical problem-solving. However, these technological tools should not simplify the application process to a set of automated responses. While artificial intelligence can support practical learning, it cannot replace the human experience of making complex and ethically nuanced decisions. Instructional design must ensure that students experience the deliberative process in all its complexity, thus fostering creativity and the ability to act with prudence and responsibility.

Discussion

Deliberation, as understood from the perspective of Aristotle and more recently Diego Gracia, emerges as an essential process in ethical, pedagogical, and social decision-making. In a contemporary world characterized by the rapid flow of information and complex challenges, deliberation offers an approach that allows for a deep analysis of facts, an evaluation of values, and conscious and responsible decision-making (Gracia, 2003). However, it is crucial to identify potential biases that may arise from a totalizing orientation of reasoning, which can lead to the forced elimination of opposing views or multiperspectivism (Luján Christiansen, 2020). This ability to reflect and act prudently stands as one of the fundamental competencies needed to face current challenges in educational, ethical, and technological fields.

On the other hand, Gadamer's hermeneutics, where horizons of meaning meet and mutually transform, complements the deliberative vision by emphasizing that understanding is a dialogical and contextual act. This process of the fusion of horizons invites us to open ourselves to others and recognize our limitations and prejudices, facilitating a more authentic encounter with knowledge and otherness (Walhof, 2005). Thus, deliberation and the fusion of horizons, as interrelated processes, promote a more holistic formation of individuals (Walhof, 2005). In an educational context that has often been subordinated to market interests, both approaches underscore the importance of forming critical citizens, capable of dialogue, reflection, and acting with prudence and ethics. This is the central challenge that 21st-century education must confront: to transcend the limits of economic productivity and reclaim the formative function that encompasses all dimensions of the human being, in favor of a more just and balanced society.

At this point, it is important to emphasize the necessity of not turning deliberation into an instrument integrated into the current mechanisms of economic operationalization, nor into just another tool of calculative thinking (Biesta, 2014). Instead, it should be recognized as a criterion of character, not as a device for adjustment and legitimization of a specific idea of progress or success. In this sense, confining deliberation strictly to a specific political or economic purpose represents a fundamentally teleological orientation and understanding that undermines its value and transformative potential in addressing the problematic realities of 21st-century life. Using Diego Gracia's method within a Gadamerian horizon implies seeking progress towards eudaimonia, aiming for a higher end, not instrumental means that might disguise deliberation as a mere platform for debate

and construction under a democratic or economic principle.

Diego Gracia's method, when applied to instructional design, as emphasized, suggests that teaching cannot be reduced to the mere transmission of information or operational efficiency. In a context where advanced technologies, including artificial intelligence, present both opportunities and threats, it is essential to ensure that the design of these environments preserves and promotes the legitimacy of deliberation, as an effort and expression of human intelligence (Spector & Ma, 2019). The key lies in designing educational experiences that facilitate affective interaction, empathy, and the transparent pursuit of eudaimonia, or human flourishing (Gracia, 2003). While technologies can support certain educational tasks, genuine deliberation —one that considers cognitive, emotional, and practical aspects— must remain a human activity, not subject to automation or algorithmic simplification.

Therefore, educational spaces must be intentionally constructed so that they are not displaced by technologies incapable of understanding, feeling, and deliberating (Spector & Ma, 2019). This requires designing learning environments that foster the development of cognitive, evaluative, and practical skills, thereby creating a comprehensive learning experience. The cognitive phase ensures a solid knowledge base; the emotional phase encourages critical and ethical reflection; and the practical phase guides students toward action and application, ensuring that learning is meaningful and transformative, with deliberation and affectivity remaining at the core of the educational process.

Conclusion

Ethical formation and deliberation, as proposed by Diego Gracia, offer a framework that goes beyond rigid theoretical teaching to foster a dynamic, holistic, and contextual learning experience. This approach emphasizes the development of cognitive, emotional, and practical skills, essential for making prudent decisions in complex and uncertain situations. In the educational sphere, deliberation must not only address theoretical knowledge but also integrate the affective component as an essential part of the reflective process, in line with thinkers like Aristotle, Heidegger, and Nussbaum. In a context where virtual environments and artificial intelligence are gaining prominence, new challenges arise in maintaining and promoting ethical deliberation. However, through a deliberately structured instructional design, it is possible to overcome these challenges and create spaces where dialogue, critical reflection, and affectivity remain central elements of education, both in physical and virtual settings. This ensures a more comprehensive education, focused not only on the transmission of knowledge but also on the development of ethical and reflective citizens, capable of addressing contemporary challenges with prudence and empathy.

Recommendations

For future research and practice, it is essential to explore how instructional design can effectively integrate

ethical deliberation processes that foster genuine human connection, especially in virtual contexts. It is recommended to investigate the development of didactic methodologies based on Diego Gracia's method and Gadamer's hermeneutics, to promote critical, evaluative, and operational competencies in students, ensuring that online interactions retain the authenticity and depth of ethical reflection. Additionally, it is vital to study the role that technologies, including artificial intelligence, can play in facilitating these deliberative processes, without replacing the human essence of interaction and deliberation.

Furthermore, it is crucial to create clear indicators that allow for the assessment of the quality of deliberation in educational settings, as well as to develop training programs for educators to equip them to facilitate these ethical and reflective discussions. Future research should adopt an interdisciplinary approach, combining pedagogy, technology, ethics, and philosophy, to ensure that instructional design not only conveys knowledge but also promotes holistic development and eudaimonia in students, helping them to flourish as ethical, critical, and empathetic individuals.

References

Abizadeh, A. (2002). The passions of the wise: Phronesis, rhetoric, and Aristotle's passionate practical deliberation. *Review of Metaphysics*, *56*(2; ISSU 222), 267-296. https://doi.org/10.59962/9780774855563-006

Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. *International Review of Research in Open and Distributed Learning*, *12*(3), 80-97. https://doi.org/10.19173/irrodl.v12i3.890

Aristóteles. (2004). *Ética a Nicómaco* (W. F. R. Hardie, Ed.; J. Solana, Trad.). Gredos. (Obra original publicada en el siglo IV a.C.)

Ayala Carabajo, R. (2008). La metodología fenomenológico-hermenéutica de M. Van Manen en el campo de la investigación educativa. Posibilidades y primeras experiencias. *Revista de Investigación Educativa*, *26*(2), 409–430. Recuperado a partir de https://revistas.um.es/rie/article/view/94001

Bauman, Z. (2002). Modernidad líquida Fondo de Cultura Económica. *Buenos Aires, Argentina*.

Bernal, C. A. (2011). *Metodología de la investigación: Administración*. Pearson Educación de México, SA de CV.

Biesta, G. (2014). Cultivating humanity or educating the human? Two options for education in the knowledge age. *Asia Pacific Education Review*, *15*, 13-19.. https://doi.org/10.1007/s12564-013-9292-7

Calfee, R. C., & Valencia, R. R. (1991). *APA guide to preparing manuscripts for journal publication.* Washington, DC: American Psychological Association.

Damasio, A. (2019). *The strange order of things: Life, feeling, and the making of cultures*. Vintage.

De Brasi, L., & Gutierrez, C. (2020). Anonymity and asynchronicity as key design dimensions for the reciprocity of online democratic deliberation. *International Journal of Applied Philosophy*, *34*(2), 183-200. https://users.dcc.uchile.cl/~cgutierr/papers/deliberation-pre-print.pdf

Domingo Moratalla, T. (2017). Narración fílmica a la deliberación ética. la fenomenología hermenéutica como

mediación (J. Marías Y P. Ricoeur). *SCIO: Revista de Filosofía*, (13), 27–55. https://www.redalyc.org/journal/5602/560268689011/560268689011.pdf

Duncan, G. J., & Brooks-Gunn, J. (Eds.). (1997). *Consequences of growing up poor.* New York, NY: Russell Sage Foundation.

Foucault, M. (1975). *Vigilar y castigar: nacimiento de la prisión*. Siglo XXI Editores.

Gadamer, H.-G. (2005). *Verdad y método I: Fundamentos de una hermenéutica filosófica*. Salamanca: Ediciones Sígueme.

Gadamer, H.-G. (2006). *El legado de Europa*. Barcelona: Paidós.

Galicia, J. S. (2020). De la sociedad de masas a la individualización de la sociedad. *Más poder local*, (42), 22-26. https://dialnet.unirioja.es/servlet/articulo?codigo=7574279

Gazmuri Barros, R. (2022). Afectividad, vulnerabilidad y límites de la razón científica. *Sophia, colección de Filosofía de la Educación*, (32), 197-223.

Georges-Auguste L. (2014). Ethical deliberation for bioethics: capacitating ethical reasoning in the classroom. En *Bioética: saúde, pesquisa, educação*, *2*, 261-280.

Gracia, D. (2003). Ethical case deliberation and decision making. *Medicine, Health Care and Philosophy*, *6*, 227-233. https://doi.org/10.1023/A:1025969701538

Gracia, D. (2014). La deliberación como método de la bioética. En *Bioética: saúde, pesquisa, educação*, *2*, 223-259.

Gracia, D. (2019). Problemas con la deliberación. *Folia Humanística*, (3), 1–16. https://doi.org/10.30860/0013

Gracia, D. (2023). La deliberación y sus dificultades. *Argumenta Philosophica*, *2*, 7–22. https://openurl.ebsco.com/EPDB%3Agcd%3A8%3A21097272/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A175808524&crl=c

Guariglia, O. (1997). La eudaimonía en Aristóteles: un reexamen. *Méthexis*, *10*, 83-104. https://www.jstor.org/stable/43738537

Han, B.-C. (2017). *La sociedad del cansancio*. Herder Editorial.

Harari, Y. N. (2016). *Homo Deus: Breve historia del mañana*. Debate.

Harlow, H. F. (1983). Fundamentals for preparing psychology journal articles. *Journal of Comparative and Physiological Psychology, 55*, 893-896.

Heidegger, M. (2022). *Ser y tiempo*. Editorial Universitaria de Chile.

Helfer, M. E., Kempe, R. S., & Krugman, R. D. (1997). *The battered child* (5th ed.). Chicago, IL: University of Chicago Press.

Henry, W. A., III. (1990, April 9). Making the grade in today's schools. *Time*, *135*, 28-31.

Hernández Velandia, W. A. (2023). Prudencia, buena deliberación y argumentación para la educación ciudadana. Más allá de la formación para el trabajo. *Foro de Educación*, *21*(1), 225- 243. doi: http://dx.doi.org/10.14516/fde.977

Lastname, F. N. (Year). *Title of dissertation*. (Doctoral dissertation). Retrieved from Name of database. (Accession or Order Number)

Lastname, F. N. (Year). *Title of dissertation*. (Unpublished doctoral dissertation). Name of Institution, Location.

Luján Christiansen, M. (2020). Parasitismo argumental: el punto muerto de la deliberación. *Oxímora. Revista Internacional De Ética Y Política*, (16), 50–62. https://doi.org/10.1344/oxi.2020.i16.29689

Lynch, K. (2021). *Care and capitalism*. John Wiley & Sons.

Marcuse, H. (2013). *One-dimensional man: Studies in the ideology of advanced industrial society*. Routledge. https://doi.org/10.4324/9780203995211

Mintz, Y., & Brodie, R. (2019). Introduction to artificial intelligence in medicine. *Minimally Invasive Therapy & Allied Technologies*, *28*(2), 73-81. https://doi.org/10.1080/13645706.2019.1575882

Morozov, E. (2014). *To save everything, click here: the folly of technological solutionism.* J. Inf. Policy, 4(2014), 173-175. https://shs.cairn.info/revue-reseaux-2013-5-page-205?lang=fr

Naranjo Gálvez, L. (2003). Phronesıs y mecanısmos teleológıcos: lo que va de Arıstóteles a Nozıck. *Daimon Revista Internacional de Filosofia*, (28), 7–23. Recuperado a partir de https://revistas.um.es/daimon/article/view/12851

Nussbaum, M. (1990). *Love's Knowledge: Essays on Philosophy and Literature*. Oxford: Oxford University Press.

Nussbaum, M. (2010). *Not For Profit: Why Democracy Needs the Humanities*. Princeton University Press.

Nussbaum, M. C. (2003). *Upheavals of thought: The intelligence of emotions*. Cambridge University Press.

O'Neil, J. M., & Egan, J. (1992). Men's and women's gender role journeys: A metaphor for healing, transition, and transformation. In B. R. Wainrib (Ed.), *Gender issues across the life cycle* (pp. 107-123). New York, NY: Springer.

Pintor-Ramos, A. (2020). La filosofía de los valores en Diego Gracia. *Cuadernos salmantinos de filosofía*, *47*, 541-583. https://dialnet.unirioja.es/servlet/articulo?codigo=7659589

Plath, S. (2000). *The unabridged journals.* K. V. Kukil (Ed.). New York, NY: Anchor.

Renn, O. (2004). The challenge of integrating deliberation and expertise: Participation and discourse in risk management. *Risk analysis and society: An interdisciplinary characterization of the field*, 289-366.

Ricoeur, P. (1992). *Oneself as Another*. Chicago: University of Chicago Press.

Rovai, A. P. (2002). Building sense of community at a distance. *The International Review of Research in Open and Distributed Learning*, *3*(1), 1-16. https://doi.org/10.4000/dms.2685

Salmon, G. (2013). *E-tivities: The key to active online learning*. Routledge. https://doi.org/10.4324/9780203074640

Sanchini, V., Songhorian, S., Di Fiore, P. P., & Spada, P. (2020). Deliberation and Public Bioethics: a Test Case in Reproductive Genetics. *Phenomenology and Mind*, (19), 150-193. DOI: https://doi.org/10.17454/pam-1911

Schnase, J. L., & Cunnius, E. L. (Eds.). (1995). Proceedings from CSCL '95: *The First International Conference on Computer Support for Collaborative Learning*. Mahwah, NJ: Erlbaum.

Schultz, S. (2005, December 28). Calls made to strengthen state energy policies. *The Country Today*, pp. 1A, 2A.

Scruton, R. (1996). The eclipse of listening. *The New Criterion*, *15*(30), 5-13.

Shaffer, T. J., & Longo, N. V. (Eds.). (2023). *Creating space for democracy: A primer on dialogue and*

deliberation in higher education. Taylor & Francis.

Sorial, S. (2022). Deliberation and the Problems of Exclusion and Uptake: The Virtues of Actively Facilitating Equitable Deliberation and Testimonial Sensibility. *Ethical Theory and Moral Practice*, *25*(2), 215-231. https://doi.org/10.1007/s10677-022-10273-0

Spector, J. M., & Ma, S. (2019). Inquiry and critical thinking skills for the next generation: from artificial intelligence back to human intelligence. *Smart Learning Environments*, *6*(1), 1-11. https://doi.org/10.1186/s40561-019-0088-z

Turkle, S. (2016). *Reclaiming conversation: The power of talk in a digital age*. Penguin.

Varas-Meza, H., Suárez-Amaya, W., López-Valenzuela, C., & Valdés-Montecinos, M. (2020). Educación virtual: factores que influyen en su expansión en América Latina. *Utopía y praxis latinoamericana*, *25*(13), 21-40. http://doi.org/10.5281/zenodo.4292698

Vergara Henríquez, F. J. (2008). Gadamer y la" comprensión efectual": Diálogo y tra-dicción en el horizonte de la Koiné Contemporánea. *Universum (Talca)*, *23*(2), 184-200. http://dx.doi.org/10.4067/S0718-23762008000200011

Vessey, D. (2021). Gadamer on tradition. In *The Gadamerian Mind* (pp. 117-126). Routledge. https://www.taylorfrancis.com/chapters/edit/10.4324/9780429202544-12/gadamer-tradition-david-vessey

Vigo, A. G. (2010). La concepción aristotélica del silogismo práctico: en defensa de una interpretación restrictiva. *Diánoia*, *55*(65), 3-39. https://www.scielo.org.mx/scielo.php?pid=S0185-24502010000200001&script=sci_arttext

Walhof, D. R. (2005). Bringing the deliberative back in: Gadamer on conversation and understanding. *Contemporary Political Theory*, *4*, 154-174. https://doi.org/10.1057/palgrave.cpt.9300119

The Use of Technology in Teaching Mathematics

Haohao Wang
Southeast MO State University, U.S.A., https://orcid.org/0000-0001-7942-5623

Natalya Kustsevalova
Southeast MO State University, U.S.A., https://orcid.org/0009-0001-6857-0232

Abstract: Technology provides instant information. Appropriate use of diverse types of technology is important in the classroom including a virtual classroom, and integration of technology will enhance the student learning experience. Utilizing a variety of technology will actively engage students with learning objectives, generate communications among students/instructors, spark more intellectual curiosity among students, and assist instructors to meet the unique needs of individual learners. The purpose of this paper is to determine whether technology, multimedia in this case, works to improve student performance in an in-person or an online instructional environment; to reveal the value of multimedia in online learning as perceived by the students; to provide a glimps of an innovative curriculum that will help students to become successful members of society and prepare them for a wide range of professions. Data were collected and analyzed to show that technologies, multimedia in this case, have made a big difference on student performance in an online instructional environment.

Keywords: Technology, Mathematics learning, Online learning

Citation: Wang, H. & Kustsevalova, N. (2024). The use of technology in teaching mathematics. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 18-26), Chicago, IL, USA. ISTES.

Introduction

Technology and multimedia can contribute positively to student performance in an in-person or an online instructional environment. Multimedia is the combination of various digital media types, such as text, graphics, audio, video, and animation, into an integrated multisensory interactive application or presentation. Owing to its attributes (i.e., visual, interactive, engaging, and animated), multimedia can present or represent action, objects, phenomena, or status that text alone can't or can't do as well (Hedberg, 2004; Mayer, 2002).

One of the key advantages of multimedia is its capability of demonstrating qualitative and quantitative relationships, showing changes over time and showing hidden concepts that enable students to see and hear many of the things that they can't through text reading only. With visual display of the subject being studied, the

students can process information quicker, which, consequently, may help foster their acquisition of sophisticated skills and understanding of complex concepts and procedures that may otherwise be unattainable (i.e., the skills, concepts and procedures illustrated with simply text) (Hedberg, 2004). It is believed that learners can learn more deeply, including improved performance on tests of problem-solving transfer, from well-designed multimedia messages consisting of audio, video, graphics, and animation than from more traditional modes of communication involving verbal alone (Mayer, 2003; Paivio, 1986; Clark & Paivio, 1991).

Online education continues to grow across disciplines at institutions of higher learning (Glass & Sue, 2008; Olesova et al., 2011; Wagner et al., 2011). Accompanying the popularity of online education is the use of technology in teaching and learning that is believed to be redefining how learning takes place (Brown, 2002). Along with the increasing use of iPads, tablet PCs, or smart phones, students are becoming familiar with and accustomed to listening to and watching materials which traditionally were simply read. *The Horizon Report* (Johnson et al., 2009) identifies "digital media literacy continues its rise in importance as a key skill in every discipline and profession" (Johnson et al., p. 3). A meta-study and review of literature of 51 online learning studies released by U.S. Department of Education (2009, p. ix) found that "on average, students in online learning conditions performed better than those receiving face-to-face instruction." Various factors may have contributed to the student performance of online instruction, including multimedia. Multimedia has been argued as an effective technology means to positively impact student performance in online, blended, or face-to-face classes (Astleitner & Wiesner, 2004; Paivio, 1986, Clark & Paivio, 1991; Hedberg, 2004; Mayer, 2002; Mayer, 2003; Sadaghiani, 2010).

Education enables students to acquire knowledge and skills that will help them to become successful members of society and prepare them for a wide range of professions. The inventions and implementations of new technologies have signifcant impacts on our education, and have played key roles during the COVID-19 pandemic. Modern technologies provided new learning experiences for millions of students globally during such devastating period, and motivate educators to rethink strategies and approaches to deliver course materials, to assess learning objectives, and to evaluate students' achievements. Modern technologies make it possible to create a wide spectrum of courses that would meet the increasing demand of skilled professionals in the job markets. With this goal in mind, we carefully integrate the best-known educational practices in technologies to create innovation curriculums. The use of technologies provides an engaging and cross-discipline active learning experience to inspire students from diverse backgrounds and abilities, and to assist students in acquiring the knowledge and skills necessary to compete in a global economy.

Striving to accommodate student needs and improve their performance in learning, a variety of technology and multimedia components were introduced into the lower-division mathematics classes. The types of technology include graphing calculators, and computer software packages such as mathematical. The multimedia component consisted of learning objects presented in the format of text, audio, video, and animation. This study analyzed student performance data in several lower-division mathematics courses. Specifically, the final course

grades of the students enrolled in those courses were analyzed to determine the effectiveness of the use of the technology and multimedia. Student responses to an online survey were also discussed. The purpose of this study was threefold: First, it endeavored to determine whether technology, multimedia in this case, works to improve student performance in an in-person or an online instructional environment. Second, it attempted to reveal the value of OER multimedia in online learning as perceived by the students. Third, it strived to provide a glimpse of an innovative curriculum to assist students in acquiring knowledge and skills that will help them to become successful members of society and prepare them for a wide range of professions.

Method

MA139 Applied Calculus

Attempting to measure the impact of multimedia on student performance in an online instructional environment, one set of data collected for this study was from MA139 Applied Calculus, a three-credit hour online math course offered for the first-year students of all disciplines. The objectives of this course are to introduce basic concepts of differential and integral calculus, and to present applications of calculus to problems in business, life sciences, and social sciences. Since fall of 2010, multimedia instructional materials were incorporated in this online class. In particular, different types of multimedia such as animation, audio, video, and YouTube were used to explain some difficult concepts. Group 1 data were collected from three sections without multimedia component, and Group 2 from three sections with multimedia component. All the sections were taught by the same instructor. All course assessments were developed and graded by the instructor using the same criteria and standards.

A comparison of the descriptive statistics for the two groups for MA139 revealed that the mean, median and mode were all higher for the multimedia group, and the range of scores was smaller for the multimedia group (See Table 1). For the final scores of Groups 1, the range was 99.50%, the median was 71.90%, and the mode was F. For the final scores of Groups 2, the range was 89.20%, the median was 75.30%, and the mode was B (89.5%-100% = A, 79.5%-89.4% = B, 69.5-79.4% = C, 59.5%-69.4% = D, 0-59.4% = F). Although there was not a big difference between Group 1 and Group 2 in terms of median, the outliers in Group 1 greatly lowered the group's mode because 29 students got F in Group 1 versus 13 students in Group 2. Had the outliers been excluded, C would be the mode for Group 1 and B for Group 2. An independent samples t-test was then conducted using SPSS (Statistical Package for the Social Sciences) to determine if there was a significant difference in final scores between the two groups of students who participated in this study. The mean score for Group 1 was 56.36% (SD = 32.00 percentage points) whereas Group 2 was 70.68% (SD = 19.03 percentage points). The results of the t-test revealed a statistically significant difference between the two groups ($t = 3.52$, $p = .001$), indicating that Group 2, where multimedia was used, had performed considerably better than Group 1, where no multimedia was used. There was a mean difference of 14.32 percentage points between the two groups.

Table 1. Medians, Modes and Ranges for the Two Groups

	Median	Mode	Range	N
Group 1	71.90%	F	0.5%-100%	13
Group 2	75.3%	B	10.8%-100%	29

In order to find out students' perception of multimedia, we administered an online survey toward the end of each semester for the Group 2 students (enrolled in the MA139 with a multimedia component). As Table 2 below, Group 2 students in general had a positive experience with the technology used in the sections they were in. For example, the students were 100% positive about the multimedia instructional materials when asked about their experience with multimedia in the course (Table 2). Similarly, most of the students have positive experience with animation, interactive exercise, text-audio-video, and YouTube video.

Table 2. Multimedia and Student Experience

Media	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
Multimedia in general	6	9				15
Animation	2	11	8	1		22
Interactive exercise	7	4	6			17
Text-audio-video	4	7	4	1		16
YouTube video	8	4	1		1	14

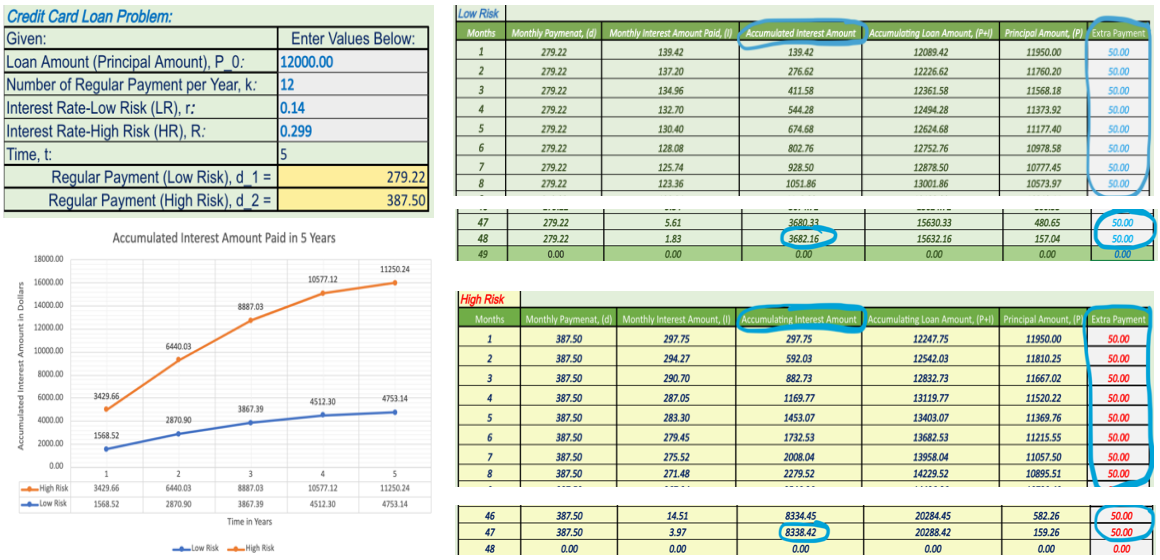
MA123 Mathematical Modeling and Reasoning

Attempting to measure the impact of the use of technologies to create an engaging and cross-discipline active learning experience, one set of data collected for this study was from MA123 Mathematical Modeling and Reasoning. While designing an innovative curriculum, the instructor created projects that are relevant to students' life and experiences, and assisted students in acquiring knowledge and skills that will help them to become successful members of society and prepare them for a wide range of professions.

One of the projects in MA123 was a personal finance project. The project introduced low-risk and high-risk loan plans with low and high interest rates respectively, where all the other loan parameters were matched for both plans. The students were asked to consider scenarios of paying off a credit card loan. The first objective was to examine how the interest rates affect the total amount of interest paid for the term of the loan. The second objective was to determine real-life strategies that would help a loan holder to reduce the total amount of interest paid.

The MS Excel dashboard was created for this project in advance by the instructor. A dashboard is a visual representation of key metrics that allow one to quickly view and analyze the data in one place. Dashboards not

only provide consolidated data views, but a self-service business intelligence opportunity, where users are able to filter the data to display just what's important to them. This dashboard is easy to use, and has a dynamic display of graphs and tables. MS Excel tools and functions provide the ability to create dashboards with focus and emphasize on specific learning objectives. For example, Figure 1 illustrates a sample dashboard for this project with four different views. First, the upper-left table in Figure 1 is the data entry location where students can enter the given inputs under the column named "Enter Values Below." To be specific, the students are asked to enter the loan amount, number of regular payments per year, low-risk interest rate, high-risk interest rate, and loan term. As soon as these required values are entered, the amounts for regular payment for low-risk and high-risk loan are immediately computed, shown, and highlighted in the last two rows of the table. Second, based on the inputs, two graphs of the cumulative interest paid in the loan term are instantly displayed in the lower-left of Figure 1, where the high-risk case is in red and the low-risk case is in blue. Finally, upon entering the data, a spreadsheet on the right side of Figure 1 spells out the detailed information, where the table on top is for a low-risk loan and the table at the bottom is for a high-risk loan, and each table includes the columns indexed by number of months, monthly payment, monthly interest payment, accumulated interest amount, the sum of principle and the interest up-to-date, the remainder of the principle, and extra payment.



Credit Card Loan Problem:

Given:	Enter Values Below:
Loan Amount (Principal Amount), P_0:	12000.00
Number of Regular Payment per Year, k:	12
Interest Rate-Low Risk (LR), r:	0.14
Interest Rate-High Risk (HR), R:	0.299
Time, t:	5
Regular Payment (Low Risk), d_1 =	279.22
Regular Payment (High Risk), d_2 =	387.50

Low Risk

Months	Monthly Paymenat, (d)	Monthly Interest Amount Paid, (I)	Accumulated Interest Amount	Accumulating Loan Amount, (P+I)	Principal Amount, (P)	Extra Payment
1	279.22	139.42	139.42	12089.42	11950.00	50.00
2	279.22	137.20	276.62	12226.62	11760.20	50.00
3	279.22	134.96	411.58	12361.58	11568.18	50.00
4	279.22	132.70	544.28	12494.28	11373.92	50.00
5	279.22	130.40	674.68	12624.68	11177.40	50.00
6	279.22	128.08	802.76	12752.76	10978.58	50.00
7	279.22	125.74	928.50	12878.50	10777.45	50.00
8	279.22	123.36	1051.86	13001.86	10573.97	50.00
47	279.22	5.61	3680.33	15630.33	480.65	50.00
48	279.22	1.83	3682.16	15632.16	157.04	50.00
49	0.00	0.00	0.00	0.00	0.00	0.00

High Risk

Months	Monthly Paymenat, (d)	Monthly Interest Amount, (I)	Accumulating Interest Amount	Accumulating Loan Amount, (P+I)	Principal Amount, (P)	Extra Payment
1	387.50	297.75	297.75	12247.75	11950.00	50.00
2	387.50	294.27	592.03	12542.03	11810.25	50.00
3	387.50	290.70	882.73	12832.73	11667.02	50.00
4	387.50	287.05	1169.77	13119.77	11520.22	50.00
5	387.50	283.30	1453.07	13403.07	11369.76	50.00
6	387.50	279.45	1732.53	13682.53	11215.55	50.00
7	387.50	275.52	2008.04	13958.04	11057.50	50.00
8	387.50	271.48	2279.52	14229.52	10895.51	50.00
46	387.50	14.51	8334.45	20284.45	582.26	50.00
47	387.50	3.97	8338.42	20288.42	159.26	50.00
48	0.00	0.00	0.00	0.00	0.00	0.00

Figure 1. Finance Project Dashboard: Paying off a Credit Card Loan

One of the advantages of using dashboard for this project is that it creates interactive data visualization, and presents data in a meaningful way. Once data are entered, the dashboard provides computational outputs, displays these results in graphs instantly, and exhibits in spreadsheets simultaneously. These comprehensive reports can then be used by students to analyze and draw conclusions, even make recommendations.

Another advantage of using dashboard is that it is interactive. The students can manipulate the data, change the inputs, and observe the outputs. For example, the spreadsheet located on the right side of Figure 1 allows students to observe the impact of extra payments on accumulated interest amount. Students can make changes to

the amounts of regular or extra payments, and observe their immediate effects on other factors, such as accumulated interst paid or the amounts of principle. Since the project focuses on the accumulated interest amount, the upper portion of the spreadsheet on the right of Figure 1 reports the data for the low-risk loan, whereas the lower portion describes the data for the high-risk loan.

The purpose of the last column of both spreadsheets of Figure 1 is designed to interact with the user for extra payments. For example, suppose a $50 regulator extra monthly payment is entered and applied to the low-risk loan; as a result, the loan would be paid off in 48 months (i.e., four years), which is one year earlier than the five-year loan term, and the amount of accumulated interest paid would be reduced to $3,682.16 from the original amount of $4,753.14 that should be paid in a scheduled 5-year term loan. Similarly, suppose a $50 regulator extra monthly payment is entered and applied to the high-risk loan, then the loan would be paid off in 47 months (i.e., three years and 11 month), which is one year and one month earlier than the five-year loan term, and the cumulative interest paid would be reduced to $8,338.42 from the original amount of $11,250.24 that should be paid in a scheduled 5-year term loan.

The use of such dashboards is very convenient for instructors and students. The project conditions can be easily modified, and students can simply change the inputs, experience various scenarios, then analyze and draw conclusions. In particular, it is not necessary for students to memorize formulas; once the students know how to use this tool, they may use this tool in their daily lives such as when purchasing cars or houses, investing in financial market, taking personal loans, or paying off debts. This project is closely related to students' life and experiences, and helps prepare them for their future daily lives.

Modern technologies allow model life-related simulations, which are beneficial in the learning process. They are helping more effectively to connect education to real-life experience. The multimedia survey was also taken in MA123 classes in the middle of the Spring 2024 semester. A total of 17 student responses were collected and summarized in Table 3.

Table 3. Multimedia and Students' Preferences

Media	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
e-Text/Class Notes	5	7	4	0	1	17
Audio/Video	9	5	3	0	0	17
Animations	2	6	9	0	0	17
Interactive exercise	4	7	4	2	0	17
YouTube Videos	8	4	3	2	0	17
Class Recordings	3	4	8	2	0	17
Multimedia is Useful	4	9	4	0	0	17

Table 3 indicates that audio/video (provided in the the course) is the most perferred media where14 out of 17 students were in favor of using video as the supporting learning source while working on the assignments; it was followed by the usage of YouTube videos, where 12 out of 17 students were in favor of YouTube videos (searched by students). On the other hand, it seemed that the post Zoom lecture recordings was used not as much as other media catagories, and it was the last resort for the students if they exhausted all other resources and still couldn't figure out solutions for the problem. Finaly, 13 out of 17 students favor using multimedia as supporting material for studying homework assignments. The survey showed that multimedia played an important role in the students' learning process.

In addition, feedback from students in MA123 Spring 2024 and MA123 Summer 2024 classes showed: "*...I did appreciate having the assignments online making it easier for feedback when and wherever I did my homework...Projects 3 & 4 made the most sense going over the materials that we covered"*; "*Really understandable and appreciate your way of teaching"*; "*The course was taught really well, and the instructor Natalya Kiselyova did an excellent job at teaching and making the class interesting"* (MA123, Spring 2024) *"This course has been highly organized and easy to follow along. The instructor answers emails and grades assignments in a timely manner. She was incredibly helpful by meeting with me via Zoom to discuss an online project in detail. This has been one of my best experiences in an online college course!"*; "*This is my third time attempting this class and this was by far my favorite instructor. I really liked the way the class was organized. The instructor communicated regularly and laid out clear expectations for the class."* (MA123, Summer 2024) Based on these comments, it is obvious that students appreciated the online homework system, especially the immediate feedback from the instructor, and they liked the options of trying similar problems as needed. The students felt they learned from projects 3 and 4, where they created linear and exponential regression models and determined the best fit model for provided project data in project 3, and managed personal finance—paying of a credit card loan in project 4. Both projects connected students to real-life scenarios, and helped them understand the class materials. It appears that the activities and projects made class more interesting, and the implementation of technologies in the curriculum helped students learn skills that could be useful outside of the classroom. Finally, the last two comments from Summer 2024 indicate the importance of communication in online class. For online classes Zoom office hours were provided at scheduled times and by appointments. Zoom office hours provided students with much more flexibility and greater opportunities to access help than were available before the Zoom era. Zoom made it possible to communicate with an individual or a group of students at the same time. For example, as soon as one student scheduled an appointment to discuss a project via Zoom, the details of the Zoom session including the potential discussion topics would be sent to the entire class by an email to invite all the students to participate in this Zoom discussion. Usually, as a result, an additional two or three students would join this Zoom session, and hence more than one student would benefit from this project discussion. This shows that applications like Zoom bridge the communication gap between students and instructors in online classes, and increase the quality of communication in an online environment closer to that in a face-to-face setting.

In summary, students comment clearly indicate that technologies provide a more engaging learning environment, improve the collaborations and communication among students and instructors, and enhance time-on-task classroom management. Technologies assist the instructors in delivering lectures more smoothly and more effectively. In addition, technologies connect students and instructors in online study groups, and help mitigate feelings of isolation. There is no doubt that technologies help mitigate the challenges of online learning and improve the quality of virtual teaching and learning.

Conclusion

Technology, multimedia in this case, seems to have made a big difference on student performance in online instructional environments, as the quantitative data showed. Various factors may have contributed to the positive difference multimedia made; for example, its visuality and animation can make learning engaging and active, its 24/7 accessibility affords students autonomy and control over pacing and sequencing of the learning content, its motion capability and revealing process of deduction and reduction enable students' knowledge retention and its application. Multimedia, therefore, can extend and augment students' learning experience as it capitalizes on the characteristics of each individual. There was abundant qualitative evidence from student testimonials why technology in general, and multimedia in particular, made a difference.

While both qualitative and quantitative data demonstrate that in the same online instructional environment, using multimedia will effectively improve student performance, further studies may reveal whether the demographics of student also contribute to student performance, for example, their gender, age, marital status, and employment status. As well, it will be interesting to see whether the students' improved technology skills are another contributing factor to improved student performance. Our hope is that with the passage of time, as students became more proficient in the use of technology, the demand for all online offerings will keep growing. Future efforts may be made to identify and exclude those outliers such that the data will more accurately reveal the impact of multimedia on the performance of students taking online math course. As well, efforts may also be made to improve the quality of multimedia presentation such that it will do more (i.e., development of more multimedia instructional materials for teaching and learning, and more in-depth content analysis, illustration, and/or demonstration), and to replicate the dynamics in a face-to-face learning environment.

References

Astleitner, H., and Wiesner, C. (2004). An integrated model of multimedia learning and motivation. *Journal of Educational Multimedia and Hypermedia*, *13*(1), 3-21.

Brown, J. S. (2002). Learning in the digital age. *Forum Futures*, 20-23.

Clark, J. M. & Paivio, A. (1991). Dual coding theory and education. *Educational Psychology Review* 3, 149-210.

Glass, J. & Sue, V. (2008). Student preferences, satisfaction, and perceived learning in an online mathematics

class. *MERLOT Journal of Online Learning and Teaching*. 4(3), 325-338.

Hedberg, J. (2004). Designing multimedia: Seven discourses. *Cambridge Journal of Education*, 34(2), 241-256.

Johnson, L., Levine, A., Smith, R., & Stone, S. (2010). The 2010 Horizon Report. Austin, Texas: The New Media Consortium.

Mayer, R. E. (2002). Cognitive theory and the design of multimedia instruction: An example of the two-way street between cognition and instruction. *New Dırectıons for Teachıng and Learnıng*, 89, 55-71.

Mayer, R. E. (2003). The promise of multimedia learning: Using the same instructional design methods across different media. *Learning and Instruction*, 13(2), 125-139

Olesova, L. A., Richardson, J. C., Weasenforth, D. & Meloni, C. (2011). Using asynchronous instructional audio feedback in online environments: A mixed methods study. *MERLOT Journal of Online Learning and Teaching.* 7(1), 30-42.

Paivio, A. (1986). *Mental representations: A dual coding approach*. Oxford University Press.

Sadaghiani, H.R. (2011). Using multimedia learning modules in a hybrid-online course in electricity and magnetism. *Physical Review Special Topics – Physical Education Research*, 7, 101021-101027.

U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*.

Washington, D.C., 2009.Wagner, S. C., Garippo, S. J. & Lovaas, P. (2011). A longitudinal comparison of online versus raditional instruction. MERLOT Journal of Online Learning and Teaching.7(1),68-73.

Implementation of the Shoah Events into Teaching According to the Experience of Czech University Students

Milan Mašát, Ph.D., MBA
Univerzita Palackého v Olomouci, Czech Republic

Abstract: In this paper, we present partial results of a quantitative research investigation, the aim of which was to find out the preconceptions and misconceptions of students of teaching in implementation of the Shoah phenomenon into the teaching. We present the results of two questions: 1. The opinion of respondents on the implementation of the term Shoah in the *Framework Educational Program for Primary Education* (2021); and 2. The opinions of the research participants on the inclusion of the phenomenon of the Shoah in the cross-cutting topics that are part of the normative Czech educational curriculum. The research was carried out by means of a non-standardized questionnaire. A total of 319 students, 300 women and 19 men, participated in the research an overwhelming majority of respondents, total 73 %, believe that the concept of the Shoah should be made explicit in the *Framework Educational Program for Primary Education*. A total of 96 % prospective teachers believe that Shoah problematic should be integrated into Education for Thinking in European and Global Contexts. Based on these findings, it will be possible to undertake targeted intervention in teacher education in this area.

Keywords: Shoah, Holocaust, Pre-concept, Misconception,Czech Framework Educational Program for Primary Education,Implementation, cross-cutting themes

Citation: Mašát, M. (2024). Implementation of the Shoah Events into Teaching According to the Experience of Czech University Students. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024--International Conference on Social and Education Sciences* (pp. 27-39), Chicago, IL, USA. ISTES.

Introduction

The main aim of this paper is to present partial results of a research investigation aimed at finding out the experiences of students of teacher education programs at the Faculty of Education of Palacký University in Olomouc in the Czech Republic with the implementation of the Shoah phenomenon into the teaching of various educational disciplines within the institutional education in the Czech Republic.

The implementation of Shoah themes in teaching involves utilizing various methods and resources to educate students about the Holocaust. Research emphasizes the importance of incorporating artistic narratives, historical images, and survivor testimonies to effectively teach this sensitive subject (Mašát & Sladová, 2019a). Teachers play a crucial role in presenting the Shoah theme, guiding students through the complexities of this historical

event while fostering critical thinking and empathy. Perelberg (2022) finds that the significance of the Shoah, or Holocaust, for contemporary society is multifaceted and profound. The Shoah represents the abolition of traditional familial structures and the rise of narcissistic power dynamics, leading to the creation of the abject.

We are convinced that the Shoah should become an integral part of the educational curricula of various countries, as the relevance of the Shoah to the present is evident in various ways. Studies on genocides, including the Holocaust, have deepened our understanding of history, memory, and cultural representations (Vásquez, 2023). The rhetoric of never again is a ubiquitous anti-racist device in Italy, drawing on historical analogies and the memory of the Shoah (Schwarz, 2022). The impact of the Shoah extends to education and pedagogy, as knowledge and connections to the Holocaust are passed between generations and shape contemporary society (Chernivsky et al., 2022). Moreover, the need for Holocaust education in India highlights the importance of recognizing the connections between different historical events and fostering awareness of the Holocaust as a unique and catastrophic event (Urban, 2022). Overall, the Shoah continues to influence our understanding of history, shape anti-racist discourse, influence educational practice, and highlight the importance of Holocaust education in different contexts. Countries like India and Germany face challenges with the implementation of Holocaust education. In India, there is a lack of mandatory Holocaust education in schools, leading to misconceptions and overshadowing the uniqueness of the event (Burza, 2022). Author (2022) further notes that on the other hand, Germany struggles with inclusivity in Holocaust education due to its status as an immigration country with diverse historical narratives, making traditional educational approaches exclusive to certain groups, particularly those with migrant backgrounds (Ambrosewicz-Jacobs, 2017). Drahi (2015) states that teaching the Shoah in France is a socially sensitive issue and therefore teachers adopt different approaches and roles when teaching the Shoah.

It is the indicated topicality of the Shoah events that led us to carry out the research investigation, as finding out the preconceptions of pupils - future teachers is a key prerequisite for improving the situation in the field of integrating of the Shoah into various levels of education. Finding out the current situation in the given area and with emphasis on the misconceptions in the given area can lead to a straightening of the approach of Czech teachers, but also of Czech society in the given issue, e.g. in perception of the victim of the Shoah. The victim paradigm that emerged in the mid-20th century sacralized the Holocaust and privileged Jewish victims, separating them from other groups persecuted by the Nazi New European Order (Courcelle, Fijalkow & Victor, 2022) However, this framing of Jews exclusively as victims led to the erasure of the pre- and post-war periods and experiences of other persecuted social groups (Silveira, 2023). At the national level, the Czech primary and secondary education system is governed by the *Framework Educational Programs*, which are currently undergoing a certain restructuring in terms of content, from requirements to master a certain amount of curriculum to the mastery of certain competences. The *Framework Educational Programs* set the boundaries for the school curricula, which schools themselves develop to profile them. We do not encounter the term Shoah in the *Framework Educational Programs*, the term Holocaust is part of the curriculum in the third year of lower-secondary school within the subject curriculum of History (Faltýn et al., 2021, p. 57).

Teaching about the Shoah at the university level is crucial for combating fascism, negating revisionist theories, and fostering a new moral and ethical understanding post-war (da Silva Palmeira & Schurster, 2019). Mašát & Sladová (2019a) state that teaching about the Shoah in Czech universities involves various challenges and considerations. Research in the Vysočina Region highlights the importance of integrating the Shoah theme into literary education at the primary school level. Understanding the historical significance of the Holocaust through images is crucial for constructing a comprehensive history curriculum (von Borries, 2017). When designing courses on Shoah literature and history, educators face complex challenges, including personal connections to the Holocaust and potential perceptions of bias or political motivations (Alaniz, 2018).

One study focuses on the representations of Shoah and Holocaust terms in curriculum documents, comparing the Israeli curriculum with the Czech curriculum. The study highlights the need for strategies regarding historical, social, and geographical aspects in curriculum documents and emphasizes the importance of implementing these issues into the Czech curriculum (Mašát & Sladová, 2019b). Another study examines the effectiveness of a teaching proposal on the Holocaust for high school students. The study finds positive results in using historical documents, internet sources, and group work to promote ethical and critical thinking about the Holocaust (López-García, 2022). Additionally, a comprehensive guide for educators preparing to teach about the Holocaust emphasizes the fundamental issues and approaches in Holocaust education (Kaiser & Salmons, 2016). These studies demonstrate the significance of including the Holocaust in educational documents and the potential impact it can have on students´ understanding and awareness of this historical event.

It is precisely in the non-normative anchoring of the defined events that we see room for identifying the preconceptions and misconceptions of future teachers in this area, with an emphasis on their opinion on the (un)need to anchor the concept of the Shoah in normative educational documents, or to extend the concept of the Holocaust to other educational disciplines besides History. The potential of anchoring the term Holocaust in educational documents is a topic of interest in various studies.

Method

The research part of the present project was carried out by means of a non-standardized questionnaire, which was verified in the framework of a research that focused on finding out the opinions of teachers of Czech Language and Literature professionally working at the lower-secondary schools on the implementation of the Shoah theme into the teaching of Literary Education. Mahsin (2022) states that quantitative research is a systematic approach that involves collecting numerical data to analyze and draw conclusions about a particular phenomenon. It focuses on quantifying variables such as attitudes, behaviors, and opinions through methods like surveys and questionnaires, allowing for mathematical and statistical manipulations to be performed on the data. The findings of quantitative research are typically disseminated through reports that can be understood by both laypersons and experts, aiding in the communication of results to various stakeholders (Mohajan, 2020). This

type of research is crucial in fields like engineering education, where it is used to reach larger sample sizes, ensure quick data collection, and generalize findings to make informed decisions and predictions based on empirical evidence (Frierson-Campbell & Froehlich, 2022). Given the focus of quantitative research and its objectives, we are convinced that the chosen methodological approach is adequate for the main objective of the research investigation. It allows us to obtain a sufficient amount of data on the basis of which it will be possible to describe the current situation and propose possible partial solutions to improve the observed situation.

The statistical processing of the data obtained by this research instrument was used to verify the validity and reliability of the questionnaire. We believe that using the same research instrument for the quantitative research investigation that we plan to carry out in the proposed project ensures that its objective will be met.

Respondents of the Research

The respondents of the quantitative research were students of the Department of Czech Language and Literature at the Faculty of Education of Palacký University in Olomouc. Students of full-time, combined and extension studies of all study programs implemented at the given department or whose study plans include a course professionally and staffed by the given department were contacted with a request to participate in the research.

A total of 319 students, 300 women and 19 men, participated in the research. A very significant gender discrepancy is because there is a significant representation of female students at the faculties of education in the Czech Republic, because the profession is financially undervalued in the Czech Republic. The age distribution of respondents is shown in Table 1. The age statistics of the respondents are shown in Table 2.

Table 1. The Age Distribution of Respondents

Age of respondents	Frequencies	
	absolute	relative
19 years	16	5.0 %
20 years	52	16.3 %
21 years	45	14.1 %
22 years	37	11.6 %
23 years	49	15.4 %
24 years	27	8.5 %
25 years	18	5.6 %
26 years	8	2.5 %
27 years and more	67	2.0 %
Total	**319**	**100 %**

Table 2. The Age Statistics of The Respondents

Characteristics	Values
Average	23.03
Median	23
Modus	27
Standard deviation	2.62

The relatively large dispersion of the age of respondents is mainly due to the possibility of Czech students to study according to their interest, professional focus, or external motivation (e.g. the need to broaden their qualifications based on the employer´s request). Dopita & Poláchová Vašťatková (2021) state that this is one of the signs of the neoliberal set-up of higher education policy in the Czech Republic.

The university year that respondents were attending at the time of the survey is shown in Table 3. The level of study that the respondents of the presented research were pursuing at the time of the research is shown in Table 4.

Table 3. The University Year That Respondents Were Attending at The Time of The Survey

	Frequencies	
Answers	absolute	relative
1. year	89	27.9 %
2. year	67	21.0 %
3. year	64	20.1 %
4. year	40	12.5 %
5. year	53	16.6 %
6. year and higher	6	1.9 %
Total	**319**	**100 %**

Table 4. The Level of Study of The Respondents

	Frequencies	
Answers	absolute	relative
Bachelor´s degree program (BA)	151	47.3 %
Master´s degree program (MA)	102	32.0 %
Postgraduate Master´s degree program (MA)	54	16.9 %
Doctoral study program (Ph.D.)	5	1.6 %
Lifelong learning	5	1.6 %
Other	2	0.6 %
Total	**319**	**100 %**

The levels of education were completed by respondents in different forms: full-time, combined or extension (lifelong learning). The distribution of respondents according to this stratification is presented in Table 5.

Table 5. Form of Study Respondents

	Frequencies	
Answers	absolute	relative
Full-time	214	67.1 %
Combined	99	31.0 %
Lifelong learning	4	1.3 %
Other	2	0.6 %
Total	**319**	**100 %**

Results and Discussion

Data collection was carried out via an online questionnaire, which was sent to the respective potential respondents at their university e-mail addresses. This phase of the research was conducted in cooperation with the management of the Department of Czech Language and Literature of Palacký University in Olomouc and its secretariat.

The main research tool was a non-standardized questionnaire, which was verified in the framework of a research that focused on finding out the opinions of teachers of Czech Language and Literature professionally working at the lower-secondary schools on the implementation of the Shoah theme into the teaching of Literary Education.

We present selected results of the questionnaire survey, specifically the question in which we asked a defined group of respondents whether they would welcome the inclusion of the term Shoah in the *Framework Educational Program for Primary Education*. As we have already indicated, this term is not part of this normative curriculum document, which was the main reason why we decided to include this question in the questionnaire. Another factor for including this question in the questionnaire is the fact that the issue of the Shoah and the aspects it connotes are very topical now. Although in the mentioned Czech normative educational document there is the term Holocaust, which is perceived by the majority of the Czech society as a synonym of the term Shoah, we believe that the perception of one line of events of the Second World War from the position of the experience of persons of Jewish nationality may have a different narrative value and may lead to the internalization of the warnings that this line of the Second World War presents to the contemporary society, because the significance of the Shoah for contemporary society lies in its impact on memory, victimhood, and cultural understanding. This statement is not only part of the Czech consciousness, but of the general consciousness. Mills´ statement (2023) is that the Holocaust, also known as the Shoah, refers to the systematic genocide of millions of Jews and other targeted groups by the Nazis during World War II. The Nazi regime, led by Adolf Hitler (compare Bartov, 2023 or Haseljić, 2022). The Shoah challenged traditional notions of

genealogy and filiation, leading to the destruction of social structures and the creation of the abject (Perelberg, 2022). It also influenced the formation of the Jewish identity (de Lima & Lopes, 2023). The explicit focus on the issue of the Shoah, i.e. the mass murder of Jews during the Second World War, can, in our opinion, direct the possible misconceptions of future teachers in this area, which we consider to be one of the key aspects of the thematization of the defined phenomenon. A summary of the responses for this question is presented in Table 6.

Table 6. Would you like to see the term Shoah anchored in the Framework Educational Program for Primary Education?

	Frequencies	
	absolute	relative
Welcomed	233	73.0 %
I find it unnecessary	27	8.5 %
I don´t care	52	16.3 %
Other	7	2.2 %
Total	**319**	**100 %**

As the table shows, almost three-quarters of respondents would welcome the inclusion of the term Shoah in the *Framework Educational Program for Primary Education*. In our opinion, this finding is related to the above-mentioned confusion between the terms Shoah and Holocaust and their semantic perception as synonyms. Less than a fifth of student teachers do not care, which we attribute to the fact that they perceive the issue in a narrowly specific way, not realizing its significance for contemporary global society. In the frame of the item other, one respondent answered: “Probably at the lower-secondary school would welcome it because I know from my own experience that we don´t have much time left for this topic” and “partly students should be introduced to it”. We believe that these answers are related to the perception of the Shoah only in terms of mass murder, which is an inappropriate topic for younger pupils than those attending the lower-secondary school. On the other hand, these events must be perceived primarily as a warning of the extent to which stigmatization and persecutory practices can reach, with an emphasis on developing pupils´ abilities to recognize these manipulative and other practices in their embryonic stages, which can prevent them from developing. At this level, in our view, it is appropriate to introduce pupils to the Shoah already in pre-primary education (see Achituv, Muller, Alexander & Alexander, 2023).

The above question is to some extent related to the respondents´ answers to the question in which cross-cutting topic it is appropriate to implement the Shoah theme. Neudecker et al. (2023) state that cross-cutting topics are issues that are relevant across different levels and perspectives of a system or sector. They are concerns that need to be addressed to achieve success or understand the impact of certain scenarios. The *Czech Framework Educational Program for Primary Education* includes the following cross-cutting themes: Personal and Social Education, Education of a Democratic Citizen, Education for Thinking in European and Global Contexts, Multicultural Education, Environmental Education, and Media Education. All of them are based on the premise

that they represent "current issues of the contemporary world and become an important and integral part of basic education. Cross-cutting themes are an important formative element of basic education, creating opportunities for individual pupils to work individually and collaboratively, and helping to develop pupils´ personality, especially in attitudes and values" (Faltýn et al., 2021, p. 124). Cross-cutting themes need to be integrated by individual schools in their school curricula, but "not all cross-cutting themes need to be represented in every grade. During primary education, it is the school´s duty to offer pupils all the thematic areas of each cross-cutting theme in turn; the scope and implementation of each cross-cutting theme is determined by the curriculum. The cross-cutting themes can be used as an integrative part of the educational content of a subject or in the form of separate subjects, projects, seminars, courses, etc." (Faltýn et al., 2021, p. 124).

For the relevant question in the questionnaire, all the cross-cutting themes were presented to the respondents to assess whether the area was suitable for the integration of Shoah events. In Table 7 we show the positive (i.e. answer "yes") responses of the respondents, i.e. how many of them indicated that the cross-cutting theme is suitable for the inclusion of the Shoah phenomenon. Respondents could give any number of answers, i.e., the maximum number of cross-cutting themes presented to them.

Table 7. Is It Appropriate to Integrate the Shoah into This Cross-Cutting Theme?

	Frequencies	
	absolute	relative
Education for Thinking in European and Global Contexts	305	21.9 %
Education of a Democratic Citizen	301	21.6 %
Multicultural Education	297	21.3 %
Personal and Social Education	266	19.1 %
Media Education	152	10.9 %
Environmental Education	73	5.2 %
Total	**1394**	**100 %**

As the table shows, the cross-cutting themes Education for Thinking in European and Global Contexts, Education of a Democratic Citizen and Multicultural Education received the most positive responses. These choices are not surprising given their postulation and focus. Democratic Education emphasizes the development of democratic competences and the understanding of power and privilege (Helland, 2023). Multicultural Education, on the other hand, focuses on recognizing and valuing the diversity of ethnic groups while maintaining the unity of national identity (Kim, 2023). Global Citizenship Education, which is closely related to Democratic Education, promotes universal values and virtues in the global society, contributing to the resolution of global problems (Lott, 2023). Democratic Education, being cosmopolitan in nature, implies the inclusion of diverse experiences and worldviews, regardless of nationality or cultural background (Nussbaum, 2023). Therefore, Education of a Democratic Citizen in European, and global contexts encompass elements of

Multicultural Education, Global Citizenship Education, and the recognition of equal moral status for all students (Li, 2023).

Literary representations of the Shoah or Holocaust include various cross-cutting themes such as aesthetics, ethics, memory and the challenges of narrating such a traumatic event. These themes are integral to the cross-cutting themes that respondents assessed in relation to the possible implementation of Shoah themes in them (Oliveira Santana Júnior, 2012). Educational initiatives focus on introducing the Shoah theme into institutional education through artistic narratives and emphasize the role of teachers in facilitating student engagement with this sensitive topic, and in as wide a range of educational disciplines as possible, thus including cross-cutting themes (Mašát, 2019 or Mašát & Šmakalová, 2019).

Conclusion

In this paper, we present selected results of a quantitative research investigation, the aim of which was to determine the preconceptions and misconceptions of students of teacher education programs in the field of integration of the Shoah into the teaching of various subjects at different levels of education in the Czech Republic.

We have presented the results of two questionnaire items: 1. The opinion of respondents on the (non)implementation of the term Shoah in the *Framework Educational Program for Primary Education* and 2. The opinions of the research participants on the inclusion of the phenomenon of the Shoah in the cross-cutting topics that are part of the normative Czech educational curriculum. The postulation of these questionnaire items was mainly driven by the prevailing misconceptions between the semantic meaning of the concept of the Holocaust and the Shoah and because of the possible application of the Shoah phenomenon to cross-cutting themes that should conceptualize the various topics holistically with an emphasis on the personal, social, and axiological development of the students.

An overwhelming majority of respondents, 233 out of 319, believe that the concept of the Shoah should be made explicit in the *Framework Educational Program for Primary Education*. We consider this finding to be positive, especially considering the current anti-Semitic sentiment in society. Current anti-Semitic sentiment in society is a global phenomenon that is on the rise, affecting various countries and cultures. It takes different forms, including anti-Zionist antisemitism, neo-traditionalism, Holocaust relativization, and anti-Judaism (Arnold, 2022). The reasons for this increase in Jew-hatred are complex and multifaceted, involving factors such as political influences, the internet, and modern media (Lange, Mayerhofer, Porat & Schiffman, 2021). Hate crimes against Jews have increased significantly, making it crucial for social work educators, practitioners, and researchers to act and create a more socially just society for the Jewish community (Tkáčová, 2022). A total of 305 out of 319 prospective teachers believe that Shoah problematic should be integrated into Education for Thinking in European and Global Contexts, a total of 301 out of the tested sample believe that Education of a

Democratic Citizen is an appropriate basis for implementing the defined line of the Second World War, and a total of 297 out of 319 respondents believe that the Shoah phenomenon should be part of Multicultural Education.

We are aware that the undertaken research investigation is limited by its specific focus, or rather by the specific sample of respondents, i.e. students of selected teaching disciplines implemented by the Department of Czech Language and Literature of the Faculty of Education of Palacký University in Olomouc. However, we believe that based on its results it is possible to trace the direction of the opinions of future teachers and Czech society in general towards the issue of the Shoah, its perception, and the awareness of the importance of its constant commemoration. It is important that we learn from history, therefore it is important to introduce its significant milestones to pupils who are completing their primary (compulsory) education and at the same time to make a targeted intervention in the education of Czech teachers in this area.

We consider it important to mention the limitations of the presented research investigation. Probably the most significant of these is the participation of respondents who wanted to take part in the research. It can be inferred from the given that these are students with some relation to the researched issue. Khatri & Karki (2022) state that while quantitative research is valuable, it has limitations that need to be acknowledged. These limitations include the possibility of a smaller sample size and time-consuming methods. Also, conducting a research investigation at one university does not guarantee the possibility of generalizing the results: on the other hand, we see the research undertaken as a probe into the current situation with the possibility of extending such oriented research to other educational institutions. To this, Boeren (2019) adds that quantitative research may not always capture the depth of understanding provided by qualitative methodologies that aim to understand complex realities and contextual meanings.

In any case, it can be concluded that the results of this research have indicated a direction of travel in the field, and based on these results it will be possible to undertake a targeted intervention in the education of future as well as current teachers.

References

Achituv, S., Muller, M. A., Alexander, S. T., & Alexander, H. (Eds.). (2023). *Early Childhood Jewish Education. Multicultural, Gender, and Constructivist Perspectives*. Camden: Bloomsbury Publishing.

Alaniz, J. (2018). The Shoah, Czech comics and Drda/Mazal's "The Enormous Disc of the Sun." *Journal of Modern Jewish Studies*, *17*(1), 64–78. https://doi.org/10.1080/14725886.2017.1382102

Ambrosewicz-Jacobs, J. (2016). „…The World Felt a Huge Guilt over the Scale of the Holocaust…". Debates Surrounding the Teaching about the Holocaust. *Studia nad Autorytaryzmem i Totalitaryzmem*, *38*(2), 19–33. https://doi.org/10.19195/2300-7249.38.2.2

Arnold, S. (2022). Antisemitismus in der Migrationsgesellschaft. Theoretische Überlegungen, Empirische

Fallbeispiele, Pädagogische Praxis - Nikolaus Hagen and Tobias Neuburger. *Antisemitism studies*, *6*(2), 441–447. https://doi.org/10.2979/antistud.6.2.15

Bartov, O. (2023). The Holocaust. In: Gellately, R. (Ed.), *The Oxford History of the Third Reich* (pp. 190–216). Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780192886835.003.0008

Boeren, E. (2019). Quantitative Research in Research on the Education and Learning of Adults. In Fejes, A., & Nylander, E. (Eds.), *Mapping out the Research Field of Adult Education and Learning. Lifelong Learning Book Series* (pp. 139–155). Cham: Springer. https://doi.org/10.1007/978-3-030-10946-2_8

Burza, M. (2022). Shoah Education: The Indian Scenario. *SHERM*, *4*(1), 46–58. https://doi.org/10.33929/sherm.2022.vol4.no1.04

Chernivsky, M. et al. (2022). *Die Shoah in Bildung und Erziehung heute*. Leverkusen: Verlag Barbara Budrich. https://doi.org/10.3224/84742571

Courcelle, T., Fijalkow, Y., & Victor, S. (2022). Enquêter sur le terrain de la Shoah par balles: un dispositif d'appréhension de la fabrique des savoirs scientifiques. *Emulations*, *2022*(39–40), 91–116. https://doi.org/10.14428/emulations.039-40.05

da Silva Palmeira, A. N., & Schurster, K. Educar para alteridade: o ensino de história da Shoah e o uso dos testemunhos audiovisuais da USC Shoah Foundation. *EDUCAÇÃO & FORMAÇÃO*, *5(*13), 195–214. https://doi.org/10.25053/redufor.v5i13.1123

De Lima, A. F., & Lopes, G. C. D. (2023). A questão criptojudaica (Judeus Marranos) dentro de uma sociedade judaico-cristã oficial opressora e excludente: da invisibilidade à exclusão em massa dos judeus bnei anussim. *Contribuciones a las ciencias sociales*, *16*(3), 1362–1380. https://doi.org/10.55905/revconv.16n.3-024

Drahi, P. (2015). *L'expérience de l'enseignement de la Shoah en France par des professeurs de collège et de lycée: un analyseur de l'expertise professionnelle face à une question socialement vive*. Nanterre, Hauts-de-Seine: École doctorale Connaissance, langage, modélisation.

Dopita, M., & Poláchová Vašťatková, J. (2021). Paradoxes of Doctoral Studies in Education Sciences in the Czech Republic. *Qualitative Sociology Review*, *17*(1), 60–71. https://doi.org/10.18778/1733-8077.17.1.5

Haseljić, Meldijan, A. (2022). Genocide(s) in World War II. Towards the Genocide Convention (origins, definition, processing). *Historical Views 8*, *5*(8), 239–273. https://doi.org/10.52259/historijskipogledi.2022.5.8.239

Helland, K. (2023). Discourses of democratic education in the preparation of teachers for international contexts an analysis of curriculum documents. Nordic *Journal of Comparative and International Education (NJCIE)*, *7*(1), 1–21. https://doi.org/10.7577/njcie.4944

Faltýn, J. et al. (2021). *Framework Educational Program for Primary Education*. Prague: NÚV.

Frierson-Campbell, C., & Froehlich, H. C. (2022). *Inquiry in Music Education Concepts and Methods for the Beginning Researcher*. New York: Routledge. https://doi.org/10.4324/9781003057703

Kaiser, W., & Salmons, P. (2016). Encountering the Holocaust through primary documents. In: Totten, S. (Ed.), *Holocaust Chronology 1933–1946. From Power to Punishment* (pp. 115–146). London: Routledge.

https://doi.org/10.4324/9781315762364-13

Khatri, K. K., & Karki, D. (2022). Uses and Limitations of Quantitative Research in English Language Education. *Bouddhik Abhiyan (बौद्धिक अभियान)*, *7*(1), 70–75. https://doi.org/10.3126/bdkan.v7i1.47565

Kim, J. Y. (2023). A Study on World Peace through Global Citizenship Education in a Multicultural Society. *다문화와 교육*, *8*(1), 19–29. https://doi.org/10.31041/jme.2023.8.1.19

Lange, A., Mayerhofer, K., Porat, D., & Schiffman, L. H. (Eds.). (2021). *Confronting Antisemitism in Modern Media, the Legal and Political Worlds.* Berlin/Boston: Walter de Gruyter GmbH. https://10.1515/9783110671964

Li, J. (2023). Research on Multiculturalism Citizenship and Civic Education. *Applied & Educational Psychology*, *4*(1), 27–32. http://dx.doi.org/10.23977/appep.2023.040105

López-García, A. (2022). Desarrollo del Holocausto a través de fuentes históricas y pensamiento ético. Percepciones del alumnado en enseñanza secundaria. *Clío*, *48*(2022), 444–461. https://doi.org/10.26754/ojs_clio/clio.2022487159

Mahsin, M. (2022). Techniques for Reporting Quantitative Data. In: Islam, M. R., Khan, N. A., & Baikady, R. (Eds.), *Principles of Social Research Methodology* (pp. 235–255). Singapore: Springer. https://doi.org/10.1007/978-981-19-5441-2_172

Mašát, M. (2019). The theme of the Shoah in the context of institutional education: Teachers, pupils and texts. *Journal of Pedagogical Research*, *3*(3), 166–172. https://doi.org/10.33902/jpr.v3i3.80

Mašát, M., & Sladová, J. (2019a). Implementation of the Shoah theme in the teaching of Literary Education from the perspective of teachers of Czech Language and Literature. In Petkova, T. V., & Chukov, V. S. (Eds.), *4th International e-Conference on Studies in Humanities and Social Sciences: Conference Proceedings* (pp. 33–46). Belgrade: Center for Open Access in Science. https://doi.org/10.32591/coas.e-conf.04

Mašát, M., & Sladová, J. (2019b). Representations of Shoah and Holocaust Terms in Selected Curriculum Documents: A Teacher´s Perspective. *Universal Journal of Educational Research*, *7*(2), 457–462. https://doi.org/10.13189/ujer.2019.070218

Mašát, M., & Šmakalová, K. (2019). The Reception of Selected Texts with the Theme of Shoah among Pupils of the 6th–9th Year in the Primary Schools. *Universal Journal of Educational Research*, *7*(6), 1341–1346. https://doi.org/10.13189/ujer.2019.070601

Mills, J-R. (2023). The Holocaust. In: Piehler, G. K., & Grant, J. A. (Eds.), *The Oxford Handbook of World War II* (pp. 482–496). Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199341795.013.13

Mohajan, H. K. (2020). Quantitative Research: A Successful Investigation in Natural and Social Sciences. *Journal of Economic Development, Environment and People*, *9*(4), 50–79. https://doi.org/10.26458/jedep.v9i4.679

Neudecker, D. et al. (2023). *5–10 Years Cross-cutting Priorities on the Topic of Nuclear Data Covariances and Uncertainty Quantification for Users*. Los Alamos: Los Alamos National Laboratory.

Nussbaum, M. C. (2023). Education and Democratic Citizenship: Capabilities and Quality Education. In: Culp, J., Drerup, J., & Yacek, D. (Eds.), *The Cambridge Handbook of Democratic Education* (pp. 250–260). Cambridge: Cambridge University Press. https://doi.org/10.1017/9781009071536.018

Oliveira Santana Júnior, F. (2012). Aesthetics of Fracture and Ethics of Memory: Untranslatability and Witness Representation of the Shoah in the Poetics of *Logocausto* by Leandro Sarmatz. *Arquivo Maaravi: Revista Digital de Estudos Judaicos da UFMG. Belo Horizonte*, *6*(10), 1–11.

Perelberg, R. J. (2022). The murder of the dead father: The Shoah and contemporary antisemitism. *The International Journal of Psychoanalysis*, *103*(5), 851–871. https://doi.org/10.1080/00207578.2022.2094797

Schwarz, G. (2022). Un antirazzismo commemorativo. La Shoah, i migranti e i demoni dell'analogia. *Italia contemporanea*, *297*(2022), 145–179. https://doi.org/10.3280/IC2021-297-S1OA-007

Silveira, P. C. L. (2023). Memory, Memorialization, and the Shoah after "the End of History". In: Consonni, M. (Ed.), *The Routledge Handbook of Judaism in the 21st Century* (pp. 163–176). London: Routledge. https://doi.org/10.4324/9781003108276-12

Stojanov, K. (2023). Global Justice and Democratic Education. In: Culp, J., Drerup, J., & Yacek, D. (Eds.), *The Cambridge Handbook of Democratic Education* (pp. 281–297). Cambridge: Cambridge University Press. https://doi.org/10.1017/9781009071536.021

Tkáčová, H. (2022). Inherited anti-Jewish narratives in the current disinformation media (case study from Slovakia). *Revista Mediterránea de Comunicación*, *13*(2), 155. https://doi.org/10.14198/medcom.21861

Urba, S. (2022). The Shoah, Postcolonialism, and Historikerstreit 2.0: Germany's Past in Its Present. *Israel Journal of Foreign Affairs*, *16*(1), 83–97. https://doi.org/10.1080/23739770.2022.2065798

Vázquez, Ó. F. (2023). A história do Tempo Presente, a Shoah e a paratradução. O processo de construção das narrativas sobre o genocídio. *Estudos Ibero-americanos*, *49*(1), 43357. https://doi.org/10.15448/1980-864X.2023.1.43357

von Borries, B. (2017). Learning and teaching about the Shoah: retrospect and prospect. *Holocaust Studies*, *23*(3), 425–440. https://doi.org/10.1080/17504902.2017.1298348

The Rationale for a Special Education Teacher's Primary Role in Presenting Intensive Instruction in a School's Tiered Intervention Framework

Timothy E. Morse

University of West Florida, United States, https://orcid.org/0000-0001-6917-500X

Abstract: Identifying a special education teacher's primary role has been complicated by competing legislative demands emphasizing every student's academic achievement in the general education curriculum versus some students' needs for individualized instruction that addresses their noteworthy academic achievement deficits. One result is that school administrators have to decide whether a special education teacher's primary role will be to (a) provide accommodations that enable students with disabilities to remain in general education classrooms in accordance with the least restrictive environment requirement in the Individuals with Disabilities Education Act (IDEA) or (b) present the intensive instruction called for by a student's performance in the school's tiered intervention framework. This paper argues that a special education teacher's primary role is to present intensive instruction. The paper (a) reviews the evolution of the current dilemma, (b) explains both accommodations and intensive instruction, and (c) presents a rationale for a special education teacher's primary role as a presenter of intensive instruction. The paper concludes with a brief discussion about how school administrators can establish this primary role for special education teachers while meeting related mandates through the work of other educators.

Keywords: Tiered intervention frameworks, Multi-tiered system of supports, Intensive instruction, Accommodations, Special education teachers

Citation: Morse, T. E. (2024). The rationale for a special education teacher's primary role in presenting intensive instruction in a school's tiered intervention framework. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 40-47), Chicago, IL, USA. ISTES.

Introduction

In 2001, the United States Congress passed the No Child Left Behind Act (NCLB Act, 2008), which directed schools to measure every student's academic achievement to establish a school's success. Successive legislation (i.e., Every Student Succeeds Act (ESSA, 2015)) has maintained this focus. Thus, what has been referred to as the era of school accountability has existed for nearly a quarter century.

Shortly after the NCLB Act's passage, another federal law that addresses special education, the Individuals with Disabilities Education Act (IDEA, 2004), established two closely related mechanisms schools could use to address every student's academic achievement. One mechanism was a tiered intervention framework known as response to intervention (RTI). The other was early intervening services (EIS).

A tiered intervention framework is an organizational scheme designed to match a school's system of interventions to its students' needs (Potter, 2023). Frameworks have been designed to address three needs: academic, behavioral, and social-emotional (Lane et al., 2016). For clarity, this paper explains a framework designed to address students' academic needs.

In a tiered intervention framework, a school's interventions are categorized according to their structure and purpose. The categories are referred to as tiers, and a three-tier framework is described most often. Graphically, the framework is depicted as a triangle with Tier 1 at the base, Tier 2 atop Tier 1, and Tier 3 atop Tier 2. This depiction explains why Tier 2 and Tier 3 are sometimes called higher-level tiers.

Tier 1 consists of instruction presented to all students in the general education classroom. The purpose is to enable every student to attain the grade-level core curriculum academic achievement standards. At a minimum, Tier 1 instruction is supposed to be effective with at least 80% of a school's students.

Tier 2 involves targeted, supplemental instruction. Targeted refers to focusing on essential skills a student has not mastered while receiving Tier 1 instruction. Supplemental means that a student receives Tier 2 instruction while continuing to receive all of the Tier 1 instruction the school provides. The goal is for a student to master the skills taught in Tier 2 and then return to Tier 1 without needing any more supplemental instruction.

Tier 3 is intensive instruction for students demonstrating persistent, significant academic achievement deficits. Persistent refers to the fact that the students exhibit these deficits even after receiving Tier 2 instruction. Hence, these students have been referred to as nonresponders (Fuchs et al., 2014). Significant means the students must learn academic content much lower than that identified by their age-designated, grade-level core curriculum academic standards. By the design and operation of a school's tiered intervention framework, these students are to be provided the most intensive instruction available. In most instances, this instruction is a student's special education. However, this is not always the case, meaning some students without an individualized education program (IEP) receive Tier 3 instruction. Danielson et al. (2019) reported that approximately five percent of a school's students will need Tier 3 services, which includes 80%-90% of special education students whose IEP services align with the criteria for what is considered to be Tier 3 services (Shapiro, n.d.).

Over time, various frameworks have been designed to address different student needs. For instance, RTI has an academic focus, while a positive behavioral intervention and supports (PBIS) framework has a behavioral focus. A multi-tiered system of supports (MTSS) framework has evolved as an integrated framework that

simultaneously addresses students' academic and behavioral needs (Danielson et al., 2019). Presently, the MTSS framework has gained prominence via the ESSA, which mentions the framework five times and characterizes it as an approach for improving the outcomes of students with disabilities and English language learners (Danielson et al., 2019). Furthermore, Bailey (2018) reported that reviews of this country's 50 state Department of Education websites documented evidence of MTSS initiatives or guidance for using an MTSS. Hence, Bailey concluded that this framework will be sustained.

Early intervening services (EIS) are another mechanism schools can use to address their students' academic needs. EIS are services for students who have not been identified as needing special education but need additional academic and behavioral support (i.e., support beyond what is provided in Tier 1) to succeed in the general education environment. While these services are for all students, grades K-12, the IDEA emphasized kindergarten through grade 3 students. According to Yell and Walker (2010; as reported in Yell, 2016), "The purpose of EIS is to identify young students who are at risk for developing academic and behavioral problems while they are still in general education settings, and then to address these problems by designing interventions in a systematic manner using research-based academic and behavioral interventions along with progress monitoring systems. The advantages of an early intervening model include (a) identifying students early in their school careers using a risk rather than a deficit model, (b) emphasizing research-based practices in intervention, and (c) focusing on student outcomes rather than services received" (pp. 334-335). Thus, EIS aligns with the services in a tiered intervention framework.

Concerns About a Special Education Teacher's Primary Role

The RTI and EIS approaches mostly direct educators' efforts outside special education. In fact, RTI has been referred to as a preventative approach, meaning it functions to prevent a student from being misidentified as a student who needs costly, labor-intensive special education services when the root cause of the student's academic achievement deficit is improper instruction rather than an innate disability (Fuchs & Fuchs, 2006). However, within RTI, the needs of students with disabilities have to be addressed since RTI serves as a mechanism for accounting for each student's academic performance.

This situation, along with other aspects of the IDEA (2004), means that schools have to develop two types of services for many students with disabilities: services that directly support an individual's daily performance in a general education classroom and services that address a student's need for remedial academic instruction due to demonstrating a persistent, significant academic achievement deficit. Thus, an issue that has emerged is establishing a special education teacher's primary role. One view is that this role involves providing students with accommodations, whereas the other is providing students with intensive instruction (Fuchs et al., 2014).

Supporting Students With Disabilities in General Education Classrooms Through Accommodations

In accordance with the IDEA's general least restrictive environment requirement, the default placement for a student with a disability is the general education classroom where the core curriculum is taught. When necessary, the student is to be provided supplementary aids and services to support this placement and access to the general education curriculum (Bailey & Zirkel, 2024). Additionally, due to school administrators' concerns about their students' performances on annual statewide academic achievement tests, they want students with disabilities in general education classrooms to receive instruction directly addressing the core curriculum academic standards covered on the state tests.

A noteworthy supplementary service involves providing accommodations. Accommodations refer to changes surrounding the conditions of teaching and learning that enable a student to surmount limitations resulting from their disability. Accommodations have been categorized as one of four types.

a. Presentation accommodations involve the way information is presented. An example is a text-to-speech program that enables content to be presented orally rather than exclusively through text.
b. Response accommodations address how a student conveys an answer. Accordingly, instead of writing a response, a student can dictate it to a scribe.
c. Setting accommodations pertain to the environmental arrangement. A student prone to distractions and needing frequent redirection to remain on task might be seated at the front of the classroom, next to the teacher's desk.
d. Timing accommodations pertain to how long a student is permitted to complete a task or when a student does so during the day. For example, a student who experiences fatigue resulting from a health impairment can be permitted to complete a test across two consecutive days and allowed 1.5 of the allotted time to do so.

Importantly, accommodations do not change the targeted learning outcome. That is to say, students who receive accommodations work to achieve the grade-level core curriculum academic standards all students in a general education classroom work to attain. Likewise, accommodations do not directly address a student's academic achievement deficit. Hence, while sound reasons were explained previously for providing accommodations to enable students with disabilities to remain in general education classrooms, data indicate the vast majority of special education students will require Tier 3 intensive instruction as documented in their IEP (Shapiro, n.d.). This outcome will be based on a student's performance in the school's tiered intervention framework.

Supporting Students with Disabilities Through Intensive Instruction

In a tiered intervention framework, intensifying instruction occurs across tiers. Intensifying instruction involves manipulating alterable variables to make a student's instruction more individualized and effective than prior instruction. Hence, a key feature of intensive instruction is its focus on individualization in a way that is not possible in a general education classroom.

A general education classroom teacher may adapt instruction for one or more students. Still, the teacher focuses on moving the group forward according to the core curriculum's scope and sequence. Conversely, when instruction is intensified, a teacher focuses on an individual student and improving his performance on an academic standard relative to his prior performance. In other words, the student serves as his control or reference point.

Two commonly referenced alterable variables for intensifying instruction are group size and dosage. Instruction is intensified when the size of the group receiving instruction is reduced, resulting in a lower pupil-to-teacher ratio. This instructional adaptation, by itself, can result in more individualized instruction for a student who can remain on-task longer because he is not subject to a greater number of distractions in a larger group that causes him to be off-task. More often, a change in group size allows the teacher to employ new evidence-based strategies, such as increasing a student's opportunities to respond and receive behavior-specific feedback.

Dosage involves the amount of time a student receives instruction. Intensifying instruction occurs when a student's dosage is increased. Increasing the time a teacher engages in effective instructional strategies, including guided practice, asking questions, checking for understanding, and correcting errors, has been associated with increased academic achievement (Rosenshine, 2012).

For most students with disabilities, their intensified instruction is their specially designed instruction (SDI), or special education, under the IDEA. This equates to Tier 3 instruction, a logical extension of the instruction intensified across Tier 1 and Tier 2 in their school's tiered intervention framework. The student's SDI often addresses academic content several years behind the student's grade level (Powell, n.d.) and is presented in a special education placement, such as a resource room.

Braun et al.'s (2018) findings regarding urban schools' MTSS implementation are germane when determining the special education teacher's role with respect to providing this instruction. The general education teachers Braun et al. interviewed reported they needed to acquire much more knowledge about intensive instruction. According to these teachers, their schools struggled with intensifying instruction beyond the small numbers of students who readily responded to the first type of Tier 2 intensive instruction provided. These teachers' reports highlight a significant difference in preservice teacher preparation for general versus special education teachers and the focus of their work as practicing teachers. Whereas general education teachers focus on strategies for moving a group of students forward, special education teachers focus on the needs of individual students.

Special Educator's Primary Role: Present Intensive Instruction

Some tiered intervention framework advocates have characterized the dichotomy that has emerged as being "special education as accommodations versus special education as intensive intervention" (Fuchs et al., 2014). To be clear, every student's special education must involve specially designed instruction and supplementary aids and services, which might include accommodations. Thus, providing accommodations or intensive

instruction for students with disabilities is not an either-or proposition. Instead, the issue at hand is the extent to which a special education teacher engages in activities involving (a) the provision of accommodations or similar support services as opposed to (b) specially designed instruction that is intensive instruction. Below are four reasons that support the position that the special education teacher's primary role is to present intensive instruction to students with disabilities.

a. General education teachers report that they do not possess the requisite knowledge for presenting the intensive instruction these students require (Braun et al., 2018).
b. In accordance with the logic of a tiered intervention framework, these students' intensive instruction is supposed to be the most intensive a school is equipped to present. This intensive instruction is highly individualized, meaning it does not comport with general education teachers' training that focuses on groups of students.
c. These students' intensive instruction aligns with the specially designed instruction called for in the IDEA that special education teachers have been trained to provide.
d. Accommodations can be provided outside of special education, within Tier 1 of a school's tiered intervention framework. For instance, the general education teacher could implement effective accommodations in Tier 1 through the principles of universal design for learning (UDL). Once a student's disability is documented, a Section 504 plan could establish the student's accommodations (Bailey & Zirkel, 2019). Similarly, if a student receiving special education services demonstrates appropriate progress through the exclusive provision of accommodations, the student's special education services would be discontinued, and the student provided a 504 plan. In other words, the student would demonstrate they do not need specially designed instruction, which is the heart of special education services.

Special Educator's Secondary Role and Related Concerns

Special education teachers will be available to address all matters stipulated in the IDEA (e.g., writing an IEP). However, some of these will not be their primary responsibility, particularly providing accommodations that are not interventions that directly address a student's academic achievement deficit. Instead, accommodations should be handled in Tier 1 by the general education teacher with help from others, such as a properly trained paraprofessional, who cannot address matters that a special education teacher must handle.

A related concern impacting establishing a special education teacher's primary role is the United States Supreme Court's outcome standard for students with disabilities. According to this standard, a student with a disability is to make progress appropriate in light of their circumstances (Yell & Bateman, 2017). Notably, this progress may not result in a student demonstrating mastery of all grade-level core curriculum academic standards. This circumstance means it is fair to ask why a particular student's special education would be centered on receiving accommodations in a general education classroom where the academic achievement standard is unattainable. Instead, in this instance, the logical course of action would be for the special education teacher to provide specially designed instruction, which is the intensive instruction called for via the student's progression in the

school's tiered intervention framework. The special education teacher may be the only full-time school staff member qualified to perform this work.

Conclusion

Schools face myriad, sometimes conflicting mandates as they work to address each student's academic needs. Such is the case when schools try to simultaneously address the IDEA's general least restrictive environment requirement and present intensive Tier 3 instruction to a student with a disability because the student demonstrates a persistent, significant academic achievement deficit. Both matters impact a school's ability to document its success via its students' performances on mandatory annual statewide academic achievement tests.

Two issues must be resolved for schools to meet these mandates adequately. One is providing schools with the necessary resources. For example, urban schools in high-poverty settings need adequate resources to address formidable challenges beyond their direct control, including high staff turnover rates, having no choice but to employ relatively inexperienced teachers, and meeting the needs of students who arrive displaying significant academic and behavioral support needs. A second issue is deciding how to deploy the school's special and general education teachers. This matter is directly under a school's control and can be resolved logically. That is to say, special education teachers may be the only teachers in the school with in-depth knowledge and advanced skills who can implement intensive instruction. Conversely, general education teachers could provide accommodations by practicing the principles of UDL while receiving support from adequately trained paraprofessionals.

Armed with knowledge about accommodations and intensive instruction and, as appropriate, the skills to provide both, general and special education teachers can collaborate to address every student's academic needs. One result will be an increase in the probability that a school will demonstrate success on the annual statewide academic achievement tests. Moreover, the school will serve as an example of how conflicting legislative mandates can be managed.

References

Bailey, T. R. (2018). *Is MTSS/RTI here to stay? All signs point to yes!* [National Center on Response to Intervention blog]. https://rti4success.org/blog/mtssrti-here-stay-all-signs-point-yes

Bailey, T., & Zirkel, P. A. (2024, April 30). *Supporting students with disabilities' access to and progress in the general education curriculum: Legal requirements and examples from the field*. [Webinar]. https://promotingprogress.org/resources/supporting-access-and-progress-general-curriculum

Braun, G., Kumm, S. Brown, C., Walte, S., Hughes, M. T., & Maggin, D. M. (2018). Living in Tier 2: Educators' perceptions of MTSS in urban schools. *International Journal of Inclusive Education*. https://doi.org/10.1080/13603116.2018.1511758

Danielson, L., Edmonds, R. Z., & Gandhi, A. G. (2019). *Introduction*. In Edmonds, R. Z., Gandhi, A. G., & Danielson, L. (Eds.), *Essentials of intensive intervention* (pp. 1-6). The Guilford Press.

Every Student Succeeds Act, Pub. L. No. 114-95 (2015).

Fuchs, D., & Fuchs, L. S. (2006). Introduction to response to intervention: What, why, and how valid is it? *Reading Research Quarterly*, *41*(1), 93-99. https://www.jstor.org/stable/4151803" https://www.jstor.org/stable/4151803.

Fuchs, D., Fuchs, L. S., & Vaughn, S. (2014). What is intensive instruction and why is it important? *TEACHING Exceptional Children*, *46*(4), 13-18. https://doi.org/10.1177/0040059914522966.

Individuals with Disabilities Education Act (IDEA), 20 U.S.C. §1401 *et seq*. (2004).

Lane, K. L., Oakes, W. P., Cantwell, E. D., & Royer, D. J. (2016). *Building and installing comprehensive, integrated, three-tiered (Ci3T) models of prevention: A practical guide to supporting school success*. (1st ed.). Apple.

No Child Left Behind Act of 2001, Pub. L. No. 107-110 **(2001).**

Potter, J. (2023). *What to do when students don't respond to interventions*. [Center on Multi-Tiered System of Supports blog]. https://mtss4success.org/blog/students-dont-respond-interventions

Powell, S. (n.d.). *Part 2: What mathematical content do students need to master across kindergarten through eighth grade?* [Online learning module]. National Center on Intensive Intervention. https://intensiveintervention.org/developing-scope-and-sequence-math-course#Module1Part2

Rosenshine, B. (2012). Principles of instruction: Research-based strategies that all teachers should know. *American Educator*, *36*(1), 12-19, 39.

Shapiro, E. S. (n.d.). *Tiered instruction and intervention in a response to intervention model*. RTI Action Network, National Center for Learning Disabilities. https://www.rtinetwork.org/essential/tieredinstruction/tiered-instruction-and-intervention-rti-model

Yell, M. L. (2016). *The law and special education.* (4th ed.). Pearson.

Yell, M. L., & Bateman, D. F. (2017). Endrew F. v. Douglas County School District (2017). *TEACHING Exceptional Children*, *50*(1), 7-15. 10.1177/0040059917721116

Yell, M. L., & Walker, D. W. (2010). Response to intervention: The legal basis and current litigation. *Exceptionality*, *18*(1), 124-136. https://doi-org.ezproxy.lib.uwf.edu/10.1080/09362835.2010.491741

The Principles of Compiling an Online Dictionary for Teaching Georgian as a Second and Foreign Language

Nino Sharashenidze
Tbilisi State University, Georgia

Abstract: Taking into account the peculiarities of the Georgian language and integrating them into the teaching process remains an important task. Georgian is an agglutinative language, which means the existence of grammatical markers in word-forms related to certain semantic features. The system of the Georgian verb is unique in that it is based on morphosyntactic features, whereby verb forms are grouped into three series and eleven screeves. Moreover, the teaching process is complicated due to the lack of a unified pattern for tense formation. Once the learner has mastered the verb forms, they face the challenge of constructing correct sentences. This largely depends on the verb forms, as these govern the elements of the sentence, requiring specific case forms in each situation. The issue is further complicated because, in the native languages of Georgian learners, there are no analogous structures to support positive transfer. To overcome these challenges, it is necessary to compile learner's dictionaries (both printed and online versions) that will enable learners to become familiar with important issues related to language acquisition, including specific verb forms and constructions. It is worth mentioning that the existing dictionaries, both explanatory and bilingual, are aimed at native speakers and do not contain the specific information necessary for foreign learners of Georgian. We have developed certain principles based on which the dictionary on the portal for learning the Georgian language (http://dictionary.geofl.ge//) will be compiled. Defining these principles and identifying the information attached to the dictionary entries will help learners understand and master the complex linguistic peculiarities of the Georgian language. The dictionary also enables verification of information regarding verb forms, which was previously impossible due to the lack of corresponding data.

Keywords: Teaching language, Georgian language, Second/foreign language teaching, online dictionary.

Citation: Sharashenidze, N. (2024). The Principles of Compiling an Online Dictionary for Teaching Georgian as a Second and Foreign Language. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 48-56), Chicago, IL, USA. ISTES.

Introduction

The Georgian language is the official state language of Georgia. It belongs to the Kartvelian language group, which includes four languages: Georgian, Svan, Mingrelian, and Laz. Georgian, Svan, and Mingrelian are spoken within the territory of Georgia, while Laz is spoken in both Georgia and Turkey. Kartvelian languages are also referred to as Iberian or South Caucasian languages. The Kartvelian language group is unique and has

no genetic connection to other language families. Around five million people speak Kartvelian languages. These languages are among the oldest language groups, with their division into distinct languages dating back to the second millennium BCE. Since the 5th century CE, Georgian literature has existed. The Georgian script has evolved through three stages: Asomtavruli (5th-10th centuries), Nuskhuri (10th-12th centuries), and Mkhedruli (from the 11th century to the present). The Georgian alphabet is shared by all Kartvelian languages.

The population of Georgia is multi-ethnic. According to the 2014 census, 13.2% of Georgia's population is represented by ethnic minorities, with Azerbaijanis accounting for 6.3%, Armenians for 4.5%, and Russians and other ethnic groups making up 0.7%. In Georgia, there are 54,325 non-Georgian schools where education is conducted in the languages of national minorities, while Georgian is taught as one of the subjects.

The primary target group for teaching Georgian as a second/foreign language consists mainly of national minorities of Georgia who are compactly settled in two regions of Georgia (Kvemo Kartli and Samtskhe-Javakheti), receive education in national schools and have poor or no knowledge of the state language. Additionally, students who come to Georgia to pursue education are increasingly interested in learning Georgian. A special program exists for teaching Georgian to the second generation of Georgian emigrants, who live in various countries and non-Georgian environments (the number of emigrants increased by up to 23% between 2010 and 2020). Kartvelian or Georgian languages are also of interest to linguists or individuals interested in language studies. Thus, the methodological development of teaching Georgian as a second/foreign language represents one of the key directions in modern Georgia for promoting the language and maintaining its functionality. Georgian belongs to the agglutinative language group, meaning that word forms are created with affixes that express various grammatical categories. A particularly unique phenomenon in Georgian is the verb, which is characterized by a complex and grammatically rich system. Therefore, the principles of mastering and delivering verb forms for practical use in language teaching are of special importance.

The primary goal of this paper is to present innovations valuable for teaching Georgian as a second/foreign language and to demonstrate how their implementation will make the learning process more effective. The paper discusses existing problems in teaching and lexicography of the Georgian language, analyzes the system of grouping Georgian verbs based on morphosyntactic categories, and provides ways to make this complexity understandable and adaptable for speakers of other linguistic groups. The paper also explores the principles that should underpin online learning dictionaries, which serve as important aids in the language learning process. Information is provided about the structure of the online learning dictionary available on the Georgian language learning website (http://geofl.ge/).

The Verb System in Georgian

A Brief Overview

The Georgian verb system is based on morphosyntactic principles. This means that when grouping verbs, both

morphological and syntactic categories are taken into account. Akaki Shanidze developed a system (Shanidze, 1953) that groups the verb forms of the Georgian language into three groups. Each of these groups is called a "series." In Georgian, there are three series, and each series contains a subsystem grouped by morphological characteristics, called a "screeve." (These terms are used exclusively in Georgian grammar, but when describing the Georgian verb system, they are carried over unchanged into the international scientific literature.) The grouping of verb forms into three series is based on a syntactic principle: transitive verb forms govern the subject and objects in various cases (see Table 1 below):

Table 1. Syntactic Characteristics of the Georgian Transitive Verb System.

Transitive Verbs (Active voice)		
I seria	II seria	III seria
S nominative + $O_{indirect.}$ dative + $O_{direct.}$ dative	S ergative + $O_{indirect.}$ dative + $O_{direct.}$ nominative	S dative + $O_{direct.}$ nominative $O_{indirect.}$ Genitive + tvis (=for)
სწერს დედა შვილს წერილს.	მისწერა დედამ შვილს წერილი.	მიუწერია დედას შვილისთვის წერილი.
sçers deda švils çerils. write V PRS S3.SG mother N NOM son N DAT. Letter N DAT	*misçara dedam švils çerili.* write PR V AOR S3.SG mother N ERG son N DAT. Letter N NOM	*miuçeia dedas švilistvis çerili.* write PR V PRF S3.SG mother N DAT son N GEN P *tvis.* Letter N NOM
A mother writes a letter to her son	The mother wrote a letter to her son.	The mother wrote (has written) a letter to her son.

The syntactic construction of the passive voice verb is different (see Table 2):

Table 2. Syntactic Characteristics of the Georgian Intransitive Verb System.

Intransitive verb (Passive voice)		
I seria	II seria	III seria
S nominative S nominative + $O_{indirect.}$ dative	S nominative S nominative + $O_{indirect.}$ dative	S nominative S nominative + $O_{indirect.}$ dative
იწერება წერილი.	დაიწერა წერილი.	დაწერილა წერილი.
Içereba çerili. write V PRS S3.SG Letter N NOM	*daiçera çerili.* write PR V AOR S3.SG Letter N NOM	*daçerila çerili* . write PR V PRF S3.SG Letter N NOM
A letter is being written.	A letter was written.	A letter has been written.

The third group consists of the so-called medio-active verbs (see Table 3):

Table 3. Syntactic Characteristics of the Georgian Medio-Active Verb System.

Intransitive verb (Medio-active)		
I seria	II seria	III seria
S nominative	S ergative	S dative
მარიამი მუშაობს სკოლაში.	მარიამმა იმუშავა სკოლაში.	მარიამს უმუშავია სკოლაში.
Mariami mušaobs skolaši. *Mariam N NOM work V* PRS S3.SG *school* N GEN P *ši*	*Mariamma imušva skolaši.* *Mariam N ERG work V* PRS S3.SG *school* N GEN P *ši*	*Mariams umušavia skolaši.* *Mariam N DAT work V* PRS S3.SG *school* N GEN P *ši*
Mariam works at school.	*Mariam worked at school.*	*Mariam has worked at school.*

At this point, we are not focusing on the morphological structure of the verb and its acquisition in the language learning process, as the teaching of verbs in this area is a topic for separate discussion. However, it should be noted that at lower levels of language learning, learners primarily acquire the full form of the verb, while at higher levels, grammatical categories are analyzed, as they introduce new meaning and semantics to the verb forms. This phenomenon is addressed with varying degrees of success in different textbooks.

As for the system of grouping Georgian verbs, numerous studies exist on this subject (Melikishvili, 2014; Gogolashvili, 2010; Melikishvili, 2001; Makharoblidze, 2012; Jorbenadze, 1980; Sharashenidze, 2010; Kurdadze, 2005; Kiguradze, 2016; Gérardine, 2014). The system proposed by Akaki Shanidze has been widely accepted by all scholars working in Georgian morphology. The problem of classifying Georgian verbs has been analyzed from different perspectives in the works dedicated to this topic, although most of these studies focus more on verb formation (the structure of the form), which is an important characteristic for agglutinative languages. In Georgian scientific literature, there have been various attempts to create principles for grouping verb forms, but the analysis of syntactic constructions has not been the focus, as this remains a constant, established linguistic phenomenon in all theories.

As for the syntactic peculiarity of the Georgian verb system, it is a characteristic of the Georgian language and does not exist in other languages. Naturally, this creates difficulties in the language learning process because learners struggle to understand, assimilate, and use this phenomenon in practice due to the absence of positive transfer. It is also worth noting that this phenomenon is not sufficiently represented in Georgian language textbooks, nor is it delivered with specific strategies in the teaching process, which leads to a number of problems. Observations show that this issue persists even at higher levels of language proficiency, appearing in both speech and written texts. It is also important to note that neither explanatory nor bilingual dictionaries provide sufficient information on this subject because, for native speakers, this phenomenon is not problematic, while language teaching is more oriented towards morphological phenomena and form construction. Thus, our raising of this issue represents, on the one hand, an analysis of a major problem in the language learning process and, on the other hand, an attempt to address the issue by presenting and offering solutions to make this unique feature of the Georgian language more adaptable for the language learning process.

What is the situation in the dictionaries in this regard? The "Explanatory Dictionary of the Georgian Language" (KEGL) provides information on the syntactic construction of verbs only with an indication of their transitivity/intransitivity. The verbs are given in the third person present tense, followed by the abbreviation "გრდმ." (grdm. for "transitive"), which indicates that the verb has a case-changing subject and object. The "Georgian Dictionary" (https://www.ganmarteba.ge/), however, provides only the verb's infinitive, meaning no additional information is available about the verb forms. Therefore, if a language learner wishes to obtain more information about a verb, the information provided is quite limited and insufficient, or it assumes a comprehensive knowledge of Georgian verb grammatical features. This is a very complex matter because transitivity in Georgian is a morphosyntactic category: a verb is considered transitive if it governs a case-shifting subject and object. On the other hand, if a verb governs a case-shifting subject and object, it is transitive. However, it is also possible for an intransitive verb (i.e., a medio-active verb) to govern a case-shifting subject. This is a very complex phenomenon, and understanding it poses a significant challenge for language learners.

Therefore, it becomes necessary to present this unique and complex feature of the Georgian language to learners in such a way that they can apply it in both the learning process and in the creation or editing of written texts. It is desirable for learners to grasp this phenomenon from a more practical perspective. In this regard, a learning dictionary adapted to the learner's needs and created with consideration of various factors can provide valuable assistance.

Methodological Foundation for Teaching Verb Forms

In the process of acquiring the Georgian language, the teaching of verb forms should be carried out progressively, according to levels. This is the case in most Georgian language textbooks; however, many of these textbooks do not provide (or only generally provide) information about the syntactic construction of verbs. Along with teaching verb forms, learners should also be given information about the case forms (declensions) related to the subject and object governed by the verb. This should be presented in constructions with attached pronouns, where the pronoun is a "variable" and can be replaced with any noun in the corresponding form. In other words, a construction with pronouns should be presented alongside the verb being taught, as a "formula." For example: აქვს მას ის = დავითს აქვს წიგნი (akvs mas is = Davits akvs ṭigni; Davit has a book).

This feature of the Georgian language must be considered in both textbooks and learning dictionaries. However, the learner needs to be prepared for this: if every new verb is presented with such a construction during the learning process, the step of replacing pronouns with other nouns should be practiced through exercises.

Verb constructions should also be reflected in learning dictionaries. This will help both the teacher and the learner to better understand this feature of the Georgian language.

Common Error Analysis

The issue of using the correct case form of nouns related to verbs persists even at advanced levels of proficiency in Georgian, creating a sense of incompleteness in language knowledge. Mastering verb forms or using them correctly does not solve the problem that arises while constructing syntactic structures. Learners do not have a way to verify this. The information provided in learning dictionaries will help to solve this issue by offering a means of verification. Below are examples of common errors found in written texts by non-Georgian-speaking students. To address these mistakes, verb constructions are presented first (using a "pronoun formula"), which can assist the student in correcting the errors, even through verification. Focusing on this issue and building a step-by-step learning process in this direction will help the teacher and the learner master this aspect alongside verb form learning. Moreover, in the Georgian language, the verb influences not only the case forms of the subject and object but also the case of the modifier noun (attribute) or the conjunctions used in that function. The following examples demonstrate such cases (incorrect forms are highlighted, and correct forms are provided in square brackets). (See Table 4):

Table 3. Common Errors Made by Students Due to Incorrect Use of Verb Constructions.

ისწავლა მან ის (isçavla man is)	*უნივერსიტეტში ერთი წელის სწავლის მერე ვისწავლე არა მარტო ენას, [ენა] არამედ შევიძინე ბევრი მეგობარი.* *universiṭeṭši erti çlis sçavlis mere visçavle ara marṭo enas [ena], aramed ševiʒine bevri megobari.* *After studying at the university for one year, I not only learned the language but also made many friends.*
ითვალისწინებს ის მას (itvalisçinebs is mas)	*სტუდენტები არ ითვალისწინებენ ის, [იმას] რომ ლექციებზე დასწრება მნიშვნელოვანია.* *sṭudenṭebi ar itvalisçineben is [imas], rom lekciebze dasçreba mnišvnelovania.* *Students do not consider that attending lectures is important.*
სწავლობს ის მას (sçavlobs is mas)	*საგანი, რომელიც [რომელსაც] მე ვსწავლობ, რთულია.* *sagani, romelic [romelsac] me vsçavlob, rtulia.* *The subject I study is difficult.*
იმოქმედა მან (imokmeda man)	*ეს ცვლილებები [ამ ცვლილებებმა] კარგად იმოქმედა ჩემს სწავლაზე.* *es cvlilebebi [am cvlilebebma] ḳargad imokmeda čems sçavlaze.* *These changes had a good effect on my studies.*
მოსწონს მას ის (mosçons mas is)	*ეს სტუდენტი სწავლას მოსწონს. [ამ სტუდენტს სწავლა მოსწონს].* *es sṭudenṭi sçavlas mosçons. [am sṭudenṭs sçavla]* *This student likes to study.*

გრძნობდეს ის მას (grʒnobdes is mas)	*სტუდენტი უნდა გრძნობდეს მეორე ენის სწავლის საჭიროება. [საჭიროებას] ṣtudenṭi unda grʒnobdes meore enis sc̣avlis sač̣iroeba. [sač̣iroebas] The student must feel the need to learn a second language.*
ხედავს ის მას (xedavs is mas)	*ეს ის ადგილია, სადაც მე ვხედავ ჩემი მომავალი. [ჩემს მომავალს] es is adgilia, sadac me vxedav cemi momavali. [momavals] This is where I see my future*
მისცა მან მას ის (misca man mas is)	*წინა წელს პროგრამაზე ლექტორი [ლექტორმა] მისცა წიგნის წაკითხვის დავალება. cina c̣els programaze lekṭori [lekṭorma] misca c̣ignis c̣akitxvis davaleba. In the program last year, the lecturer gave an assignment to read a book.*
სწავლობს ის მას (sc̣avlobs is mas)	*დადებითი მხარე ჩემთვის არის ის, რომ საგნები, რომლებიც [რომლებსაც] ახლა ვსწავლობ, ძალიან საინტერესოა. dadebiti mxare čemtvis aris is, rom sagnebi, romlebic [romlebsac] axla vsc̣avlob, ʒalian sainṭeresoa. The positive side for me is that the subjects I am studying now are very interesting.*
უყვარს მას ის (uq̇vars mas is)	*ბავშვები ძალიან მიყვარს და ახსნას [ახსნა] მიყვარს. bavšvebi ʒalian miq̇vars da axsnas [axsna] miq̇vars. I love children very much and I love to explain.*

From the first level of language learning, the textbook “Midamo” (Sharashenidze, 2015) is built on providing verb constructions. The appendix also presents the full paradigm of every verb introduced in the textbook, followed by simple sentences. This appendix offers the learner comprehensive information on the nature of Georgian verbs and all their features. The textbook also includes special exercises, which guide the learner first through reception and then through production, helping them overcome the mentioned problem.

The principle of presenting verb constructions is also applied in the printed dictionary “Georgian-Abkhazian-English Frequency Dictionary” (2018), which provides the base form of the verb and its seven screeves with constructions. This material is also presented in the dictionary's appendix, making it useful for both teachers and individuals interested in learning the language.

This principle should also be implemented in online dictionaries. The Georgian language learning website (http://geofl.ge/) includes a dictionary (http://dictionary.geofl.ge/), which, in addition to other information, contains the full paradigm of verb conjugations. The paradigm presents the 11 screeves of the verb in the third-person form. Each form is accompanied by a construction presented with pronouns (the "formula"), and in

parentheses, the construction is given with nouns substituted for the pronouns. This information is adapted for those who wish to visually understand constructions presented with pronouns and nouns.

Conclusion

Providing verb constructions along with verb forms (such as - *sçers is mas mas* – "he writes it to him," *misçera man mas is* – "he wrote it to him," *miuçeria mas is *mistvis* – "he has written it to him for him") will be a useful innovation for learners of Georgian and will help those interested in learning the language during the acquisition process. This phenomenon should become part of Georgian language learning dictionaries and textbooks. The established principles and the information attached to dictionary entries will help learners to understand and easily master the complex linguistic features of the Georgian language. The learning dictionary will also allow learners to verify information regarding verb forms, which was previously impossible due to the lack of such data.

Abbreviations:
V – Verb
PR – Preverb
AOR – Aorist
S3 – Subject 3
SG – Singular
N – Noun
NOM – Nominative Case
ERG – Ergative Case
D – Dative Case
GEN – Genitive Case
P – Postposition

References

Gérardine, E. (2014). Issues in Teaching the Morphosyntax of Georgian Verbs: Two Challenges and Several Suggestions, Current Problems in Kartvelology, III, pp. 134-145, Tbilisi, St. Andrew the First-Called Georgian University of the Patriarchate of Georgia.

Georgian-Abkhazian-English Frequency Dictionary (2018). Beridze, M., Tetradze, M., Daraselia, S., Sharashenidze N., Poniava N., Georgian-Abkhazian-English Frequency Dictionary, Tbilisi.

Gogolashvili, G. (2010). The Georgian Verb (Issues of Verb Formation), Tbilisi, Meridiani.

Jorbenadze, B. (1980). Principles of Formal and Functional Analysis of the Georgian Verb, Tbilisi, Tbilisi University Press.

Kiguradze, T. (2016). Static Dimension Verbs and Their Teaching Peculiarities in the Sphere of Georgian as a Second Language, Tbilisi, Ilia State University.

Kobadze, M. (2011). On Types of Verb Conjugation in Georgian, Issues of the Structure of Kartvelian Languages, 11, pp. 98-131, Tbilisi, Tbilisi University Press.

Kurdadze, R. (2005). Alternating Vowels in Verbs in Modern Georgian, Tbilisi.

Makharoblidze, T. (2012). The Georgian Verb, Linkom. (https://eprints.iliauni.edu.ge/3038/1/TheGeorgianVerb.pdf)

Melikishvili, D. (2001). The System of Verb Conjugation in Georgian, Tbilisi, Logos Press.

Melikishvili, D. (2014). Systematic Morphosyntactic Analysis of the Georgian Verb (Lecture Course), Tbilisi.

Shanidze, A. (1953). Fundamentals of Georgian Grammar, Tbilisi.

Sharashenidze, N. (2010). Changes in Verb Forms and Functions in Georgian, Tbilisi, Universali Publishing.

Sharashenidze, N. (2015). Midamo 1, Georgian Language for Non-Georgian Speaking Students, Graphema, Tbilisi.

KEGL - Explanatory Dictionary of the Georgian Language, https://ena.ge/explanatory-online

Georgian Dictionary, https://www.ganmarteba.ge/

Obtaining Informed Consent of Vulnerable Populations for Participating in Social and Education Sciences Research

Karen S. Voytecki, Ph.D.
East Carolina University, USA, https://orcid.org/0000-0002-0866-6144

Gregory L. Hassler, J.D., Ph.D.
East Carolina University, USA, https://orcid.org/0009-0004-3439-0884

Abstract: Obtaining informed consent is the foundation of ethics in clinical research involving human participants. Individuals who provide informed consent acknowledge they understand all aspects of the research including the nature of the study, the risks and benefits of participation, the participant's rights, study procedures, research duration, confidentiality, and voluntariness. The process of obtaining informed consent from research study participants contains legal and ethical procedures. The "Common Rule" identifies "vulnerable subjects" for research purposes as "children, prisoners, individuals with impaired decision-making capacity, or economically or educational disadvantaged persons." This social and education sciences research article explores a pragmatic approach for Institutional Review Boards ("IRBs") to review research protocols involving individuals with disabilities and/or those who are educationally-disadvantaged as study participants. Consideration is also given to Universal Design for Learning (UDL) principles in relation to appropriate and effective accessibility options to IRB materials. As a direct result, a process is formed for obtaining informed consent of vulnerable participants in social and education sciences research.

Keywords: Social science, Education science, Research, Informed consent, Vulnerable subject

Citation: Voytecki, K.S. & Hassler, G.L. (2024). Obtaining informed consent of vulnerable populations for participating in social and education sciences research. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 57-63), Chicago, IL, USA. ISTES.

Introduction

History has extensive examples of research studies which inflicted harm on study participants, many of whom were unwilling human subjects (e.g., 1930's Tuskegee Syphilis Study, 1960's Willowbrook State School for individuals with intellectual disabilities). Therefore, in 1974, the United States Congress established the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The commission then published the Belmont Report. The Belmont Report remains the foundation of the ethical principles guiding federal regulations for the protection of human subjects. As this is an international issue, The

Mental Health Capacity Act 2005 poses that, in England and Wales, the ethical research implications of utilizing particicipants unable to provide consent must be considered compared to the ethical considerations of exclusions of those participants from the research study (Calveley, 2012).

As has been noted, historically vulnerable populations have been included in research without their consent. In addition, it has also often been the case that vulnerable populations have been excluded from research that influenced their care and treatment. Excluding the voice of vulnerable populations in research that shares their lived experiences challenges the assumption of ethical practice (Cook & Inglis, 2009).

There has been great progress in research involving human subjects since the early 1900's. However, further improvements must be made to the identification and protection of vulnerable populations, especially in regard to obtaining valid consent and voluntary and knowledgeable study participation. This is due to adverse effects on the informed consent process as a direct result of understanding, comprehension, competence, and willingness to participate; further complicated by use of complex, technical language and specialized information to participants with limited literacy, intellectual capacities, and diverse sociocultural backgrounds, and debilitating diseases (Kadam, 2017). This article explores a pragmatic approach for IRBs to review research protocols that use innovative strategies to enhance the informed consent process when involving individuals with disabilities and/or those who are educationally-disadvantaged as participants.

Current Research Base

The "Common Rule" (heretofore referred to as the "Rule") provides a limited list of those who are considered as "vulnerable subjects" for research purposes. The Rule defines vulnerable subjects as "children, prisoners, individuals with impaired decision-making capacity, or economically or educational disadvantaged persons." Thus, these individuals are noted to be "vulnerable to coercion or undue influence" in context of selection as participants within research studies (45 C.F.R. 46.111(3).). The Rule appears even more limited when compared with the expansive scope of those provided in other principled standards. These include "human in vitro fertilization, employees, military persons and students in hierarchical organizations, terminally ill, comatose, physically and intellectually challenged individuals, and institutionalized individuals."

The Rule further narrows its specific safeguards applicable to only three of its vulnerable subjects: women/fetuses (45 C.F.R. 46.201, et. seq.), prisoners (45 C.F.R..46.301, et seq.) and minors (45 C.F.R. 46.401 et seq.). Safeguards for the remaining subjects typically include treating such subjects "with concern, patience, respect, equitably, allowing free will, ruling out any form of inducement, enticements, insensitivity or prejudice" (Shivayogi, 2013, 53-57).

Vulnerability is a foundation of the theoretical basis and application of ethics in human subjects' research. Therefore, it is emphasized that risks posed to individuals participating in research must be minimized. Thus,

research participants must be provided protection from risks. It is important to note that vulnerable individuals and populations require additional protections (Gordon, 2020).

For purposes of this article, the concept of "vulnerable participant" is defined as "any individual who lacks the ability to fully consent to participate in a study". Applicable federal regulations further identify certain groups as "vulnerable populations." These vulnerable population groups include "pregnant women and fetuses, minors, prisoners, persons with diminished mental capacity, and those who are educationally or economically disadvantaged." The federal regulations provide specific rules that apply directly to research that involves pregnant women, prisoners, and minors. However, as opposed to generalizing groups and classifying certain groups as "vulnerable," the IRB-SBS assesses each individual participant's ability to consent despite her/his ability to qualify in one of the afore-mentioned categories. Therefore, rather than categorizing a certain group as "at risk," which could potentially stigmatize and limit study participation, IRBs for the Social and Behavioral Sciences ("IRB-SBS") utilize an analytical framework so that every study is provided with a unique response that is targeted to the study participants' needs. Specifically, IRBs-SBS will evaluate the study proposal in regard to the study participants' ability to provide consent, the researchers' plan to minimize unnecessary risks, and the procedures in place to meet the needs of the participants. It is recommended to align consent procedures, based in contemporary concepts of human research participant protections, with integration of disability rights (McDonald et al., 2024).

Disability Factors Influencing Informed Consent

Certain types of disabilities can lend themselves to having characteristics that can impair the individual's decision-making capacity. Thus, some individuals with disabilities can be classified as being in a vulnerable population for obtaining informed consent.

In cases with individuals with intellectual disabilities, it is essential to assume that young individuals with intellectual disabilities are the experts of their own lives (Borgstrom, 2023). When obtaining research consent with individuals with intellectual disabilities, it is necessary to use systematic, holistic consent procedures along with ethical guidelines, recommended communication strategies, adapted written information sheets, and inclusion of a familiar caregiver (Ho et al., 2018). Initial research shows promise for the use of a digital decision support tool during the informed consent process for individuals with intellectual disabilities, specifically with individuals with Fragile X Syndrome (McCormack et al., 2019). Research has found that it is critical to utilize appropriately modified alternative communication mechanisms and assistive communication tools, as necessary, during the informed consent process with individuals with intellectual disabilities (Wark et al., 2017).

Research has shown that individuals with learning disabilities have impairments with verbal and memory aptitudes that negatively influence their ability to consent. More specifically, these individuals have challenges with answering questions that focus on the rights of participants, impacts of choices, and options (Arscott et al.,

1999).

Ethics in autism research shows a direct correlation between decision-making and empowerment for individuals with autism who are involved in research studies, including empowerment utilized for establishing informed consent and beyond. The study participant, through empowerment, can decide their level of involvement and influence the research procedures and contexts (Cascio et al., 2020). Individuals with autism need a differentiated consent process which offers multiple modes of participation, adapted survey instruments, accessible interview measures, and data handled by proxy reporters (Nicolaidis et al., 2019).

Obtaining Informed Consent

There are many promising practices in place to educate IRB-SBS members on the ethical impacts and requirements of research studies involving human subjects. One such current practice that has promise in this area is from Public Responsibility in Medicine and Research ("PRIM&R"). PRIM&R offers an engaging, interactive Ethical Research Online Course designed to prepare IRB-SBS members with ethical principles and regulatory frameworks to guide their research practices. Fundamental concepts covered in this course focus on human subjects' protections, including "informed consent, data and safety monitoring, privacy and confidentiality protections, and more." (*Public Responsibility in Medicine and Research (PRIM&R) a 501 (C) (3) Nonprofit*, 2024).

There are numerous, innovative means of obtaining informed consent from vulnerable populations. However, it is imperative to protect the rights and interests of the participants throughout the process. Some processes engage children with disabilities as co-researcher participants in narrative research, in relaxed environments with qualitative vigor that supports their voice and agency (Ajodhia-Andrews, 2016). When focusing on vulnerable populations, it is important to build and maintain trusting relationships, utilize reasonable accommodations to support decision-making, and plan for the development of empathic relationships (Carey & Griffiths, 2017).

Maintaining Informed Consent

Research supports innovative approaches to obtaining informed consent from children, since it can encourage dialogue and questioning about the study (Arnott et al., 2020). However, it is critical for the approaches to be pedagogically meaningful and to correspond to the maturity levels and capabilities of the children. Furthermore, it is the researcher's responsibility to negotiate consent continuously throughout the research study through reflexive questioning (Arnott et al., 2020).

Universal Design for Learning

The Universal Design for Learning (UDL) framework was originally designed for education settings in order to

meet the needs of a variety of learners, both with and without disabilities. It provides principles which apply to the IRB-SBS process as well.

Universal Design for Learning Principles for Application

There are three principles for application within the UDL model. They include Representation, Engagement, and Expression.

Representation is how the information is presented to the individual. For purposes of informed consent, accommodations within the area of representation can be beneficial. The use of editing tools, for instance, can be utilized for ease of access. Editing tools can be utilized to make changes in font type, size, and/or color; alter the background contrast to be high visibility and/or high contrast; and apply appropriate graphics. Another area of representation is to support the understanding of written and visual content. This can be accomplished through image descriptions, alternate format options, and digital files for screen readers.

Engagement and Expression are how the individual interacts with the content and reflect their knowledge and understanding back to the provider. Ideas to consider for these categories include flexibility in communication; use of verbal and written communication for clarity, utilization of live readers, incorporation of e-readers via text to speech capability, use of open or closed captioning, and alternate locations for ease.

Universal Design for Learning and the Institutional Review Board Process

A clear understanding of every step of the IRB process is important, particularly for those considered "vulnerable subjects." Disability characteristics may impact a potential participant's understanding of the research study's overall intent, as well as the individual's ability to participate independently and/or respond to queries, tasks, or expectations. It is imperative to design IRB protocols which will engage and sustain participants' active engagement to help ensure a successful research project. By integrating specific elements of the UDL principles of representation, engagement, and expression when developing the IRB and the study activities, researchers can strategically incorporate UDL principles and ensure the maximum engagement by individuals with disabilities in the research study.

Conclusion

It is imperative to protect the rights of all research study participants, including those from vulnerable populations. The right to be included in research that involves their lived experiences and the right to understand fully the informed consent for the study. With certain individuals from vulnerable populations, it may be necessary to use accommodations and principles of UDL to make the informed consent process accessible and comprehensible for the participants. To uphold legal and ethical procedures, Institutional Review Boards (IRBs)

must remain aware of ever-changing assistive technology, and other accommodations, that can assist with the fidelity of the informed consent process when administered to vulnerable populations.

References

Ajodhia-Andrews, A. (2016). Reflexively conducting research with ethnically diverse children with disabilities. *The Qualitative Report*, *21*(2), 252-287.

Arnott, L., Martinez-Lejarreta, L., Wall, K., Blaisdell, C., & Palaiologou, I. (2020). Reflecting on three creative approaches to informed consent with children under six. *British Educational Research Journal*, *46*(4), 786-810.

Arscott, K., Dagnan, D., & Kroese, B.S. (1999). Assessing the ability of people with a learning disability to give informed consent to treatment. *Pyschological Medicine*, *29*(6), 1367-1375.

Borgstrom, A. (2023). Young people with intellectual disability and the internet: Challenges and opportunities in qualitative research. *Journal of Intellectual Disabilities*, *27*(3), 598-612.

Calveley, J. (2012). Including adults with intellectual disabilities who lack capacity to consent in research. *Nursing Ethics*, *19*(4), 558-567.

Carey, E., & Griffiths, C. (2017). Recruitment and consent of adults with intellectual disabilities in a classic grounded theory research study: Ethical and methodological considerations. *Disability & Society*, *32*, 193-212.

Cascio, M.A., Weiss, J.A., & Racine, E. (2020). Empowerment in decision-making for autistic people in research. *Disability & Society*, *36*(1), 100-144.

Cook, T., & Inglis, P. (2009). Making our own decisions: Researching the process of 'being informed' with people with learning difficulties. *Research Ethics*, *5*(2), 55-64.

Gordon, B. G. (2020). Vulnerability in research: Basic ethical concepts and general approach to review. *The Ochsner Journal*, *20*(1), 34-38.

Ho, P., Downs, J., Bulsara, C., Patman, S., & Hill, A. (2018). Addressing challenges in gaining informed consent for a research study investigating falls in people with intellectual disability. *British Journal of Learning Disabilities*, *46*(2), 92-100.

Kadam, R.A. (2017). Informed consent process: A step further towards making it meaningful! *Perspectives in Clinical Research*, *8*(3), 107-112.

McCormack, L.A., Wylie, A., Moultrie, R., Furberg, R.D., Wheeler, A.C., Treiman, K., Bailey, D.B., Jr., & Raspa, M. (2019). Supporting informed clinical trial decisions: Results from a randomized controlled trial evaluating a digital decision support tool for those with intellectual disability. *PloS One*, *14*(10).

McDonald, K.E., Schwartz, A.E., Dinerstein, R., Olick, R., & Sabatello, M. (2024). Responsible inclusion: A systematic review of consent to social-behavioral research with adults with intellectual disability in the US. *Disability and Health Journal*, *17*(4), 101669.

Nicolaidis, C., Raymaker, D., Kapp, S.K., Baggs, A., Ashkenazy, E., McDonald, K., Weiner, M., Maslak, J., Hunter, M., & Joyce, A. (2019). The AASPIRE practice-based guidelines for the inclusion of adults in

research as co-researchers and study participants. *Autism*, *23*(8), 2007-2019.

Public Responsibility in Medicine and Research (PRIM&R) a 501 (c)(3) nonprofit. (2024). PRIMR. http://www.primr.org

Shivayogi, P. (2013). Vulnerable population and methods for their safeguard. *Perspectives in Clinical Research*, *4*(1), 53–57. https://doi.org/10.4103/2229-3485.106389

Wark, S., MacPhail, C., McKay, K., & Mueller, A. (2017). Informed consent in a vulnerable population group: Supporting individuals aging with intellectual disability to participate in developing their own health and support programs. *Australian Health Review*, *41*(4), 436-442.

AI-Powered Personalized Education: Impacts on Student Achievement and Future Perspectives

Eyüp Yurt
Bursa Uludağ University, Türkiye, https://orcid.org/0000-0003-4732-6879

Abstract: This study examines the impacts of AI-powered personalized education on student achievement and future perspectives. Personalized education refers to teaching methods tailored to the individual needs and learning paces of students, made more effective by the opportunities offered by AI. AI technologies transform educational processes such as adaptive learning systems, automated assessment and feedback, and learning analytics. The first section of the study addresses the fundamental concepts and history of personalized education, discussing the development of these approaches and the role of AI in education. The impacts of AI-powered personalized education on student achievement are emphasized, focusing on improving the learning process, increasing student motivation and engagement, and enhancing student performance. Additionally, ethical and social issues such as data privacy and security, equity and access problems, and the roles of teachers and students are examined in detail. This study provides examples of successful AI-powered personalized education practices, demonstrating how these technologies can be utilized in education and how they can enhance student achievement. The Future Perspectives and Trends section discusses the future of AI and personalized education and how technological advancements will shape innovations in education. In the conclusion, recommendations for educational policies and strategies and future research areas and studies are presented. Successfully and ethically integrating AI-powered personalized education will make education systems more efficient, effective, and equitable. This article comprehensively evaluates how AI technologies can be used in education and how their use can contribute to student achievement.

Keywords: AI-powered education, Future perspectives, Personalized learning, Student achievement

Citation: Yurt, E. (2024). -Powered Personalized Education: Impacts on Student Achievement and Future Perspectives. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 64-72), Chicago, IL, USA. ISTES.

Introduction

The use of artificial intelligence (AI) technologies in the field of education is leading to significant changes in teaching methods. Personalized education, in particular, offers opportunities for students to have learning experiences tailored to their individual needs, learning speeds, and areas of interest, thanks to the possibilities provided by AI (Chen et al., 2020). While the limited resources and uniform teaching methods of traditional education systems make it difficult for all students to achieve the same level of learning, AI-supported

personalized education aims to maximize each student's potential (Maghsudi et al., 2021). This article aims to address the impacts of AI-supported personalized education on student achievement and future perspectives in this field.

Personalized education refers to teaching methods specifically designed to meet the individual learning needs of students. This approach makes the educational process more effective by considering each student's learning speed, style, and level (Cakir et al., 2019; Ozturk, 2023; Zhang & Zhang, 2024). The integration of AI into education provides teachers and students with new tools and methods, making learning processes more dynamic and efficient. This article will thoroughly examine the basic concepts of AI-supported personalized education, the effects of this technology on student achievement, the ethical and social issues encountered, and the potential future developments in this area (Ibrahim et al., 2024).

Personalized Education: Basic Concepts and History

What is Personalized Education?

Personalized education refers to teaching methods tailored to the individual needs, learning speeds, and interests of students. This approach aims to maximize each student's potential by considering their unique learning styles and levels (Maghsudi et al., 2021; Saglam & Akman, 2023). In traditional education models, all students follow the same curriculum at the same pace, whereas in personalized education, a unique learning journey is created for each student. This increases students' motivation to learn and supports their academic success (Shoaib et al., 2024). Personalized education redefines the role of teachers, enhancing their capacity to provide guidance and support. Teachers can monitor students' individual progress, intervene when necessary, and offer more personalized feedback (Kaswan et al., 2024; Zmuda et al., 2015).

The Development of Personalized Education

Personalized education emerged as part of educational reform movements in the mid-20th century. Alternative education models such as Montessori and Waldorf were among the first to advocate focusing on students' individual learning needs, making significant strides in this area (Aljabreen, 2020; Watters, 2023). However, the widespread adoption of personalized education became possible with the development of digital technologies and especially AI.

In the 21st century, advances in educational technologies provide more sophisticated tools to track and support students' individual learning paths (Kujur et al., 2023). AI-based adaptive learning systems analyze students' learning processes in real-time, dynamically presenting appropriate content and learning materials. This has enabled the wider implementation of personalized education and fundamentally transformed students' learning experiences (Saaida, 2023).

Artificial Intelligence and Personalized Education

The Basic Principles of Artificial Intelligence

Artificial intelligence (AI) is a branch of technology that enables computers and machines to perform human-like intelligence functions. Comprising sub-disciplines such as machine learning, deep learning, and natural language processing, AI possesses the ability to learn and make decisions based on large datasets (Webb et al., 2023). In education, AI is used to analyze student performance, personalize learning materials, and optimize teaching processes. The basic principles of AI include data analytics, modeling, and predictive analysis. These technologies are used to analyze educational data, understand students' learning paths, and provide them with more effective learning experiences. AI offers innovative and effective approaches in education by developing solutions tailored to the needs of teachers and students (Miao et al., 2021).

Areas of Use of AI in Education

AI is utilized in various areas within education. These include personalized learning, automated assessment and feedback, and monitoring and analyzing student performance. AI-based adaptive learning systems dynamically adjust content according to students' learning styles and performance, providing a unique learning experience for each student (Zhang et al., 2020). Automated assessment systems enable fast and objective evaluation of exams and assignments (Colavizza et al., 2021). Learning analytics help identify potential problems and opportunities for success by analyzing students' learning processes. Additionally, AI reduces teachers' workloads, allowing them to devote more time to students and offer more personalized feedback (Iqbal, 2023).

The Effects of AI-Supported Personalized Education on Student Achievement

Improving the Learning Process

AI-supported personalized education makes the learning process more effective. Adaptive learning systems dynamically adjust content according to students' individual learning speeds and needs, ensuring active participation in the learning process (Lee & Lee, 2021). These systems identify students' strengths and weaknesses, presenting them with suitable learning materials and activities (van der Vorst & Jelicic, 2019). When students have the opportunity to learn at their own pace and level, their motivation to learn increases and their academic success rises. Moreover, AI-supported education continuously monitors and analyzes students' learning processes. These analyses provide valuable information to optimize the learning journey and intervene when necessary, making the learning process more efficient and effective (Maghsudi et al., 2021).

Student Motivation and Engagement

AI-supported personalized education enhances student motivation and engagement. Educational content tailored to students' individual interests and learning styles ensures greater participation in the learning process (Butcher

et al., 2020; Dimitriadou & Lanitis, 2023). AI-based adaptive learning systems allow students to focus on topics they are interested in and gain in-depth knowledge on these subjects (Arora & Arora, 2022). This motivates students to participate in the learning process more eagerly and enthusiastically. Additionally, AI-supported education provides instant feedback, enabling students to continuously monitor and evaluate their learning progress. Such feedback allows students to play a more active role in the learning process and control their own success (Ayeni et al., 2024).

Student Performance and Success Rates

AI-supported personalized education increases student performance and success rates. AI-based learning systems determine students' individual learning needs, offering suitable teaching strategies and materials (Hashim et al., 2022). This makes the learning process more effective and supports academic success. Furthermore, AI systems continuously monitor and analyze students' performance (Mir et al., 2023). These analyses help identify students' strengths and weaknesses and provide appropriate support. Students achieve higher success rates thanks to learning experiences tailored to their individual needs. AI-supported education aims to optimize student performance, maximizing their potential (Zhang et al., 2024).

Ethical and Social Issues in AI-Supported Education

Data Privacy and Security

The collection and analysis of student data in AI-supported education raises significant concerns about data privacy and security. Ensuring the protection and confidentiality of student data from unauthorized access requires the ethical use of AI in education (Selwyn, 2022). Technical measures such as data encryption, anonymization, and access control should be implemented to ensure data security. Additionally, educational institutions should be transparent in their data collection and usage processes, clearly indicating how student data is used. Establishing and regularly reviewing data privacy policies are essential steps to ensure data security. The ethical use of AI in education is possible through the secure management and protection of student data (Leimanis & Palkova, 2021).

Equity and Access Issues

Equity and access issues are also significant ethical concerns in AI-supported education (Jeyaraman et al., 2023; Walsh et al., 2022). Ensuring equal access to AI-based educational materials and technologies for all students is critical for achieving fairness in education (Schiff, 2022). However, in regions with insufficient technological infrastructure and digital resources, students may find it difficult to benefit from such educational opportunities. This can deepen the digital divide in education and increase inequalities (Slimi & Carballido, 2023). Addressing equity and access issues requires educational policies and strategies that address these concerns and take necessary measures. The fair and inclusive use of AI in education should ensure that all students have equal

opportunities (Yu et al., 2017).

The Role of Teachers and Students

The role of teachers and students in AI-supported education is also an important ethical and social issue. AI systems reduce teachers' workloads, allowing them to spend more time with students and provide more personalized feedback (Xiao & Yi, 2021). However, the use of these technologies requires redefining the roles and responsibilities of teachers. Teachers must possess the necessary knowledge and skills to effectively use AI systems. Additionally, it is important for students to adapt to AI-based learning systems and use these technologies effectively. Managing human and AI interaction in a balanced way ensures more comprehensive and effective outcomes in education (Ahmad et al., 2022).

Examples of AI-Supported Personalized Education Applications

Successful Application Examples

Successful application examples in AI-supported personalized education demonstrate the potential and impact of this technology. For instance, Khan Academy supports students' learning processes by offering personalized learning paths. Students can progress at their own pace and access additional materials and activities as needed. Similarly, DreamBox Learning uses AI-based adaptive learning systems in mathematics education, providing content tailored to students' individual learning needs. Such successful applications illustrate how AI-supported personalized education can be effective in enhancing student achievement and improving learning processes.

Application Areas and Techniques

Various application areas and techniques exist in AI-supported personalized education. Adaptive learning systems dynamically present content by analyzing students' performance. Automated assessment systems enable fast and objective evaluation of exams and assignments (Lee & Lee, 2021). Learning analytics help identify potential problems and opportunities for success by analyzing students' learning processes (Ibrahim et al., 2024). Additionally, AI-based virtual teachers and chatbots respond to students' questions, providing guidance and supporting their learning processes. These techniques and application areas allow for the broad use of AI-supported personalized education, enhancing student achievement (Kaswan et al., 2024).

Future Perspectives and Trends

The Future of AI and Personalized Education

AI and personalized education will become more prevalent in the future, transforming educational systems. The use of AI technologies to make learning processes more effective and efficient will continue to increase (Colavizza et al., 2021). Moreover, personalized education will be further developed, providing unique learning

experiences for each student. AI-based adaptive learning systems will continuously improve, enhancing students' learning experiences. Additionally, the role of teachers will evolve, emphasizing the importance of interaction and cooperation between humans and AI. These developments will contribute to the transformation of educational systems and increase students' success (Ibrahim et al., 2024).

Innovative Approaches and Technologies

Innovative approaches and technologies in AI-supported personalized education will significantly shape the future of education. For instance, virtual reality (VR) and augmented reality (AR) technologies will provide students with more immersive and interactive learning experiences. Furthermore, natural language processing and speech recognition technologies will allow students to interact more effectively with AI systems. These innovative approaches and technologies will enhance students' learning processes, making education more dynamic and effective. Future developments will lead to new opportunities in education, further increasing student achievement and potential (Miao et al., 2021; Zhang & Aslan, 2021).

Conclusion and Recommendations

Education Policies and Strategies

For the successful implementation of AI-supported personalized education, education policies and strategies must support these technologies. To ensure the ethical and fair use of AI in education, necessary measures must be taken concerning data privacy, equity, and access. Additionally, teachers and students must be provided with the necessary training and support to effectively use AI-based systems. Education policies should encourage the use of AI in education, aiming to enhance student achievement and engagement. Such policies and strategies will ensure the widespread and effective implementation of AI-supported personalized education.

Future Research Areas and Suggestions

Future research areas should focus on more detailed examination and evaluation of the impact of AI-supported personalized education. Research should investigate the effects of these technologies on students' learning processes, performance, and motivation, offering recommendations for more effective use of AI-based systems. Additionally, studies on the ethical and social issues of AI-supported education should provide guidance for the development of necessary measures and policies. Future research will contribute to a better understanding of the role of AI in education and offer more effective solutions to improve student achievement and engagement.

References

Ahmad, S. F., Alam, M. M., Rahmat, M. K., Mubarik, M. S., & Hyder, S. I. (2022). Academic and administrative role of artificial intelligence in education. *Sustainability*, *14*(3), 1101.

https://doi.org/10.3390/su14031101

Aljabreen, H. (2020). Montessori, Waldorf, and Reggio Emilia: A comparative analysis of alternative models of early childhood education. *International Journal of Early Childhood*, *52*(3), 337-353. https://doi.org/10.1007/s13158-020-00277-1

Arora, A., & Arora, A. (2022). Generative adversarial networks and synthetic patient data: current challenges and future perspectives. *Future Healthcare Journal*, *9*(2), 190-193. https://doi.org/10.7861/fhj.2022-0013

Ayeni, O. O., Al Hamad, N. M., Chisom, O. N., Osawaru, B., & Adewusi, O. E. (2024). AI in education: A review of personalized learning and educational technology. *GSC Advanced Research and Reviews*, *18*(2), 261-271. https://doi.org/10.30574/gscarr.2024.18.2.0062

Butcher, T., Read, M. F., Jensen, A. E., Morel, G. M., Nagurney, A., & Smith, P. A. (2020). Using an AI-supported online discussion forum to deepen learning. In *Handbook of research on online discussion-based teaching methods* (pp. 380-408). IGI Global.

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.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *Ieee Access*, *8*, 75264-75278. https://doi.org/10.1109/ACCESS.2020.2988510

Colavizza, G., Blanke, T., Jeurgens, C., & Noordegraaf, J. (2021). Archives and AI: An overview of current debates and future perspectives. *ACM Journal on Computing and Cultural Heritage (JOCCH)*, *15*(1), 1-15. https://doi.org/10.1145/347901

Dimitriadou, E., & Lanitis, A. (2023). A critical evaluation, challenges, and future perspectives of using artificial intelligence and emerging technologies in smart classrooms. *Smart Learning Environments*, *10*(1), 12. https://doi.org/10.1186/s40561-023-00231-3

Hashim, S., Omar, M. K., Ab Jalil, H., & Sharef, N. M. (2022). Trends on technologies and artificial intelligence in education for personalized learning: systematic literature. *Journal of Academic Research in Progressive Education and Development*, *12*(1), 884-903. https://doi.org/10.6007/IJARPED/v11-i1/12230

Ibrahim, A. W., Taura, A. A., Iliyasu, A., Shogbesan, Y. O., & Lukman, S. A. (2024). Artificial intelligence (AI): Perception and utilization of AI technologies in educational assessment in Nigerian universities. *Edukasiana: Jurnal Inovasi Pendidikan*, *3*(3), 367-380. https://doi.org/10.56916/ejip.v3i3.763

Iqbal, M. (2023). AI in education: Personalized learning and adaptive assessment. *Cosmic Bulletin of Business Management*, *2*(1), 280-297.

Jeyaraman, M., Ramasubramanian, S., Balaji, S., Jeyaraman, N., Nallakumarasamy, A., & Sharma, S. (2023). ChatGPT in action: Harnessing artificial intelligence potential and addressing ethical challenges in medicine, education, and scientific research. *World Journal of Methodology*, *13*(4), 170-178. https://doi.org/10.5662/wjm.v13.i4.170

Kaswan, K. S., Dhatterwal, J. S., & Ojha, R. P. (2024). AI in personalized learning. In *Advances in Technological Innovations in Higher Education* (pp. 103-117). CRC Press.

Kujur, A. G. P., Tiwari, R. K., & Panday, V. (2023, April). Student performance monitoring system using artificial intelligence models. In *International Conference on Recent Trends in Artificial Intelligence and IoT* (pp. 3-18). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-37303-9_1

Lee, H. S., & Lee, J. (2021). Applying artificial intelligence in physical education and future perspectives. *Sustainability*, *13*(1), 1-16. https://doi.org/doi.org/10.3390/su13010351

Leimanis, A., & Palkova, K. (2021). Ethical guidelines for artificial intelligence in healthcare from the sustainable development perspective. *European Journal of Sustainable Development*, *10*(1), 90-90. https://doi.org/10.14207/ejsd.2021.v10n1p90

Maghsudi, S., Lan, A., Xu, J., & van Der Schaar, M. (2021). Personalized education in the artificial intelligence era: what to expect next. *IEEE Signal Processing Magazine*, *38*(3), 37-50. https://doi.org/10.1109/MSP.2021.3055032

Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). *AI and education: A guidance for policymakers*. Unesco Publishing.

Mir, M. M., Mir, G. M., Raina, N. T., Mir, S. M., Mir, S. M., Miskeen, E., ... & Alamri, M. M. S. (2023). Application of artificial intelligence in medical education: current scenario and future perspectives. *Journal of Advances in Medical Education & Professionalism*, *11*(3), 133-140. https://doi.org/10.30476/JAMP.2023.98655.1803

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

Saaida, M. B. (2023). AI-Driven transformations in higher education: Opportunities and challenges. *International Journal of Educational Research and Studies*, *5*(1), 29-36.

Saglam, M. & Akman, O. (2023). Social Studies Teachers' Views on the Turkish Education System: Current Problems and Suggested Solutions. *International Journal of Research in Education and Science (IJRES), 9*(2), 407-427. https://doi.org/10.46328/ijres.3153

Schiff, D. (2022). Education for AI, not AI for education: The role of education and ethics in national AI policy strategies. *International Journal of Artificial Intelligence in Education*, *32*(3), 527-563. https://doi.org/10.1007/s40593-021-00270-2

Selwyn, N. (2022). The future of AI and education: Some cautionary notes. *European Journal of Education*, *57*(4), 620-631. https://doi.org/10.1111/ejed.12532

Shoaib, M., Sayed, N., Singh, J., Shafi, J., Khan, S., & Ali, F. (2024). AI student success predictor: Enhancing personalized learning in campus management systems. *Computers in Human Behavior*, *158*, 108301. https://doi.org/10.1016/j.chb.2024.108301

Slimi, Z., & Carballido, B. V. (2023). Navigating the ethical challenges of artificial intelligence in higher education: An analysis of seven global AI ethics policies. *TEM Journal*, *12*(2), 590-602. https://doi.org/10.18421/TEM122 31TU -02

van der Vorst, T., & Jelicic, N. (2019). Artificial intelligence in education: Can AI bring the full potential of personalized learning to education? In *30th European regional ITS conference, Helsinki 2019 205222*. International Telecommunications Society (ITS).

Walsh, B., Dalton, B., Forsyth, S., Haberl, E., Smilack, J., Yeh, T., ... & Sengupta-Irving, T. (2022). Aspiring for equity: Perspectives from design of AI education. In *Proceedings of the 16th International Conference of the Learning Sciences-ICLS 2022, pp. 1771-1778*. International Society of the Learning Sciences. https://dx.doi.org/10.22318/icls2022.1771

Watters, A. (2023). *Teaching machines: The history of personalized learning*. mit Press.

Webb, C., Luckin, R., & Ecoff, E. (2023). Ethical principles for the development and application of artificial intelligence in K-12 education. In *International Handbook on Education Development in Asia-Pacific* (pp. 1-19). Singapore: Springer Nature Singapore.

Xiao, M., & Yi, H. (2021). Building an efficient artificial intelligence model for personalized training in colleges and universities. *Computer Applications in Engineering Education*, *29*(2), 350-358. https://doi.org/10.1002/cae.22235

Yu, H., Miao, C., Leung, C., & White, T. J. (2017). Towards AI-powered personalization in MOOC learning. *npj Science of Learning*, *2*(15), 1-5. https://doi.org/10.1038/s41539-017-0016-3

Zhang, J., & Zhang, Z. (2024). AI in teacher education: Unlocking new dimensions in teaching support, inclusive learning, and digital literacy. *Journal of Computer Assisted Learning*. https://doi.org/10.1111/jcal.12988

Zhang, K., & Aslan, A. B. (2021). AI technologies for education: Recent research & future directions. *Computers and Education: Artificial Intelligence*, *2*, 100025. https://doi.org/10.1016/j.caeai.2021.100025

Zhang, L., Basham, J. D., & Yang, S. (2020). Understanding the implementation of personalized learning: A research synthesis. *Educational research review*, *31*, 100339. https://doi.org/10.1016/j.edurev.2020.100339

Zmuda, A., Curtis, G., & Ullman, D. (2015). *Learning personalized: The evolution of the contemporary classroom*. John Wiley & Sons.

AI Applications in Education: Ethical Issues and Proposed Solutions

Eyüp Yurt

Bursa Uludağ University, Türkiye, https://orcid.org/0000-0003-4732-6879

Abstract: This study addresses the opportunities presented by AI applications in education and the ethical issues brought about by this technology. AI in education holds excellent potential in personalized learning, automated assessment and feedback, and monitoring and analyzing student performance. However, using these technologies also raises ethical concerns, including data privacy and security, fairness and impartiality, transparency and accountability, and the diminishing role of the human factor. The present study thoroughly examines the role of AI in education and the opportunities it offers while providing solutions to the ethical issues that arise in this context. The primary proposed solutions include implementing robust protection measures to ensure data privacy and security, developing fair and impartial algorithms, adopting transparency policies, and promoting human-AI collaboration. Finally, this study offers perspectives on the future of AI in education and emphasizes the importance of using this technology responsibly through continuous ethical evaluation and improvement processes. Successfully and ethically integrating AI applications in education will make education systems more efficient, effective, and equitable.

Keywords: AI applications, Education, Ethical issues, Solutions

Citation: Yurt, E. (2024). AI Applications in Education: Ethical Issues and Proposed Solutions. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 73-80), Chicago, IL, USA. ISTES.

Introduction

The applications of artificial intelligence (AI) in education have rapidly developed in recent years, transforming educational systems significantly. AI, with its potential to make learning processes more efficient, effective, and personalized, provides solutions that cater to the needs of both teachers and students (Chen, Chen, & Lin, 2020). However, the widespread use of this technology has also raised various ethical issues and concerns (Remian, 2019). The increasing interest in using AI technologies in education has sparked ethical debates encompassing data privacy, impartiality, transparency, and the reduction of the human factor (Panagopoulou, Parpoula, & Karpouzis, 2023). This article will address the opportunities presented by AI applications in education and the ethical issues brought about by this technology, offering solutions to these problems. Aiming to provide a comprehensive perspective on the ethical use of AI in education, this study seeks to develop strategies for the responsible and fair integration of this technology (Schiff, 2022).

Artificial Intelligence and Education: Fundamental Concepts

What is Artificial Intelligence?

Artificial intelligence (AI) is a technology that enables computers and machines to acquire the abilities to think, learn, make decisions, and solve problems like humans (McCarthy, 2007). AI is often associated with sub-disciplines such as machine learning, deep learning, and natural language processing. In the field of education, AI is used to enhance teaching and learning processes, reduce teachers' workloads, and offer more personalized learning experiences for students (Hwang et al., 2020). AI technologies, through tools like big data analytics, automated assessment systems, and learning analytics, make educational systems more efficient and effective (Pedro et al., 2019).

Applications of Artificial Intelligence in Education

AI is used in many different areas within education. Some of these areas include monitoring student performance, personalizing learning materials, providing automatic feedback, and predicting student success (Cao et al., 2020). For example, adaptive learning systems offer content tailored to students' individual needs and learning speeds, making the learning process more effective (Alam, 2023). Additionally, automated assessment systems enable quick and objective evaluation of exams and assignments, reducing teachers' workloads (Chen, Chen, & Lin, 2020). Learning analytics helps analyze students' learning processes, identifying potential problems and opportunities for success (Ahmad et al., 2022).

The Role of AI Applications in Education

Personalized Learning

Personalized learning refers to educational methods designed according to students' individual needs, interests, and learning speeds. AI has great potential in this area (Slimi & Carballido, 2023). Adaptive learning systems dynamically adjust content based on students' learning styles and performance, offering a unique learning experience for each student (González-Calatayud, Prendes-Espinosa, & Roig-Vila, 2021). These systems analyze student data to determine which topics need more study and guide students accordingly. Thus, students have the opportunity to learn at their own pace and level. Personalized learning increases student motivation, supports success, and makes the learning process more effective (Alam, 2023).

Automated Assessment and Feedback

Automated assessment systems enable quick and objective evaluation of exams, assignments, and other assessment tools (Bulut et al., 2024). These systems provide continuous feedback by evaluating students' performance instantly, contributing to the learning process (Hwang et al., 2020). For example, AI-based systems that detect language and composition errors in written exams provide instant feedback to students, helping them

improve their writing skills (Fang, Roscoe, & McNamara, 2023). These systems reduce teachers' workloads and save them time (Jeyaraman et al., 2023). Simultaneously, they allow the development of personalized teaching strategies by identifying areas where students need more support in their learning processes (Sidiropoulos & Anagnostopoulos, 2024).

Monitoring and Analyzing Student Performance

Monitoring and analyzing student performance is one of the most critical application areas of AI in education (Webb et al., 2023). Learning analytics and big data analytics enable a detailed analysis of students' learning processes and performance (Bogina et al., 2022). These analyses provide information about student behaviors, participation levels, success rates, and other learning indicators (Ibrahim et al., 2024).

Student data helps teachers and educational administrators identify students' strengths and weaknesses and intervene accordingly (Cakir et al., 2018; Eski & Akman, 2023; Hwang et al., 2020; Ozturk, 2023). Additionally, these analyses allow for the prediction of student successes, enabling the development of early intervention programs (Kujur, Tiwari, & Panday, 2023). Thus, students' educational processes become more efficient and effective (Chen et al., 2020).

Ethical Issues in the Use of Artificial Intelligence in Education

Data Privacy and Security

AI applications in education require the collection and analysis of large amounts of student data, leading to serious concerns about data privacy and security (Sidiropoulos & Anagnostopoulos, 2024). Unauthorized access, misuse, or leakage of student data can jeopardize students' privacy (Tang & Su, 2024). Furthermore, a lack of transparency regarding how student data is collected, stored, and used can cause trust issues (Airaj, 2024). Educational institutions must take strong security measures to protect student data. Creating data privacy policies, limiting data access permissions, and implementing data security standards can help mitigate these risks (Diaz-Asper et al., 2024).

Impartiality and Fairness

Designing and using AI systems in accordance with the principles of impartiality and fairness is crucial in education (Alshammari et al., 2022). However, biases in the datasets used to train AI algorithms can result in systems that are not impartial and fair (Leimanis & Palkova, 2021). For instance, discrimination against specific demographic groups or biased evaluations can harm the principle of equality in education (Panagopoulou, Parpoula, & Karpouzis, 2023). Ensuring AI systems are impartial and fair requires regular review and testing of algorithms (Kiemde & Kora, 2022). Additionally, using diverse and inclusive datasets can help reduce biases. Adopting ethical principles and standards is essential to ensure the fair and equitable use of AI applications in education (Remian, 2019).

Transparency and Accountability

The transparency and accountability of AI systems are critical for ensuring users' trust in these systems (Diaz-Asper et al., 2024). Students, teachers, and other stakeholders may want to know how AI systems work and how decisions are made (Schiff, 2022). However, many AI systems, due to their complex and opaque nature, may fall short in providing such information (Slimi & Carballido, 2023). A lack of transparency can lead to misunderstandings and mistrust (Bulut et al., 2024). Ensuring the transparency of AI applications in education requires providing clear and understandable information about how these systems work (Diaz-Asper et al., 2024). Furthermore, establishing accountability mechanisms can encourage the responsible use of AI systems (Jeyaraman et al., 2023). Increasing the reliability and acceptability of AI in education can be achieved through such transparency and accountability measures (Fang, Roscoe, & McNamara, 2023).

Reduction of the Human Factor

AI applications have the potential to reduce the human factor in educational processes (Slimi & Carballido, 2023). The diminishing role of teachers or the replacement of human interactions with AI systems may question the importance of the human factor in education (Kiemde & Kora, 2022). Education involves not only the transfer of information but also the development of emotional and social skills (Sidiropoulos & Anagnostopoulos, 2024). Human teachers play a crucial role in understanding and guiding students' emotional needs (Webb, Luckin, & Ecoff, 2023).

AI systems may not fully replicate these emotional and social interactions (Hwang et al., 2020). To preserve and support the importance of the human factor in education, it is essential to use AI applications in collaboration with human teachers (Bogina et al., 2022). Balancing human and AI interaction can result in more comprehensive and effective educational outcomes (Panagopoulou, Parpoula, & Karpouzis, 2023).

Proposed Solutions to Ethical Issues

Strong Data Protection Measures

Ensuring the ethical use of AI applications in education requires taking robust protection measures concerning data privacy and security (Diaz-Asper et al., 2024). Technical measures such as data encryption, anonymization, and access control should be implemented to protect student data from unauthorized access (Sidiropoulos & Anagnostopoulos, 2024). Additionally, educational institutions must be transparent about data collection and usage processes, clearly stating how student data will be used (Airaj, 2024). Creating and regularly reviewing data privacy policies are crucial steps to ensure data security (Diaz-Asper et al., 2024). The ethical use of AI in education is only possible with the secure management and protection of student data (Slimi & Carballido, 2023).

Fair and Impartial Algorithms

To ensure AI systems are fair and impartial, algorithms must be trained with diverse and inclusive datasets (Kiemde & Kora, 2022). Identifying and eliminating biases in datasets enhances the impartiality of AI systems (Leimanis & Palkova, 2021). Regularly testing and evaluating algorithm performance ensures fair and accurate results (Panagopoulou, Parpoula, & Karpouzis, 2023). Furthermore, analyzing the impact of AI systems on users and identifying potential discrimination cases is essential (Remian, 2019). To ensure the fair and equitable use of AI applications in education, it is crucial to adopt and implement ethical principles and standards (Schiff, 2022). Algorithm transparency and accountability also contribute to supporting fair and impartial AI applications (Diaz-Asper et al., 2024).

Transparency Policies

The transparency of AI applications enhances users' trust in these systems (Slimi & Carballido, 2023). Providing clear and understandable information about how AI works helps users better understand these systems (Bulut et al., 2024). Creating and implementing transparency policies involves explaining the operating principles and decision-making processes of AI systems (Schiff, 2022). Additionally, establishing accountability mechanisms promotes the responsible use of AI systems (Jeyaraman et al., 2023). Ensuring the transparency and accountability of AI in education helps achieve its ethical use and gain users' trust (Diaz-Asper et al., 2024). Such measures make AI applications more acceptable and effective in education (Fang, Roscoe, & McNamara, 2023).

Supporting Human-AI Collaboration

It is crucial that AI applications in education do not completely eliminate the human factor but rather support human-AI collaboration (Webb, Luckin, & Ecoff, 2023). Designing and implementing AI systems to assist teachers and other educational professionals can make educational processes more effective (Bogina et al., 2022). Human teachers play an essential role in understanding and guiding students' emotional and social needs (Sidiropoulos & Anagnostopoulos, 2024). While AI can assist in these processes, it cannot fully replace human interaction (Hwang et al., 2020). Therefore, integrating and supporting AI applications to work in conjunction with human teachers is vital (Panagopoulou, Parpoula, & Karpouzis, 2023). Collaboration between humans and AI in education contributes to creating more comprehensive and effective learning experiences (Slimi & Carballido, 2023).

Conclusion and Future Perspectives

The Future of Artificial Intelligence and Education

AI applications in education will become more widespread and advanced in the future. The continuous progress of AI technologies will make educational systems more efficient, effective, and personalized. In the future, AI's

role in education will improve learning processes by providing solutions that better cater to the needs of teachers and students. However, it is crucial not to overlook the ethical dimension of these developments. Adopting ethical principles and standards is necessary to use AI responsibly and fairly in education. Continuously evaluating and improving the impacts of AI in education in the future will ensure the responsible use of this technology.

Continuous Ethical Evaluation and Improvement

The ethical use of AI applications in education is a process that requires continuous evaluation and improvement. The rapid development of AI technologies may give rise to new ethical issues. Therefore, it is essential for educational institutions and policymakers to regularly review AI applications and conduct ethical evaluations. Identifying ethical issues and developing solutions will ensure the fair and responsible use of AI in education. Additionally, continuous ethical evaluations and improvements will optimize the impacts of AI applications in education and increase users' trust. Successfully and ethically integrating AI in education will be possible through such continuous evaluation and improvement processes.

References

Ahmad, S. F., Alam, M. M., Rahmat, M. K., Mubarik, M. S., & Hyder, S. I. (2022). Academic and administrative role of artificial intelligence in education. *Sustainability*, *14*(3), 1101. https://doi.org/10.3390/su14031101

Airaj, M. (2024). Ethical artificial intelligence for teaching-learning in higher education. *Education and Information Technologies*, 1-23. https://doi.org/10.1007/s10639-024-12545-x

Alam, A. (2023). Harnessing the power of AI to create intelligent tutoring systems for enhanced classroom experience and improved learning outcomes. In *intelligent communication technologies and virtual mobile networks* (pp. 571-591). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-99-1767-9_42

Alshammari, R. F. N., Arshad, H., Abd Rahman, A. H., & Albahri, O. S. (2022). Robotics utilization in automatic vision-based assessment systems from artificial intelligence perspective: A systematic review. *IEEE Access*, *10*, 77537-77570.

Bogina, V., Hartman, A., Kuflik, T., & Shulner-Tal, A. (2022). Educating software and AI stakeholders about algorithmic fairness, accountability, transparency and ethics. *International Journal of Artificial Intelligence in Education*, 1-26. https://doi.org/10.1007/S40593-021-00248-0

Bulut, O., Beiting-Parrish, M., Casabianca, J. M., Slater, S. C., Jiao, H., Song, D., ... & Morilova, P. (2024). The rise of artificial intelligence in educational measurement: opportunities and ethical challenges. *arXiv preprint arXiv:2406.18900*. https://doi.org/10.48550/arXiv.2406.18900

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.

Cao, W., Wang, Q., Sbeih, A., & Shibly, F. H. A. (2020). Artificial intelligence based efficient smart learning framework for education platform. *Inteligencia Artificial*, *23*(66), 112-123. https://doi.org/10.4114/intartif.vol23iss66pp112-123

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

Diaz-Asper, C., Hauglid, M. K., Chandler, C., Cohen, A. S., Foltz, P. W., & Elvevåg, B. (2024). A framework for language technologies in behavioral research and clinical applications: Ethical challenges, implications, and solutions. *American Psychologist*, *79*(1), 79–91. https://doi.org/10.1037/amp0001195

Eski, H. E. & Akman, O. (2023). Development of Museum Education Activities for Social Studies Course and Evaluation of their Effects on Students' Academic Achievement. *International Journal on Social and Education Sciences (IJonSES)*, *5*(2), 341-353. https://doi.org/10.46328/ijonses.555

Fang, Y., Roscoe, R. D., & McNamara, D. S. (2023). Artificial intelligence-based assessment in education. In *Handbook of artificial intelligence in education* (pp. 485-504). Edward Elgar Publishing. https://doi.org/10.4337/9781800375413.00033

González-Calatayud, V., Prendes-Espinosa, P., & Roig-Vila, R. (2021). Artificial intelligence for student assessment: A systematic review. *Applied sciences*, *11*(12), 5467. https://doi.org/10.3390/app11125467

Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles and research issues of Artificial Intelligence in Education. *Computers and Education: Artificial Intelligence*, *1*, 100001. https://doi.org/10.1016/j.caeai.2020.100001

Ibrahim, A. W., Taura, A. A., Iliyasu, A., Shogbesan, Y. O., & Lukman, S. A. (2024). Artificial intelligence (AI): Perception and utilization of AI technologies in educational assessment in Nigerian universities. *Edukasiana: Jurnal Inovasi Pendidikan*, *3*(3), 367-380. https://doi.org/10.56916/ejip.v3i3.763

Jeyaraman, M., Ramasubramanian, S., Balaji, S., Jeyaraman, N., Nallakumarasamy, A., & Sharma, S. (2023). ChatGPT in action: Harnessing artificial intelligence potential and addressing ethical challenges in medicine, education, and scientific research. *World Journal of Methodology*, *13*(4), 170-178. https://doi.org/10.5662/wjm.v13.i4.170

Kiemde, S. M. A., & Kora, A. D. (2022). Towards an ethics of AI in Africa: rule of education. *AI and Ethics*, *2*(1), 35-40. https://doi.org/10.1007/s43681-021-00106-8

Kujur, A. G. P., Tiwari, R. K., & Panday, V. (2023, April). Student performance monitoring system using artificial intelligence models. In *International Conference on Recent Trends in Artificial Intelligence and IoT* (pp. 3-18). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-37303-9_1

Leimanis, A., & Palkova, K. (2021). Ethical guidelines for artificial intelligence in healthcare from the sustainable development perspective. *European Journal of Sustainable Development*, *10*(1), 90-90. https://doi.org/10.14207/ejsd.2021.v10n1p90

McCarthy, J. (2007). What is artificial intelligence. Available from http://jmc.stanford.edu/artificial-intelligence/what-is-ai/index.html Accessed 05.07.2024.

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

Panagopoulou, F., Parpoula, C., & Karpouzis, K. (2023). Legal and ethical considerations regarding the use of ChatGPT in education. *arXiv preprint arXiv:2306.10037*. https://doi.org/10.48550/arXiv.2306.10037

Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development. https://hdl.handle.net/20.500.12799/6533

Remian, D. (2019). Augmenting education: ethical considerations for incorporating artificial intelligence in education (Unpublished master's thesis). University of Massachusetts, Boston.

Schiff, D. (2022). Education for AI, not AI for education: The role of education and ethics in national AI policy strategies. *International Journal of Artificial Intelligence in Education*, *32*(3), 527-563. https://doi.org/10.1007/s40593-021-00270-2

Sidiropoulos, D., & Anagnostopoulos, C. N. (2024). Applications, challenges and ethical issues of AI and ChatGPT in education. *arXiv preprint arXiv:2402.07907*. https://doi.org/10.48550/arXiv.2402.07907

Slimi, Z., & Carballido, B. V. (2023). Navigating the ethical challenges of artificial intelligence in higher education: An analysis of seven global AI ethics policies. *TEM Journal*, *12*(2), 590-602. https://doi.org/10.18421/TEM122 31TU -02

Tang, L., & Su, Y. S. (2024). Ethical implications and principles of using artificial intelligence models in the classroom: A systematic literature review. *Revista IJIMAI, 8*(5), 25-36. https://doi.org/10.9781/ijimai.2024.02.010

Ungerer, L., & Slade, S. (2022). Ethical considerations of artificial intelligence in learning analytics in distance education contexts. In *Learning analytics in open and distributed learning: Potential and challenges* (pp. 105-120). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-19-0786-9_8

Uunona, G. N., & Goosen, L. (2023). Leveraging ethical standards in artificial intelligence technologies: A guideline for responsible teaching and learning applications. In *Handbook of research on instructional technologies in health education and allied disciplines* (pp. 310-330). IGI Global.

Webb, C., Luckin, R., & Ecoff, E. (2023). Ethical principles for the development and application of artificial intelligence in K-12 education. In *International Handbook on Education Development in Asia-Pacific* (pp. 1-19). Singapore: Springer Nature Singapore.

Pedagogy Of Oscillation in Physics Using Control Theory Eigenvalue Stability with Extension to Oscillation Without Physics in Post-COVID Era

Sunil Dehipawala

City University of New York Queensborough Community College Physics Department, USA

Kelvin Yao

City University of New York Queensborough Community College Physics Department, USA

Todd Holden

City University of New York Queensborough Community College Physics Department, USA

Tak Cheung

City University of New York Queensborough Community College Physics Department, USA

Abstract: The damped harmonic oscillator physics problem is a standard oscillation problem in calculus physics for pre-engineering students in a community college. The use of alternative linear algebra eigenvalue stability method is consistent with the upper engineering courses using control theory. The external force and friction damping would become the control and feedback respectively in control theory. The objective of quantifying stability has wide applications from Lego to Arduino driven educational robotic systems in mechanical engineering student projects. The IllustrisTNG galaxy simulation data and the Skynet Robotic Telescope Network Supernova data are also open-source data for student projects taking on the stability studies. The equity of authentic experience in the outcome of each student would require differential-unequal input conditions across the cohort of students every year. An extension to oscillation without physics is mathematically justified when the studied system could be represented as two coupled linear first order differential equations. All the teaching contents were extracted from the open sources posted on the websites of leading university professors and professionals. The eigenvalue pedagogy is also ready for the online delivery of student skill learning projects in the post-COVID era, given a community college setting. The assessment has been conducted with the what-if critical thinking perspective. The sustainability of the eigenvalue pedagogy in community college student skill learning projects in the post-COVID era is discussed, together with this transfer-enhancement pedagogy. Recommendations are presented.

Keywords: Eigenvalue stability, Oscillation, Engineering experience, Transfer-enhancement pedagogy

Citation: Dehipawala, S., Yao, K., Holden, T. & Cheung, T. (2024). Pedagogy of oscillation in physics using control theory eigenvalue stability with extension to oscillation without physics in post-COVID era. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 81-92), Chicago, IL, USA. ISTES.

Introduction

Queensborough Community College (QCC) has Engineering Technology and Physics Departments. Two of the difficult questions from students have been "What is engineering?" and "What is the job opportunity?" We in the Physics Department have been developing a pedagogy to show "What is engineering?" given a limited budget and a requirement of online-ready in the post-COVID era. High school science teachers could fast forward to the Recommendation section to determine the applicability of the reported pedagogy in their high schools.

The solving of two simultaneous linear equations in high school algebra can be extended into the solving of the 2-coupled first order linear differential equations in the damped harmonic oscillator physics problem, which is a standard oscillation problem in calculus physics for pe-engineering students in a community college. The alternative linear algebra eigenvalue stability method is consistent with the upper engineering courses using control theory. The external force and friction damping would become the control and feedback respectively in control theory. The pedagogy of using the control theory notations in the standard damped harmonic oscillator problem would provide a seamless transition for pre-engineering students and a better understanding of the requirement of linear algebra in the transfers to senior colleges, a pedagogy for transfer enhancement.

The objective of quantifying stability has wide applications from Lego to Arduino driven educational robotic systems in mechanical engineering student projects. The stability of circuit is also a worthy education objective in electrical engineering student projects, although less obvious when compared to other objectives in circuit projects, notwithstanding the energy grid stability study project s during space weather events. The IllustrisTNG galaxy simulation data (IllustrisTNG, 2024) and the Skynet Robotic Telescope Network Supernova data (Skynet, 2024) are also open-source data for student projects taking on the stability studies. In fact, some of the TNG mocked images from simulation have been used in classrooms (Mihos, 2023).

The equity of authentic experience in the outcome of each student would require differential-unequal input conditions across the cohort of students each year. The math derivation ability of the student cohort was observed to be a steady decline over the years. The steeper decline of math derivation ability from the 2020 Lockdown was alleviated partially by using AI as a tool. The computer assisted linear algebra computation from Excel to Matlab was found to be invaluable to achieve equity in the authentic experience outcome given the diversity of students in a community college, from motivated high school students in our Outreach mission to open admission high school graduates in our degree programs across the STEM curricula. A systematic pedagogy has been developed with two steps. (1) A game of finding the hidden two numbers when the sum and product are given at the third-grade level, (2) An exercise to find the trace and determinant values of a companion matrix in the stability study of a damped harmonic oscillator at the college level. The eigenvalue pedagogy would satisfy three authentic experiences. (1) The applied math experience in the engineering experience pedagogy, (2) the engineering technology experience in assembling/building using components, (3)

the engineering science experience in the what-if critical thinking skill when the objective of a study is on an engineering parameter with its functionality.

The eigenvalue pedagogy can serve as a complementary component in all the hands-on student projects based on engineering (Level Two classification in the Method Section). An extension to oscillation without physics is mathematically justified when the studied system could be represented as two coupled linear first order differential equations (Level Three classification in the Method Section).

All the teaching contents were extracted from the open sources posted on the websites of leading university professors and professionals. The eigenvalue pedagogy is also ready for the online delivery of student skill learning projects in the post-COVID era, given a community college setting.

Method

There are three levels in the learning of stability. The first level is based on a quick start of the learning of the matrix notations in control theory, based on first semester physics. The second level is the application of the eigenvalue stability method. The third level is to be informed that there are oscillations without physics. These three levels complete the learning objectives of a community college student project, from an undergraduate research project to a skill-learning high school project.

The YouTube materials from leading institutions are becoming mainstream in the post-COVID era under the supervision of professors in an open-admission community college, in our case the Queensborough Community College (QCC) in New York City. The YouTube videos by the top professionals are guaranteed to be videos of high authenticity. Together with the explanation an instructor, topics such as aerospace engineering, with 8% job growth rate according to the US Bureau of Lab Statistics 2022-3032, would be beneficial to students interested in jobs with higher growth rate.

The high school students in our Outreach mission could be taught at Level 1, the QCC engineering technology could be at Levels 1 and 2, and the Tristate CT-NJ-NY selected students in our NSF-REU program at QCC could be using all three levels. Practical stability issues encountered in QCC projects such as CubeSAT, NACA airfoil, telescope mount, etc. would include stability study. For physics projects using IllustrisTNG galaxy simulation data and the Skynet Robotic Telescope Network Supernova data, the stability studies have been limited to software simulations without the understanding of the mechanism captured by the related partial differential equations taught at senior colleges. Therefore, the understanding of stability in control theory will ensure a minimum scholarship in a stability study in applied physics.

Control Theory State Space Representation using Matrix Notation (Level One)

The topic of a damped harmonic motion is standard in Physics One Mechanics. The standard differential

equation is displayed with usual variables, the symbol □(t) represents the position, the symbol □ represents the torque coming from mg*sin(□(t)) component, and c represents the coefficient of the damping torque at the anchor. A diagrammatic illustration of using the perspective of the control theory approach is shown in Figure 1. The diagrammatic drawing was adapted, with a different damping coefficient of 0.25, from the YouTube video put up by Dr Christopher Lum of the University of Washington (Lum 2018). The friction term is modeled as a feedback mechanism, while the external torque □(t) is modeled as a control variable. The control theory block diagram serves as an input example in the Matlab/Simulink solution, demonstrated by Lum.

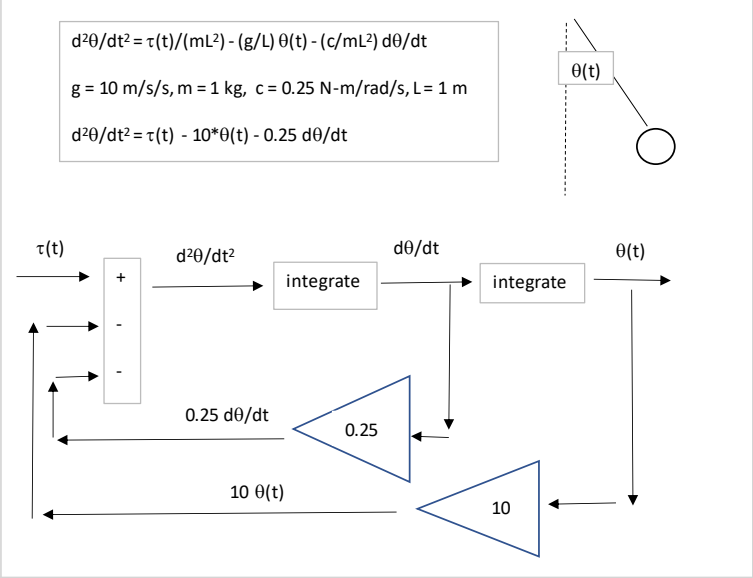


Figure 1. A Diagram Showing the Control Theory Perspective of a Pendulum With Damping.

The State Space linear algebra approach was also illustrated in the Lum's video. A summary is shown in Figure 2. The associated block diagram for Simulink simulation is shown in Figure 3.

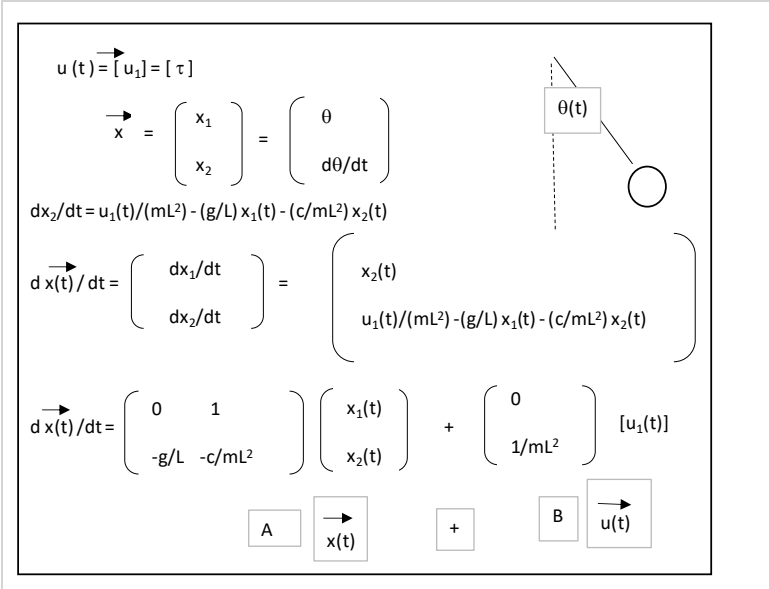


Figure 2. A Diagram Showing the State Space Model of a Pendulum with Damping.

Basically, the second order differential equation model, a popular physics approach, is transformed into two first order differential equations represented by matrix notation, a popular control theory approach. The above representation is our Excel summary version of the matrix content of the Lum's video, for illustration to our students.

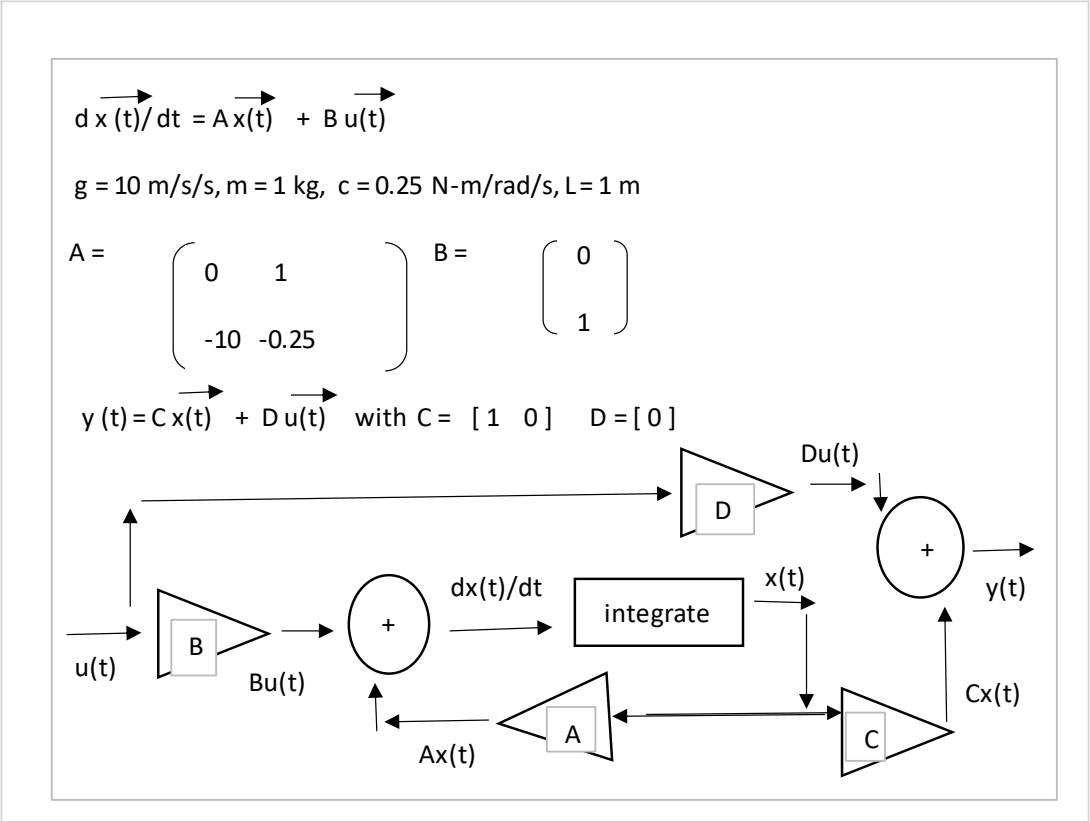


Figure 3. A Diagram Showing the State Space Block Diagram Model of a Pendulum with Damping for Simulink Simulaton, Variables Are from Figure 2.

Application of the eigenvalue stability method (Level Two)

The Linear Algebra course is usually taken by students after Calculus One for introduction, Calculus Two for infinite series, and Calculus Three for vectors and Calculus Four for differential equations. The eigenvalue stability pedagogy was based on the YouTube video of Professor Gilbert Strang of MIT using the 2 by 2 matrix example (Strang (a), 2016). For instance, the trace of a matrix with its associated determinant and the companion matrix of a differential equation are the Linear Algebra fundamental concepts, which are beyond the matrix notation for representing a system of simultaneous linear equations. A second YouTube video by of Professor Steve Brunton of University of Washington using the "N by N" matrix example has been helpful (Brunton, 2023).

Professor Strang explained that linear algebra matrix computation supports both probability/statistics and

optimization to perform deep learning algorithm with a learning function representing the evolution of the input matrices (Strang, 2018). A simple Kalman filter matrix exercise, useful in motion estimation for stability inquiry has been posted on YouTube, together with a Kalman filter arithmetic iteration exercise in temperature estimation (Biezen, 2016; Biezen, 2015)

Oscillation without physics (Level Three)

The MIT open-source lectures of Dr. Mobolaji Williams showed the well-known Prey-Predator model as an example of oscillation without physics in a summer research class for high school students (Williams, 2017). Since then, there are at least two YouTube sources with better explanation in our opinion. The video on "Divergence and curl: The language of Maxwell's equations, fluid flow, and more" explained the calculus notation with extension to the Prey-Predator model (Sanderson, 2018). The YouTube video on "Teaching dynamics to Life Science Student" used the State Space model to by-pass the complex calculus is another example of oscillation without physics (Garfinkel, (a) 2024). For engineering and physics students, it is essential to trace the 2 coupled first-derivative equations in the prey-predator model back to the single second-derivative equation in the damped harmonic oscillator model. Using Calculus Taylor Series expansion around an equilibrium point, with derivative terms set to zero, the damped harmonic oscillation differential equation would emerge (Garrett, 2012).

Results of the Pedagogy

A QCC cohort, 5 students out of 19 students, Physics One course, were assessed at satisfactory passing, in the control theory perspective of the damped harmonic oscillators (Level 1).

The Tristate NSF-REU recruited community college students, 3 students out of 3 students were assessed at satisfactory passing Level 2 (paid with NSF stipends)

The aerospace engineering video contents were preferred by QCC college engineering students, 5 students out of 19 students were assessed at satisfactory passing, Physics One Mechanics Course Level 1 Matlab)

The Kalman filter arithmetic iteration exercise for temperature estimation were assessed with 6 students satisfactory passing, N = 19, Conceptual Physics 101, following the YouTube example but with a different set of input values (Biezen, 2015)

The high school students in a Physics One class were accessed at 1 student satisfactory passing, N =2, on the prey-predator model pedagogy. Both students understood the Level 1 Matlab, but did not understand Level 2 eigenvalue.

The high school students in physics research projects were interested in Level 3 prey-predator model directly, but not the control theory pedagogy. There were 5 high school students, N = 14, satisfactory passing in the Level 3 prey-predator model at the simulation operation level (Matlab-Python-Excel), with the task of changing a parameter and examining the new results.

We have observed that the studied high school students were influenced by a recent trend that the learning of calculus is not useful for the Life Science students, seen in the "calculus from hell" slide inside the UCLA video of "Teaching Dynamics to Life Science students at video frame 12:49" (Garkinfel (a), 2024. Instead another UCLA video of "Teaching Dynamics to Biology Undergraduates" advocated the trend of using Python to solve the equations in the study of dynamics systems (Garkinfel (b), 2024), with an accompanying article (Garfinkel, et al. 2022)

Over the years since the COVID Lockdown in 2020, about 50% of our recruited high school students in projects were interested to learn oscillation in the context of medicine, hence wanting the "oscillation without physics" in the Level 3 pedagogy directly without Level 1 Matlab control theory knowledge and Level 2 eigenvalue stability knowledge. We found that the 3-coupled first-derivative equations for the hypothalamus-pituitary-gonad feedback system illustrated by the UCLA video of "Newton Abraham Lecture video frame 29:41" would be sufficient to learn about oscillation without physics, skipping the learning of control theory in Level 1 and eigenvalue stability in Level 2 (Garfinkel (c), 2022). We also found that the 2-week extra credit short projects at Level 1 state space representation and/or Level 3 prey-predator model have been be popular for premed students taking Physics One.

There are traditional pedagogies to support the concept that a community college is an extension from high school for the AAS-degree students with job seeking priority. One of the most important results in the stability pedagogy reported in this article is to remind faculty members in community college setting that there is a new pedagogy to show the continuation to a third-year syllabus. In addition, the stability pedagogy can clarify "what is engineering" to the calculus physics AS-degree students (15%) among the algebra physics AS and AAS students (85%) in the context of physics learning.

In our limited experience, we found that the student group with top 20% ranking before the Lockdown was gone from our community college in this post-COVID era. We attributed this phenomenon to the senior colleges in our CUNY System using their administration flexibility to adjust their admissions when compared to our open admissions. The feedback to the faculty mindset includes a satisfaction that we are doing the best we can with an implementation of a new pedagogy on teaching the stability concept to help our students to contiune their education in this post-COVID era. The result of faculty mental satisfaction is a surprise, not that we have psychological data to quantify our mental stability in having satisfaction in this post- COVID era with the new issues including challenges of 70% enrollment, less prepared students, job versus transfer comparison upon students' requests, etc.

Discussion

The University of Washington Christopher Lum's and Steve Burton's aerospace engineering videos on YouTube have been used because they provide links to many other videos on various aerospace engineering topics. The videos contain the topics of wind tunnel, flight parameters, etc. that we have used as guides to answer the students' question of "what is engineering". In particular, the eigenvalue stability videos in the application examples illustrate the engineering context in linear algebra, a math requirement of Grove Engineering School of City College of CUNY for our QCC transfer students.

Using the Greek symbol tau for torque instead of the T- symbol in the Lum's video was found to help the bottom 30% students who were uncomfortable in algebra manipulation.

The need for pre-engineering students to maintain interest in linear algebra sustains the rationale of using the eigenvalue stability pedagogy in oscillation physics. The single value decomposition matrix method in linear algebra is also used to study accelerator orbit stability in accelerator engineering physics, but none of our 3 physics majors knowing calculus were interested in accelerator engineering physics as of September 2024.

Faculty members would need to be flexible and get ready to deliver one of the 3 Levels (Matlab control theory, eigenvalue, oscillation without physics) as an independent topic, given the student interests variation in a DEI community college setting.

We have learned a valuable lesson from our QCC CubeSAT project experience. The QCC CubeSAT project, using the equipment and student stipend supports from the QCC-NSF-REU grants (PI Lieberman), was part of the CUNYSAT-1 Program led by the late Professor Shermane Austin of CUNY Medgar-Evers College (she sadly passed away 3 months ago). The 1U CubeSAT was launched but no signal was received (Gunter, 2013). The CUNYSAT was launched from Vandenberg Air Force Base on December 6 2013 (NASA LSP, 2013). In retrospect, the QCC students' authentic experience, (Shekoyan, et al. 2009), could have been supplemented with a more detailed CubeSAT stability study, similarly to the tumbling block stability method at low budget level (Strang, (b) 2016). The CubeSAT mission passed all the launch-protocols with the mission of the science of ionosphere disturbances, presented by QCC physics faculty mentors Tremberger and Cheung at Goddard Institute for Space Studies, Columbia University. A study of CubeSat stability in 2024 would not be sufficient to start a project, but a final CubeSAT product cannot violate stability regardless of the mission. The tumbling instability of the Advanced Composite Solar Sail System (ACS3) with a mission of solar sail testing on a 12U CubeSAT is still confronting the NASA ACS3 team as of October 22 2024 (NASA ACS3, 2024)

A stability inquiry would serve as an additional learning objective in a drone project. For instance, a drone/helicopter payload modeled as a pendulum would satisfy the criteria of an engineering physics research project in dynamical system, when using another drone for data collection. A chamber with reduced air pressure

would enable flight stability study in a Mars-like atmosphere. The method of "PocketLab Voyager 2 as a payload on DJI Drone" has been used in kinematics pedagogy (Young, et al. 2024), and would be readily deployable as equipment in engineering physics research projects. Our QCC Outreach College Now Program has a budget to support equipment for the high school students in engineering physics research projects, and yet none of the enrolled high school students were interested to continue their education in our QCC degree programs so far, based on our physics department enrolment data. The physic department faculty members could transfer the College Now teaching experience to the teaching of the degree-students in our DEI community college courses.

The stability pedagogy could be extended to include stability of rocket using fins in engineering studies, plasma instability in astrophysics studies, inertia confinement fusion studies, etc. Such extensions can be started when using the Kalman Filter technique as an academic learning outcome. The Kalman Filter on the motion and measurement models can be used to demonstrate Machine Learning in terms of Control Theory, illustrated on a YouTube video by Professor Jonathan Kelly, University of Toronto (Keller, 2021). The embedded Kalman filter using the MPU6050, a 3-axis gyroscope and a 3-axis accelerometer on a silicon chip, was illustrated on YouTube with Matlab codes by Professor Tom Moir, Auckland University of Technology (Moir, 2021)

The SpaceX rocket technology in which rockets can return to their launch pads has been a popular topic in students' discussion. The advanced thrust vector control rocket with Kalman Filter is a distant project due to an observation that there is a need of a relatively large budget to accommodate a few failed launches in the beginning when using the thrust vector rockets available in the hobby market (BPS.SPACE, 2024). The timing-loop demand on the flight control of thrust vector rocket without rocket-fins would constitute an authentic skill learning experience on the Kalman Filter technique. A tutorial video on thrust vector control assembly emphasized that the rocket stability control by the Kalman filter technique can be reduced to an activity of copying codes without the need to understand the matrix representation of the motion and measurement models (Thornhill, 2022).

It is important to include future extensions in a discussion. The Lum's aircraft dynamics videos on YouTube can be extended with YouTube videos on rocket technology. The OpenRocket simulator with its output flight data as inputs to Matlab for a calculation of the forces have been implemented by MIT students (MIT Rocket Team, 2019). The addition of roll, pitch, and yaw parameters using Matlab in an extension of OpenRocket Simulator has been demonstrated in a YouTube video (Lafayette System, 2024), and can serve as an example of an extension of the roll-pitch-yaw of an aircraft.

The DIY rocket projects on "Autodesk Instructables" is within the budget of a community college (Autodesk Instructables, 2024), but the hands-on exercises in extra- curricular activities could raise liability issues for faculty members in a community college setting, unlike other colleges with relative large budget. For instance, the RIT Launch for student clubs at Rochester Institute of Technology have been launching rockets built by

students. In fact they host a YouTube tutorial video on "Basics of OpenRocket" (RIT Launch Initiative, 2021).

The NASA paper rocket project (NASAJPL Edu, (a), 2020) and paper Mars helicopter project (NASAJPL Edu, (b) 2020) would be a first level learning, with a second level learning using the NASA foam rocket project. These hands-on projects are very effective as authentic experience, and can be upgraded to national standards like the projects funded by NSF-REU when including a stability investigation as an academic standard, deliverable by using the OpenRocket Simulator, Matlab, etc.

Conclusions

We found that the study of oscillation in physics would provide a pedagogy to introduce the concept of stability in control theory, which is important for community students to acquire some authentic experience in "what is engineering". The Level 2 of eigenvalue stability was found to be deployable in Physics One Mechanics class. The 2-week extra credit short projects at Level 1 state space representation and Level 3 prey-predator model was found to be popular for premed students taking Physics One. We found that Python would be a viable computational tool, but Matlab is easier for QCC students having free access already.

Recommendations

Oscillation and stability related projects would show a continuation to the Third-year engineering programs, such a transfer enhancement pedagogy would enhance retention of community college pre-engineering students.

In the pedagogy of state space model and prey-predator model, the computational skill development is an important learning objective. For those students doing the 2-week extra credit projects, it is important to show the students that skill development could be classified as a synergy of the following: (1) rote learning of basic skills with feedbacks for better practice, (2) using a selected standard as a reality check to evaluate progress, (3) aligning objectives to be compatible with a given environment to keep up the aspiration and time investment.

Faculty members need to be flexible to foster the learning of stability in terms of (1) Matlab/Python computations, (2) eigenvalue stability, and (3) oscillation without physics as an independent topic regardless of eigenvalue stability, due to students' diverse background in a community college setting, including high school students taking college courses.

High school science teachers could use the UCLA videos of Professor Garfinkel, discusses above, to guide their students who are interested in life science and biology to study the prey-predator model with oscillation, but without physics.

Acknowledgements

We thank those authors sharing their works on YouTube. We thank Alexei Kisselev and Arkadiy Portnoy for computer support. The author contributions are Sunil Dehipawala 25%, Kelvin Yao 25%, Todd Holden 25%, and Tak Cheung 25%. Kelvin Yao at Case Western Reserve University thanks the hospitality of Tak Cheung at Queensborough Community College.

References

Autodesk Instructables (2024) DIY Rockets (Last Accessed October 2024) https://www.instructables.com/DIY-Rockets/

Biezen, M. (2015) Special Topics - The Kalman Filter (6 of 55). A Simple Example of the Kalman Filter (Last Accessed October 2024). https://m.youtube.com/watch?v=SIQJaqYVtuE

Biezen, M. (2016) Special Topics - The Kalman Filter (13 of 55) 7: State Matrix of Moving Object in 2-D (Last Accessed October 2024). https://www.youtube.com/watch?v=uX5E8ZOI5Ms

Brunton, S. (2023). BPS.SPACE (2024). Thrust Vector Control 3D Files. (Last Accessed 2024) https://bps.space/products/thrust-vector-control

Garfinkel, A. (a) (2024) Teaching Dynamics to Life Science students. UCLA modeling class. Last Accessed October 2024) https://www.youtube.com/watch?v=NA8ivh9f_hU

Garfinkel, A (b) (2024). Teaching Dynamics to Biology Undergraduates. (Last Accessed October 2024)https://www.youtube.com/watch?v=MmmHq8pPS94

Garfinkel, A. (c) (2022). Newton Abraham lecture. (Last Accessed October 2022) https://www.youtube.com/watch?v=XhJkFPHi4ak

Garfinkel, A., Bennoun, S., Deeds, E. et al. (2022) Teaching Dynamics to Biology Undergraduates: the UCLA Experience. Bull Math Biol 84, page 43. https://link.springer.com/article/10.1007/s11538-022-00999-4

Garrett, T. (2012) Modes of growth in dynamic systems. 2012. https://arxiv.org/pdf/1202.0564

IllustrisTNG (2024). (Last accessed October 2024) https://www.tng-project.org/data/

Krebs, G. (2013), The CUNYSAT 1. Gunter's Space Page. (Last Accessed October 2024) https://space.skyrocket.de/doc_sdat/cunysat-1.htm

Lafayette System, 2024. Modeling and Simulation of Advanced Amateur Rockets. (Last accessed October 2024) https://m.youtube.com/watch?v=sEzRzkGRpDQ

Lum, C. (2018). Ordinary Differential Equations and Dynamic Systems in Simulink. (Last Accessed) https://www.youtube.com/watch?v=Cvu2zWk3gYw&list=PLxdnSsBqCrrHHvoFPxWq4l9D93jkCNIFN&index=13

Kelly, J. (2021) Kalman Filter - Part 1. YouTube Channel Machine Learning TV. https://m.youtube.com/watch?v=LioOvUZ1MiM

Mihio, C. (2023) ASTR 222 - Galaxies and Cosmology. Case Western Reserve University (Last accessed October 2024). http://burro.case.edu/Academics/Astr222/

MIT Rocket Team (2019) Calculating Loads on the Rocket Last Accessed October 2024) https://wikis.mit.edu/confluence/display/RocketTeam/Calculating+Loads+on+the+Rocket

Moir, T. (2011) Embedded Kalman Filtering. (Last Accessed October 2024) https://www.youtube.com/watch?v=sLjz-fa0og8

NASAACS3 (2024) Update on NASA's Advanced Composite Solar Sail System. https://blogs.nasa.gov/smallsatellites/2024/10/22/update-on-nasas-advanced-composite-solar-sail-system/

NASALSP (2013) Past Ela-Na Launched. NASA Launch Services Program. (Last accessed October 2024) https://www.nasa.gov/kennedy/launch-services-program/cubesat-launch-initiative/past-elana-cubesat-launches/

NASAJPL Edu (a) (2020) Learning Space: Make a Straw Rocket (Last Accessed October 2024) https://m.youtube.com/watch?v=aTd2f59TSVo

NASAJPL Edu (b) (2020) Learning Space: Make a Paper Mars Helicopter (Last Accessed October 2024) https://m.youtube.com/watch?v=HrKRWsrZuYc

RIT Launch Initiative (2021). Basics of OpenRocket (Last Accessed October 2024) https://m.youtube.com/watch?v=z16_uUnMarE

Sanderson, G. (2018) Divergence and curl: The language of Maxwell's equations, fluid flow, and more. (Last Accessed October 2024). https://www.youtube.com/watch?v=rB83DpBJQsE

Shekoyan, V., Marchese, P. Austin, S., Peck, M., Watkins, C., Vittadello, M. MSI Student Project to Investigate Ionospheric Disturbances. American Geophysical Union, Fall Meeting 2009, abstract id.SA31A-1406. (Last accessed October 2024) https://ui.adsabs.harvard.edu/abs/2009AGUFMSA31A1406S/abstract

Skynet (2024). Skynet Robotic Telescope Network. (Last accessed Oct 2024). https://skynet.unc.edu/

Strang, G. (a) (2016) Eigenvalues and Stability: 2 by 2 Matrix, A. MIT Open Course Ware (Last accessed October 2024. https://www.youtube.com/watch?v=GAOjfd5QJZE

Strang, G. (b) (2016) The Tumbling Box in 3-D. MIT Open Course Ware (Last Accessed October 2024) https://www.youtube.com/watch?v=Jy5XpZqy56U

Strang, G. (2018) Course Introduction of 18.065 by Professor Strang (last Accessed October 2024). https://www.youtube.com/watch?v=Cx5Z-OslNWE

Thornhill, J. (2022) Flight Computer for a TVC Model Rocket. (Last Accessed October 2024). https://m.youtube.com/watch?v=M87HNwIzG8o

Williams, M. (2017) Introduction to Oscillations and Waves Lecture 10 Linear Dynamics. MIT Introduction to Technology, Engineering, and Science for high school students. (Last accessed October 2024) https://ocw.mit.edu/courses/res-8-009-introduction-to-oscillations-and-waves-summer-2017/

Young, C. et al. (2024) Using Drones in a First-Year Physics Lab. Physics Teacher 62, 182–187. https://pubs.aip.org/aapt/pte/article-abstract/62/3/182/3267018/Using-Drones-in-a-First-Year-Physics-Lab.

Pedagogy of Non-Inertia Frame Effect of Tidal Torque and Atmospheric Dynamics Models in Community College Research Experience Projects for Pre-Engineering Students

Sunil Dehipawala

City University of New York Queensborough Community College Physics Department, USA.

Todd Holden

City University of New York Queensborough Community College Physics Department, USA.

Tak Cheung

City University of New York Queensborough Community College Physics Department, USA.

Abstract: Hurricane and galaxy tidal effect are routine teaching topics in community college first year science courses, but there is a knowledge gap without a quantitative discussion of the physics of non-inertia frame. A survey of YouTube videos posted by Education Centers and professors showed that the hand-waving conceptual explanation is the most popular delivery pedagogy. We have eliminated the knowledge gap by developing a pedagogy of non-inertia reference frame effect for conceptual physics and introductory astronomy courses using knowledge transference from the contents in fluid mechanics. Science demands a conceptual foundation of reference frame if the extra math terms are not being treated as fudge factors. The reference frame effect must be introduced in early physics class Mechanics to prepare students for more subtle but important applications in Electromagnetism. An understanding of the reference frame effect is also needed for the presentation of the convective derivative, reference velocity in RANS fluid, etc. Nevertheless, the learning objective of programming skill in a computational project would not be affected by using either fudge factor effect or reference frame effect perspective. A method of using the result of a student computational project to assess the understanding of the reference frame effect versus fudge factor effect is proposed. The sustainability of the pedagogy with a discernment of the fudge factor effect (phenomenon-based pedagogy) versus reference frame effect (model-based pedagogy) in student computational projects in the post-COVID era is discussed. A Context-first pedagogy as a hybrid method is presented to facilitate the transfer of what faculty have learned in the research project delivery to become an assessment tool in the understanding of physics derivation in a classroom. Recommendations are presented.

Keywords: Non-inertia frame effect, Fudge factor effect, Reference frame effect, phenomenon-based pedagogy, model-based pedagogy, Context-first pedagogy

Citation: Dehipawala, S., Holden, T., & Cheung, T. (2024). Pedagogy of non-inertia frame effect of tidal torque and atmospheric dynamics models in community college research experience projects for pre-engineering

students. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 93-103), Chicago, IL, USA. ISTES.

Introduction (Current Situation Explanation)

We are faculty members in a community college physics department. We have been using the Force Concept Inventory FCI as an assessment tool in physics one mechanics emphasizing the usefulness of the inertial frame of reference. However, there are real life examples that the non-inertial frame of reference perspective is useful, from explanations of Hurricane motion in Florida to James Webb Space Telescope orbiting L2, an empty point in Space. The proposed pedagogy includes the numeracy of Pythagorean Theorem suitable for high school teachers interested in the teaching of real-life examples.

Hurricane and galaxy tidal effect are routine teaching topics in community college first year science courses, but there is a knowledge gap without a quantitative discussion of the physics of non-inertia frame. A survey of YouTube videos posted by Education Centers and professors showed that the hand-waving conceptual explanation is the most popular delivery pedagogy, to the best of our searching skill. Specifically, the pre-engineering students in our community college interested in orbital mechanics for space flight applications and atmospheric dynamics applications for ecology studies would need to understand the rotation induced non-inertia effect in terms of algebra if not calculus. Without a fundamental understanding of what rotation would add to a rotating observer, research experience student projects with the continuation of a 4-year engineering and science program education could be futile, regardless of the mastering of the operation steps of a software package for the calculation of tidal torques in astronomy modeling and/or Coriolis effect in atmospheric modeling.

We have eliminated the knowledge gap by developing a pedagogy of non-inertia reference frame effect for conceptual physics and introductory astronomy courses using knowledge transference from the contents in fluid mechanics, due to the easy visualization of fluid (Veritasium, 2017). The additional eastward speed of a northward drifting cloud from the Equator has been animated for easy visualization as well (Atlas Pro, 2018). The addition of a few algebraic equations was found to be sufficient for quantitative student projects with a pre-requisite of Physics I Mechanics, together with some programming skills.

On the one hand, a regular knowledge transference usually would entail a reduction of calculus to algebra and then to graphics with numeric information. This reduction of math details in engineering content is a common practice without any contradictions. On the other hand, the non-inertia rotational frame effect explained with a pseudo centrifugal force contradicts the Newtonian forces arising from an interaction between two objects. Such an apparent contradiction must be eradicated. The math essence of including more terms in an equation to solve a science mystery/question could mimic the culinary essence of including more cooking ingredients to increase the taste complexity. The validity of the extra math terms requires data verification, just like the taste complexity regarding food requires customer evaluation.

In addition, science demands a conceptual foundation of reference frame if the extra math terms are not being treated as fudge factors. In comparison, the end correction for resonance in an acoustic pipe is treated as a fudge factor in a community college setting, since the math requirement to understand the analysis results of Rayleigh and then by Schwinger (both Nobel Laureates) is beyond the community college courses, in sharp contrast to the derivation of the mass correction in the spring-mass period formula as a routine practice in first year calculus physics.

The reference frame effect must be introduced in early physics class Mechanics to prepare students for more subtle but important applications in Electromagnetism. Whatever is added to an equation would have an additional energy mechanism, and such a fundamental concept in Mechanics would foster the understanding of the Wheatstone-Bridge null measurement using a passive detector in Electromagnetism, etc.. An understanding of the reference frame effect is also needed for the presentation of the convective derivative and reference velocity formulation in Reynolds-Averaged Naiver Stokes RANS fluid, etc. Nevertheless, the learning objective of programming skill in a computational project would not be affected by using either fudge factor effect or reference frame effect perspective.

The difficulty of using the result of a student computational project to assess the understanding of the reference frame effect versus fudge factor effect could be partially solved by including the reference frame effect in at least three different contexts in the literature search section. The sustainability of the pedagogy with a discernment of the fudge factor effect versus reference frame effect in student computational projects in the post-COVID era is discussed

Method

In a tidal force project, computer programming students usually would prefer programming as a substantial learning objective in projects with tidal distortion effect. The visualization of the Coriolis effect in liquid for Physics 101 students interested in climate change and Astronomy students interested in planetary science is a necessary pedagogy for most engineering students as well. The learning of mechanism, phenomenon-based pedagogy versus model-based pedagogy is discussed in details. Finally, the context-first pedagogy is discussed in details.

Phenomenon-based Pedagogy (Fudge Factor)

A discussion of Chemistry pedagogy as a phenomenon-based pedagogy has been published by a physics professor in American Chemical Society Symposium Series (Vincent-Ruz, 2020). The University of Michigan Physics Department Vincent-Ruz asserted that “Chemistry discipline studies have showed that linguistically diverse speakers have difficult asking Questions (disciplinary engagement) and experience insecurity (negative affective engagement) when investigating and writing about phenomena”. It is obvious that Phenomenon-based

pedagogy needs language skill as well as simple math skills, and in physics, math skills such as the trigonometry value calculation skill in the Snell's law of refraction application to apparent depth understanding is expected.

The Phenomenon based pedagogy usually would require less math skills when compared to the Model-based pedagogy in the college level. The van der Waals force and electric dipole force are Coulomb forces in nature, but are treated as fudge factors in the equations of molecular dynamics simulation. For instance, a recent YouTube video on the use of a molecular drug to manipulate the vibration of a protein receptor explained the fudge factor application to the F = ma mechanism in Newtonian Physics (NanoRoom, 2023). Starting video frame 7:22, the video explained that doing a simulation is very much like doing an experiment. The simulation objective must be clear, the simulation controls must be designed carefully, and repeating the simulation many times is a must for evidence in the successful recreation of a studied phenomenon.

The Phenomenon-based pedagogy is favorable in introductory science courses. The Coriolis Effect in weather pattern has been illustrated by videos posted by the UK Government, and the video on Global Circulation has been used in our classes (Met Office UK, 2018), shown in Figure 1.

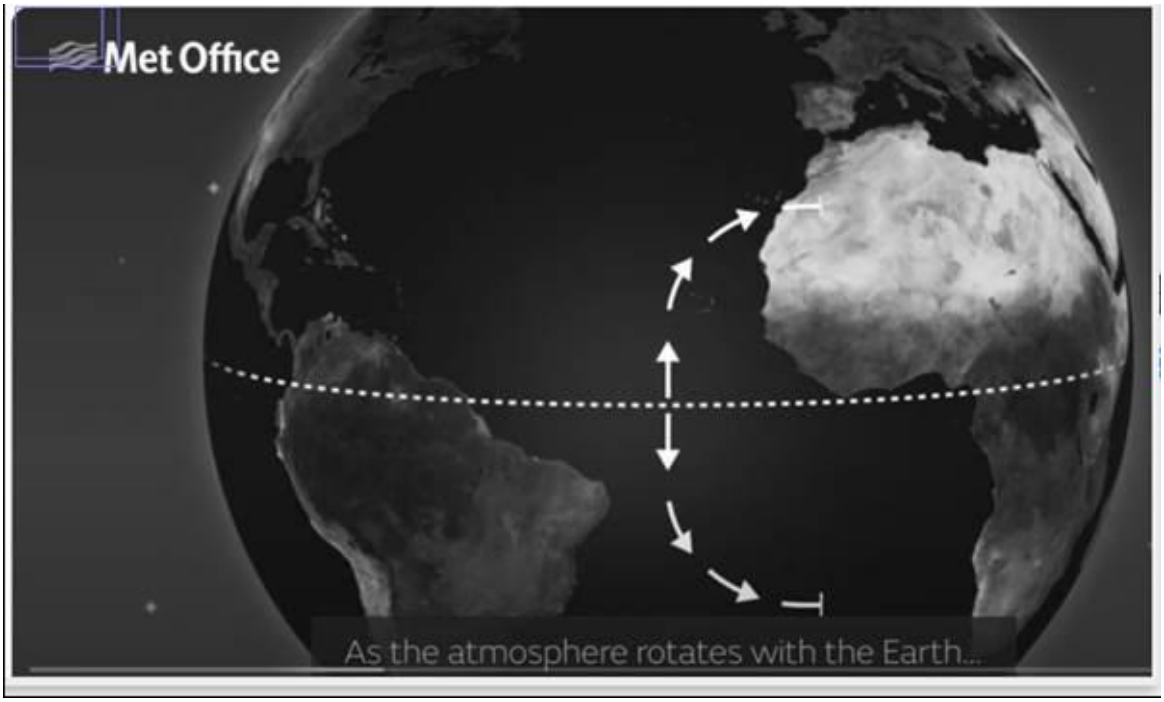


Figure 1. An Illustration of The Coriolis Effect, Adapted from The Met Office UK Video, https://www.youtube.com/watch?v=PDEcAxfSYaI, using ImageJ.

The tidal force effect in the Earth-Moon system has also been posted by a visualization professional (Merrell, 2018), and we have been using the clear animation in our Physics 101 and Astronomy classes, without the Euler's equations, shown in Figure 2.

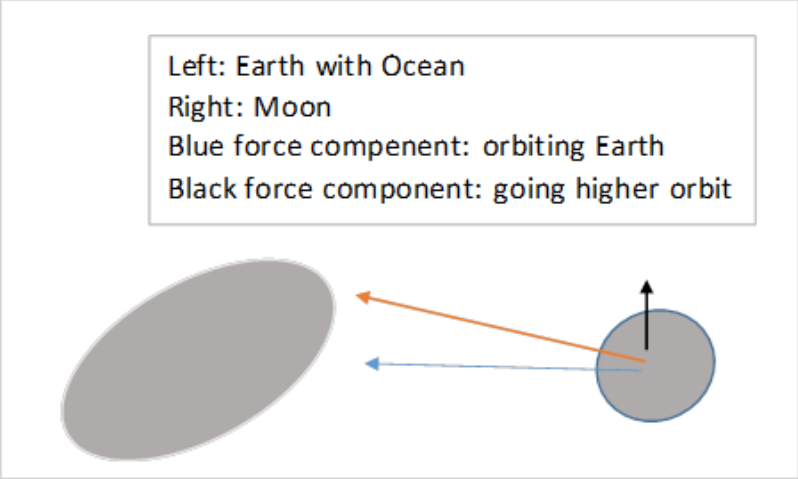


Figure 2. An illustration of tidal effect, adapted from Merrell: The Moon is Drifting Away https://www.youtube.com/watch?v=SqLzSlsrZZ4.

On the one hand, for easy calculation, the non- inertia frame centrifugal force is customary used to calculate the equatorial bulge or tidal elongation in celestial mechanics. On the other hand, conceptual physics presentation of the equatorial bulge could be presented in the following sequence. (1) The Earth and Moon have equatorial bulges. (2) The same centrifugal force concept applies to a spinning pizza dough to get a flatten structure. (3) The shift of center of gravity away from the center of mass allows a torque exerted by Earth to tidal lock the Moon spinning to reach zero torque, illustrated by Hewitt's video titled Ocean Tides, Figure 3 (Hewitt, 2012). The shift amount shown in Figure 3 is treated as a fudge factor in Phenomenon based pedagogy. (4) Earth spinning slows down and the radius of Moon must increase to maintain the conservation of angular momentum.

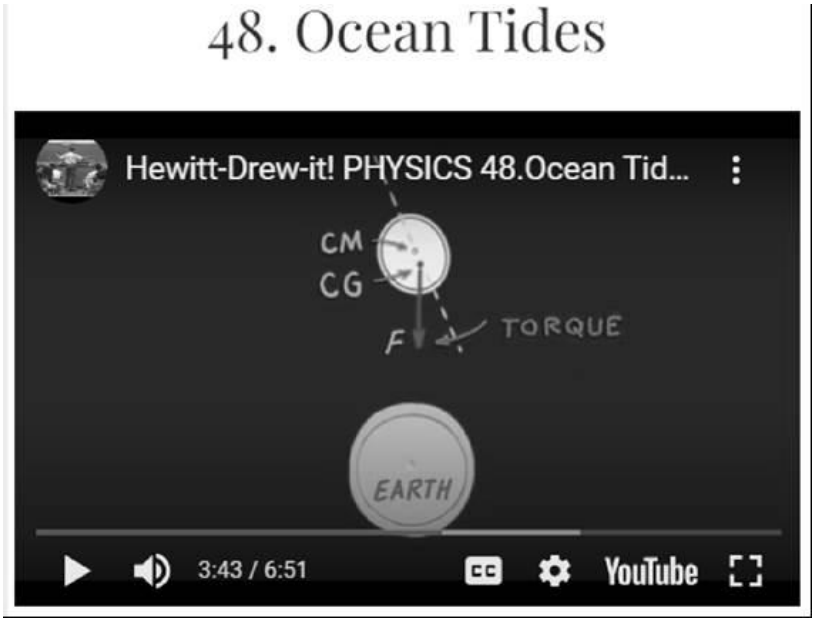


Figure 3. An illustration of the tidal torque, adapted from Hewitt Conceptual Physics video, http://www.conceptualphysics.com/41-50.html, using ImageJ.

Model-based pedagogy

The Model-based pedagogy shows the power of perdition, while the Phenomenon-based pedagogy has limited prediction.

The Model-based pedagogy of Coriolis Effect usually would start with Calculus chain rule. We found that the videos on Coriolis Effect by Dr. Ben Yelverton most helpful to our students. Calculus chain rule to derive the Coriolis Effect in rotating reference frame was presented concisely (Yelverton (a), 2021), with application to calculate the deflection of a falling particle (Yelverton (b), 2021), and the height for a significant Coriolis-induced deflection (Yelverton (c), 2021).

The Model-based pedagogy requires more calculus. We found that the materials provided by U of Texas Austin Richard Fitzpatrick to be very helpful to our students. The torque = moon mass*(-potential tangential change) to increase the Moon's orbital angular momentum, far more details than using force-arrows for torque in the Phenomenon-based model discussed above. The Earth's rotational equation of motion is I*Omega = (-torque), and by Conservation of Angular Momentum that an equal and opposite torque is applied to the Earth; the reaction torque in the model would act to decrease the Earth's angular momentum in spinning-rotation.

Context-first pedagogy

The ability of reading between the lines can be enhanced by inserting a hypothetical sentence to be placed in-between two (or several) sentences. The hypothetical sentence must be in the context of the already given sentences. These are the skills in literacy. The teaching of how to read between the lines can be called context pedagogy. Dictation is now replaced by voice to text technology in an office setting, so it is expected that AI would be able to read between the lines using statistical inferences; and students could use AI assisted guidance in good learning cases or poor cheating cases. Meanwhile we still have to teach the basic skill on how to read between two lines.

The filling of the missing information in the context of the preceding and following sentences is a standard practice. A similar practice can be extended to algebra expressions instead of English sentences. Students need to know the algebra substitution skill to fill in the missing derivation step so that the preceding step, fill-in step, following step are consistent with each other. The practice emphasizes on the consistency of the reasoning in the formation of a complete content. A collection of consistent sentences constitutes a content and the fill-in-the-blanks pedagogy is a well-accepted instrument. When the repeated calculations of a formula with different numerical values is called practice pedagogy, then a collection of algebra steps to represent the content of a formula could be called context first pedagogy.

A Context-first pedagogy first defines the circumstances on how a content (when completed) would relate to the

environment of other contents. In the context of algebraic substitution, model-based pedagogy is delivered. Wikipedia explains that "Cloze tests require the ability to understand the context and vocabulary in order to identify the correct language or part of speech that belongs in the deleted passages". In our College, the asking of a single missing word in each sentence of an exercise/test is called "fill in the blanks" in Physics101 and Astronomy courses.

The extension to "Cloze test in symbols" in finding missing steps in algebra has been described by Khans Academy on YouTube (Khan Academy, 2014). A fill in the blank exercise could be used to assess the learning of the derivation of distance = v0t + 0.5*a*t*t after the teaching of how to combine the equations of distance = (v0/2 + vf/2) *t and vf = v0 + a*t, a derivation with standard notation shown on textbooks such as Open Stax College Physics 2e Edition. The symbols of "a" stands for acceleration, "v0" stands for initial velocity, "vf" stands for final velocity, and "t" stands for time interval.

The assessment of a derivation of Coriolis acceleration used by us is shown below, adapted from Jon Toellner's video (Toellner (a) 2015). YouTube videos such as Python codes on angular momentum can be adapted for assessing an understanding of Python codes in Physics (Toellner (b), 2021)

Cloze test starts (r stands for linear distance, s stands for arc length, w stands for velocity in circular path)
We have r = v*t in linear geometry Lab 1 of Physics One
We have s = r*angle in circular geometry Lab 1 of Physics One
We have angle= w*t, common sense of displaced angle = angular velocity of a point on a wheel* time
Then s = _____ using substitution (answer v*w*t*t)
Then s = 0.5*(2*v*w)*t*t
Then a = 2*v*w, acceleration magnitude,
End

Taking one of above derivation step away will constitute a Cloze test, just like the Khan's Academy video. When the content is incomplete, there are expression in the contexts of linear motion (r = v*t), circular geometry (s= r* angle), and circular motion (angle = w*t in common sense daily life that a point on a wheel rotates a displaced angle determined by angular velocity * time in analogy to linear motion).

After completing the Cloze test, the completed content emerges, the content of Coriolis effect when the s-amount is the deflection to the East and r is the falling radial distance from a roof top towards the Earth Center (a building not on North Pole). Then the content delivery can use a drawing of a tall tower free fall, and show the directions without the (i-j-k) notation. Only when the students understand the context, defined by Merriam-Webster as the environment or setting that something exists or occurs, the content becomes clear.

The context language is not English, but algebra. Repeated calculation exercises of the Coriolis acceleration

with different numerical values would have missed the model-based pedagogy, since derivation understanding is one of the learning objectives in a Model-based pedagogy.

In the first week of Physics One, an instructor can do recitation emphasizing the algebra substitution in physics, with applications to hurricane swirling counter- clockwise in Northern Hemisphere, etc. The tidal force can be taught using the context first method when there are algebraic derivation steps. All calculus steps can be replaced by finite differences. The Context-first pedagogy aligns with environment awareness in terms of global warming, climate change, etc. In the context of algebra-based derivation, we put together the steps to transform a partial content to a full content.

In the first week of mentoring a research computational project in a community college setting, the algebra steps in the derivation of a formula can be replaced by the computer coding steps used in a published research paper. A context first approach ensures a student to understand the generality of the coding steps being applicable to the various models used in a celestial motion project, an atmospheric dynamics project, a climate change project, etc.

Results of the Pedagogy

The difficulty of using the result of a research computational project to assess the understanding of the reference frame effect versus fudge factor effect could be partially solved by including the reference frame effect in at least three different contexts in the literature search section N = 1 out of 3.

An assessment of research project students on the effective programming of the formulas with added fudge factor terms showed 3 students satisfactory passing, N =3

An assessment of astronomy students on the understanding of the tidal effect simulation video with force decomposing into 2 components, phenomenon-based pedagogy, that the Moon is moving away showed 5 students satisfactory passing, N = 15 (using Pythagoras theorem arithmetic for the force decomposition).

A similar assessment of conceptual physics students on the understanding of the tidal effect simulation video showed 8 students satisfactory passing, N =18. The equatorial bulge assessment using cloze test format showed N = 3 students satisfactory passing, N = 18.

An assessment of algebra physics mechanics students on the understanding of the kinematics s = v0*t + 0.5*a*t*t derivation cloze test, 11 students satisfactory passing, N = 18. With the same cohort, a Coriolis acceleration derivation cloze test, 6 students at satisfactory passing, N = 18.

Discussion

Tidal effect calculation has applications in solar system analysis, and the model based pedagogy could be delivered to students wanting a second course in astronomy.

The sustainability of the non-inertia frame pedagogy is supported by selecting YouTube videos, a well-accepted practice in post COVID era. We live on a rotating Earth. Students interested in atmospheric science, weather forecast, etc. need an understanding of the non-inertia frame, not to mention the Mach's Principle important to physics majors. The Nobel Laureate Weinberg regarded the Mach's Principle as one of the unresolved issues in Physics (Weinberg, 1972). In engineering, an inertial frame is a reference frame, for example, defined with respect to fixed distant stars, in which the rotating frame rotates (Tricoche, et al. 2021).

The mentoring of student research projects related to non-inertia frame effects can strengthen the faculty members in their abilities to adapt the pedagogy in research projects to classroom projects. Simple short projects like Python coding of angular momentum cases are suitable in a classroom setting, following the YouTube Toellner's video (Toellner, J. (b) (2021). There is always a need for non-inertia reference frame pedagogy, necessity of knowing orbital mechanics for space flight analysis (Wilmer, et al, 2024). In fact, the James Webb Space Telescope orbits around L2 has been explained on YouTube using a centrifugal force model at the Pythagorean Theorem calculation level, so is the case of Gaia Spacecraft orbiting L2 for parallax measurements (Ready, 2022).

Discernment of the fudge factor effect versus reference frame effect in student computational projects of atmospheric and tidal force effects increase authentic research experience in science. In other words, students knowing vector calculus could be mentored with the model-based pedagogy, while students starting in Python could be mentored with the Phenomenon-based pedagogy, fully in compliance with the DEI mission of our minority serving institution, and consistent with a report that Phenomenon based pedagogy was found to match with Model based pedagogy (Grusche, 2019).

The non-inertial frame perspective in conceptual physics discussed above is also a useful pedagogy for interested high school teachers. The numeracy in the Pythagorean Theorem is readily adaptable to the calculations of forces in terms of their components.

Conclusions

The non-inertia frame effect of tidal torque and atmospheric dynamics models could be delivered with the use of YouTube videos, popular in post COVID era. Using fudge factor concept for those students needing algebra improvement was found to be effective as an extension to the phenomenon-based pedagogy without the full implementation of model-based pedagogy

Recommendations

The tidal force and Coriolis acceleration should be included in Physics One, using cloze test to assess algebra derivation, while the Phenomenon-based pedagogy is applicable to Conceptual Physics101 as well. The James Webb Space Telescope and Gaia Spacecraft orbit around L2 in the centrifugal force model shown on YouTube at the Pythagorean Theorem calculation level should be included in astronomy pedagogy, and also would be suitable for interested high school teachers to implement in their classes.

The Context-first pedagogy could help those students who are failing in the Model-based pedagogy, when using the fudge factor perspective to continue the homework assignments

The mentoring of student research projects related to non-inertia frame effects will strengthen the faculty members in their abilities to adapt the pedagogy in research project to classroom projects, and therefore, should be recommended.

Acknowledgements

We thank those authors posting their works on open access webpages. Author Contributions: Sunil Dehipawala 34%, Todd Holden 33%, and Tak Cheung 33%.

References

Atlas Pro (2018) The Coriolis Effect Explained (Last Accessed October 2024) https://www.youtube.com/watch?v=HIyBpi7B-dE

Fitzpatrick, P. (2015) Celestial Mechanics Tidal torque (Last Accessed October 2024) https://farside.ph.utexas.edu/teaching/celestial/Celestial/node54.html

Grusche, S. (2019) Phenomenon-based learning and model-based teaching: Do they match? J. Phys.: Conf. Ser. 1287 012066. https://iopscience.iop.org/article/10.1088/1742-6596/1287/1/012066

Hewett. P. (2012) Conceptual Physics Video 48 Ocean Tides. (Last Accessed October 2024) https://www.youtube.com/watch?v=YS6IqnvnOak

Khan Academy (2014.) Figuring out missing algebraic step | Linear equations | Algebra I | Khan Academy. (Last Accessed October 2024) https://www.youtube.com/watch?v=RXgj09NXNWo

Met Office UK (2018). What is global circulation? Part Three: The Coriolis effect & winds. Learn About Weather. (Last Accessed October 2024) https://www.youtube.com/watch?v=PDEcAxfSYaI

Merrell, P. (2018). The Moon is Drifting Away: Tidal Locking, (Last Accessed October 2024) https://www.youtube.com/watch?v=SqLzSlsrZZ4

NanoRooms (2024). The Beauty of Life Through The Lens of Physics (Last Accessed October 2024). https://www.youtube.com/watch?v=ncC-GMzF9RY

Ready, C. (2022) How James Webb Orbits "Nothing" Launch Pad Astronomy. (Last accessed October 2024) https://www.youtube.com/watch?v=ybn8-_QV8Tg

Toellner, J. (a) (2015) Orbital Dynamics Part 50 -- The Coriolis Force. (Last Accessed 2024) https://www.youtube.com/watch?v=iwT10KSPYHM

Toellner, J. (b) (2021) Orbital Dynamics Part 24 Angular Momentum 2021 (Last Accessed October 2024) https://www.youtube.com/watch?v=s-faastb578

Tricoche, W. Schlei and K. C. Howell, (2021) Extraction and Visualization of Poincare Map Topology for Spacecraft Trajectory Design. IEEE Transactions on Visualization and Computer Graphics, vol. 27, no. 2, pp. 765-774. https://ieeexplore.ieee.org/document/9222254

Veritasium (2017). Does Water Swirl the Other Way in the Southern Hemisphere? (Last Accessed October 2024) https://www.youtube.com/watch?v=mXaad0rsV38)

Vincent-Ruz, P. (2020) What Does It Mean to Think Like a Chemist? ACS Symposium Series; American Chemical Society: Washington, DC, 2020. Integrating Professional Skills into Undergraduate Chemistry Curricula. Editor(s): Neiles, Mertz & Fair. (Las accessed October 2020) https://sites.lsa.umich.edu/pvincentruz/wp-content/uploads/sites/805/2021/05/bk-2020-1365.ch005-3.pdf

Weinberg S (1972). Gravitation and cosmology: principles and applications of the general theory of relativity. John Wiley & Sons, Inc. ISBN-13: 978-0471925675

Wilmer, A.P., Bettinger, R.A., Holzinger, M.J. et al. Sun–Venus CR3BP, part 1: periodic orbit generation, stability, and mission investigation. Arch Appl Mech 94, 921–941 (2024). https://link.springer.com/article/10.1007/s00419-024-02556-y

Yelverton, B. (a) (2021) Time derivatives in a rotating frame of reference (Last Accessed October 2024) https://www.youtube.com/watch?app=desktop&v=Vautr1lDJ78

Yelverton, B. (b) (2021) Coriolis force: deflection of a falling particle (Last Accessed October 2024) https://m.youtube.com/watch?v=0IMnhYEYZpc

Yelverton, B. (c) (2021) How high up should we go to see a significant Coriolis-induced deflection? (Last Accessed October 2024) https://www.youtube.com/watch?app=desktop&v=sfNfuqdSDLY

Higher Education and Leadership: A Framework to Benefit Future Leaders

Prof. Dr. Jennifer S. Sherry

Southern Illinois University Carbondale, United States of America, https://orcid.org/0000-0002-4038-7866

Abstract: An effective leader is a supportive person who values your thoughts, ideas, and opinions. Excellent leaders are available to all members of the team, willing to work hard, engaged no matter what the task, and are notably trustworthy. Leaders help focus the team through purposeful communication, vision, engagement, and inspiration to cause others to be excited and invested in the work environment. Leadership-As-Practice (L-A-P) creates a cohesive pathway and discovers how the team can collaborate toward a common goal. Specific factors make a leader and create a solid foundation for success. Character, relationships, knowledge, intuition, and experience help to build momentum and create a visionary leader. Embracing change is important because you cannot manage or control it; it must be led and initiated by the leader. Several factors encompass an effective leader in higher education settings and these specific traits will be explored and specific framework ideas will be evaluated.

Keywords: Educational leadership, Leadership framework, Higher education leadership

Citation: Sherry, J. S. (2024). Higher Education and Leadership: A Framework to Benefit Future Leaders. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 104 -107), Chicago, IL, USA. ISTES.

Introduction

An effective leader is a supportive person who values your thoughts, ideas and opinions. Leaders have open lines of communication and gain mutual respect within members of their team. They have the ability to create future leaders because they see the potential within an individual; this can foster healthy, multi-faceted experiences within their personal working environment. Effective leaders learn and build upon the power of motivational interviewing and create a technique of how to listen instead of always wanting to speak first. In addition, leaders have the capacity to celebrate other's accomplishments and assist team members when they need guidance and mentorship. They are willing to accept constructive criticism from others and learn from their shortcomings. Effective leaders are able to gather pertinent information and make difficult decisions without hesitation. The excellent leaders that resonate with me are people who are available, willing to work hard, engaged no matter what the task and are notably trustworthy. In any career, people are more willing to work hard for someone who gives them freedom to work independently but maintains a level of professionalism and valued support.

Characteristics of a Great Leader

The root word of leader is **LEAD**. There are leaders that are found in everyday life, in any position or role, and every field (Valiga, 2019). Leaders can have the same impact if they are leading a group of volunteers at a local food pantry or a school director in a university setting. Some can be just as effective at the grassroots level as the university level depending on their characteristics and qualities. Leaders usually have exceptional visionary traits and a decisive way to lead others. Leadership helps to point us in the same direction and harness our efforts jointly (Liphadzi, Aigbavboa & Thwala, 2017).

Some people are leaders and some are followers, but the leaders have to be precise in organizing the followers to "follow through" with the job responsibilities (Valiga, 2019). It takes good followers to do the work, but it takes an exceptional leader to "lead" the flock and to guide the followers using sound ethical and methodical principles. I have been privy to work with some great leaders and they have a contagious aura. As a leader, I would like to have those same traits toward my colleagues and students. Leadership is not a random occurrence; rather it is purposeful and involves ***communication, vision, engagement and inspiration to energize a group*** (Valiga, 2019). A solid ***communicator*** can go very far not only in the university system, but also in any aspect of life. Someone with ***vision*** sees the big picture and looks into the future with realistic expectations. ***Engagement*** is having a solid commitment to a goal and seeing it through until the end. Being ***inspired*** by a leader gives you not only an internal energy to do the job, but an ability to exude an external energy that is contagious to others around you.

Leadership-As-Practice (L-A-P)

Leadership-As-Practice (L-A-P) is a shared process that has collaborative tendencies (Raelin, 2011). This type of leadership is not about an individual or how they think or perform; it is about what the entire team can do together in a collaborative way. There is strength in numbers and with a cohesive pathway, many great things can be accomplished. To be able to build a toolbox with many practice oriented ideas and strategies is going to prove more useful in my path within the dental hygiene program. This is one of many reasons why the EdD track is best for me.

Leadership occurs based on four critical processes: setting a mission, actualizing goals, sustaining commitment, and responding to changes (Parsons, Bales & Shils, 1953). First, when you discover the mission within an organization, this helps everyone have a visionary mindset. As the leader, you can ensure that everyone who works with you has direction and vision to see what can happen and how it can improve. Second, actualizing goals starts first by setting goals and a plan of action to get tasks accomplished. As the leader, it is critical to stay motivated to keep your eyes on the goal and see it to fruition. Third, have a commitment that is steadfast and true and encourage others to be just as committed to the common mission and goals. In addition, a leader must learn as they lead to be successful. To have a servant's heart and to be selfless is part of being an excellent

leader. It is not all about you. Building mutual respect and trust within your organization helps to keep everyone grounded and a part of the bigger picture. I believe my faith has played a huge role in my effectiveness as a leader because I start by being thankful for each day and humble within each day.

Factors That Make a Leader

Several factors make a leader and create a solid foundation for success. This can also be true in life as well. In John Maxwell's book, *The 21 Irrefutable Laws of Leadership*, he presents a great list of factors all leaders could adopt within everyday practice.

1. **Character---Who they are---**People can see the depth of a person's character. Be who you say you are and let your character show in each experience.
2. **Relationships---Who they know---**Deep relationships produce great leaders. Be trustworthy and people will recognize you are a great person and leader.
3. **Knowledge---What they know---**Leaders need facts to visualize the future. If the path is foggy, fight through the fog to see what lies ahead. Wait for the fog to rise to see things more clearly.
4. **Intuition---What they feel---**Leaders should recognize and influence things such as energy, time, morale, and momentum. Time is a precious commodity, and leaders should respect everyone's time equally. In addition, if morale is high, a leader will receive the fruit from other people in their work ethic and pride within the work. Momentum is important because if a leader has the drive to get things done, the team members will follow along. Seeking and focusing on rewards at the end of each day and feeling good about accomplishments are true rewards.
5. **Experience---Where they have been---**The greater your past challenges, the more likely followers will be willing to let you lead. Leaders should not be afraid to share challenges or failures they have throughout their experiences. This is a good way to show your followers you are human and have survived many shortcomings. You have to continue to press on, even in times of strife and trouble. Strength will arrive when you need it the most and when you least expect it.

A Framework for Leadership

When I think of the term "framework", I see a house that is built from the ground up. First, you need a strong foundation. If you build your house on sand, it will not last. However, if you focus on building a house on land that has bedrock or clay under the foundation, it should last for many years. When I visualize this process, I see pieces of lumber that are anchored together by bolts and nails and strategically placed for strength and longevity. When you are a leader, the same principles hold true as building a house on solid ground. To be a great leader, you must begin with a moral purpose. If you do something that is beneficial using good deeds and actions, this will provide the way to see the project to fruition. Embracing change is important because you cannot be manage or control it; it has to be led and initiated by the leader. Building relationships will show that you embrace the ability to balance personal and social competence. As a leader, you must manage conflict, even

when it is uncomfortable. Collaboration is a great way to produce the synergy in the work environment that gets tasks accomplished. Producing successful outcomes create a coherent work environment (Webster & Webster, n.d.). Improving leadership strengths are critical to maintain efficiency and effectiveness. Leaders must maintain honest and open lines of communication as well as showing confidence in decision-making skills. A leader should remain open and approachable to address issues within the working environment. Team members should be looking at their leader as someone who leads by example and provides an environment of support and guidance. Leaders should always have a great instinct to pay attention to the needs of their team members and support them as much as possible (indeed.com, 2020).

Leaders should judge by credibility and character (Parkin, 2018). Leaders should always go to the source and gain all information about the situation before making a decision. Being a passionate and compassionate leader is a great way to frame your responsibility and to take it seriously. I plan to continue to work on creating a positive culture and developing my long-term vision for the dental hygiene program. I would like to hold others accountable for their work ethic and development, but I need to look in the mirror first and hold myself accountable. I look forward to continuing my role in the dental hygiene program as a good leader, but I strive to be a great leader. This reflection has been a great way to understand what a great leader is and how I can keep working toward being a great mentor and guide for our entire dental hygiene faculty and other colleagues within the university setting.

References

Indeed.com. (2020, February 14). 10 ways to build effective leadership behaviors. https://www.indeed.com/career-advice/career-development/leadership-behaviors

Liphadzi, M., Aigbavboa, C.O., & Thwala, W.D. (2017). A theoretical perspective on the difference between leadership and management. *Procedia Engineering*, *196*, 478-482. https://doi.org/10.1016/j.proeng.2017.07.227

Maxwell, J. C. (1998). *The 21 irrefutable laws of leadership: follow them and people will follow you.* Nashville, TN: Thomas Nelson Publishers.

Parkin, D. (2018, November 9). *Who do you think you are? Finding your leadership identity*. Advance HE. https://www.advance-he.ac.uk/news-and-views/finding-leadership-identity

Parsons, T., Bales, R. F., & Shils, E. A. (1953). *Working papers in the theory of action.* Glencoe, IL: Free Press.

Raelin, J. (2011). From leadership-as-practice to leaderful practice. *Leadership,7*(2), 195-211. doi: 10.1177/1742715010394808

Valiga, T.M. (2019). Leaders, managers, and followers: Working in harmony. *Nursing*, *49*(1), 45-48. doi: 10.1097/01.NURSE.0000549723.07316.0b.

Webster, V. & Webster, M. (n.d.). *A framework for leadership: a rough guide to leadership models and theories.* https://www.leadershipthoughts.com/framework-for-leadership-rough-guide-leadership-models-theories/

Perspectives of Computer Game Players on Electronic Sports

Muhammet Demirbilek

Suleyman Demirel University, Turkey, https://orcid.org/0000-0001-7448-9206

Abdullah Uysal

Suleyman Demirel University, Faculty of Education, Isparta, Turkey

Abstract: Electronic sports (e-sports) is a competitive branch of digital sports where video games are played at a professional level, with players competing individually or in teams. Beyond entertainment, e-sports has grown into a significant industry, attracting millions of viewers and hosting lucrative tournaments. These events are primarily broadcast live, and e-sports is rapidly gaining popularity among young people as an alternative to traditional sports. With a large and growing community, e-sports is now even taught in some universities, providing career opportunities for the younger generation. This study aimed to explore the perspectives of computer game players on e-sports. As interest in computer games has surged, so has the popularity of e-sports. The research examined how these gamers perceive e-sports, their level of interest and participation, and their general attitudes toward the field. Additionally, the study collected demographic data, including age, gender, education level, online gaming habits, and the types of games played. The survey included 2,234 participants, with 93% under 24 years old and predominantly male. Most participants watch e-sports on platforms like Twitch and YouTube Live, with 62% aspiring to become professional e-sports players. Nearly all participants (98%) reported regularly playing online games, with most having completed secondary education or holding a Bachelor's degree. The majority prefer gaming on a computer (PC), and 71.8% view e-sports as a professional sport. Additionally, 30% of PC gamers have attended a live e-sports event, with 80% expressing a desire to attend future events. The findings suggest that young gamers view e-sports positively, often equating it with traditional sports. As social acceptance and professional opportunities in e-sports grow, interest and positive perceptions are likely to increase. Further research is needed to understand these attitudes and support the future growth of e-sports.

Keywords: eSport, Computer game player, Perspectives, Game

Citation: Demirbilek, M. & Uysal, A. (2024). Perspectives of Computer Game Players on Electronic Sports. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 108 -120), Chicago, IL, USA. ISTES.

Introduction

With the availability of personal computers and game consoles in every home, the ease and prevalence of

internet access, and the development of competitive games, e-sports has rapidly developed and become widespread. E-sports is a sport that enables people to develop their physical and mental abilities using information and communication technologies and also educates them. defined as the activities of E-sports. It has begun to be accepted as a sport based on online games. It can be defined as a sport where people from all over the world can come together and play games or where people from various parts of the world can play games through large e-sports organizations organized from time to time. Like competitions in other sports, **e-sports** competitions also involve individuals or teams facing each other and competing by showing off their various talents, and these competitions are also presented to the audience by organizing certain systems to create an enjoyable environment to watch. As in other sports, it requires both physical and mental skills.

Today, many national and international e-sports tournaments are organized. These tournaments and matches create a professional environment for players to compete. It has made a great contribution to the development and spread of the terms e-sports and e-sportsman. The number of both official and private tournaments organized is increasing day by day. The interest and concern shown to these tournaments continues to increase at the same rat (Wagner, 2006)e. Accordingly, the way is paved for e-sports players to practice this sport as a professional profession. After these processes, prizes of up to millions of dollars were given to the winners of e-sports tournaments. Thousands of viewers watch these matches live in arenas and stadiums, as in other sports branches. Hundreds of thousands of viewers follow these matches on live broadcasts made over the internet. Since the process has taken this form, it has turned into major events.

Various companies, football clubs, municipalities operating in different areas of e-sports have begun to gather under the roof of e- sponsors . Hundreds of e-sports clubs have been established and these clubs, just like in other sports, conduct regular training, open game houses, compete in various leagues and tournaments and strengthen their squads by making transfers when necessary. In addition, e-sports players in various countries around the world are now considered athletes like players in other sports and have started to receive athlete licenses. Since 2014, our country has joined the countries that grant athlete licenses to e-sports players (Argan, Ozer, & Akin, 2006)

Types of E-Sports

Although there is no clear classification today, e-sports types with new player classes are emerging with the developing gaming sector and new games being made. Today, there are most common five types of e-sports that are considered e-sports (Engin & Ozturk, 2016). These are

- Moba (Online Multiplayer Battle Arena)
- FPS “First Person Shooter”
- Rts (Real Time Strategy
- Tps – Third Person Shooter
- RPG – Role Playing Game

E-Sports Eco System

In order to better understand what e-sports is, it is necessary to understand the e-sports ecosystem. The prominent actors in the e-sports ecosystem are defined as companies, competitions, teams participating in competitions, platforms, players, brands and fan base in order of importance. First of all, each tournament and each game in e-sports has its own rules (Mustafaoglu, 2018). In addition, although some countries or leagues go beyond the rules determined within the e-sports ecosystem, this situation is not encountered very often. The e-sports sector also offers opportunities for both employment and career development (Hamari & Sjöblom, 2015). In this regard, many career opportunities are offered to those around them, especially professional athletes, coaches, broadcasters, referees, human resources, organizers, analysts, event managers, finance, and lawyers within the ecosystem. In Turkey, the Ministry of Youth and Sports grants e-sports licenses to players and players can participate in general tournaments in this way (Karahisar, 2014). Tournament and game rules are determined by the gaming company and tournament organizers

Method

This study aimed to explore the perspectives of computer game players on e-sports. As the interest in computer games has increased, the popularity of e-sports has also increased. The study examined how these players perceive e-sports, their interest and participation levels, and their general attitudes towards this field. The study also collected demographic data such as age, gender, education level, online gaming habits, and types of games played.

Measuring Tool

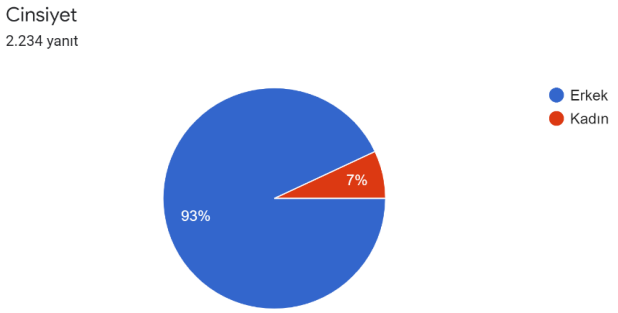
A survey was developed by the researchers, aiming to discover the perspectives of individuals who play computer games in Turkey towards e-sports. The data collection tool consists of 26 questions and seven sections including demographics information questions.

Sample Group

The sample group of the research consists of individuals playing computer games. 2234 participants participated in the research.The survey included 2,234 participants, 93% of whom were under the age of 24 and predominantly male. The majority of participants watch esports on platforms such as Twitch and YouTube Live, and 62% aim to become professional esports players. Almost all participants (98%) reported playing online games regularly, and most had completed secondary education or had a bachelor’s degree. The majority preferred to play games on a computer (PC), and 71.8% viewed esports as a professional sport. Additionally, 30% of PC gamers had attended a live esports event, and 80% expressed a desire to participate in future events.

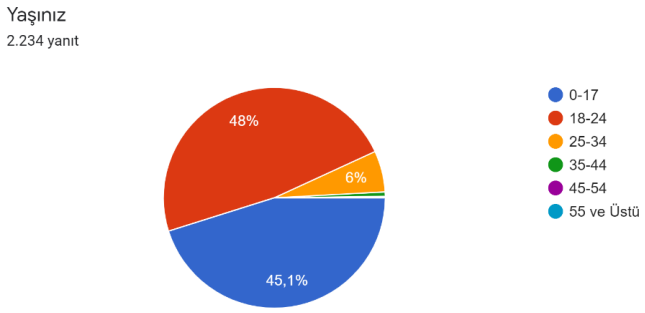
Results

Gender



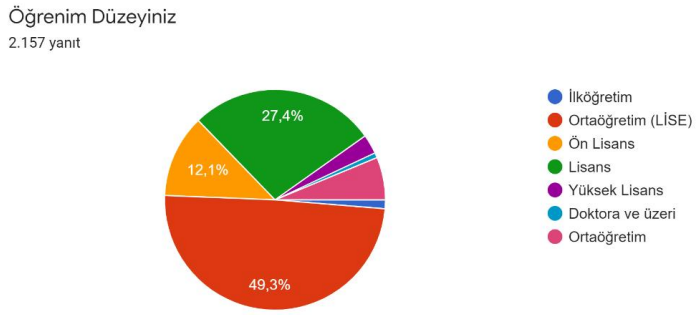
According to the survey we conducted among the audience playing computer games, the majority of the audience playing computer games is made up of men.

Age



According to the survey we conducted on the computer game playing audience, the majority of the computer game playing audience consists of people aged 24 and under.

Level of Education



According to the survey we conducted on the computer game players, the education level of the computer game players is mostly between secondary school and undergraduate.

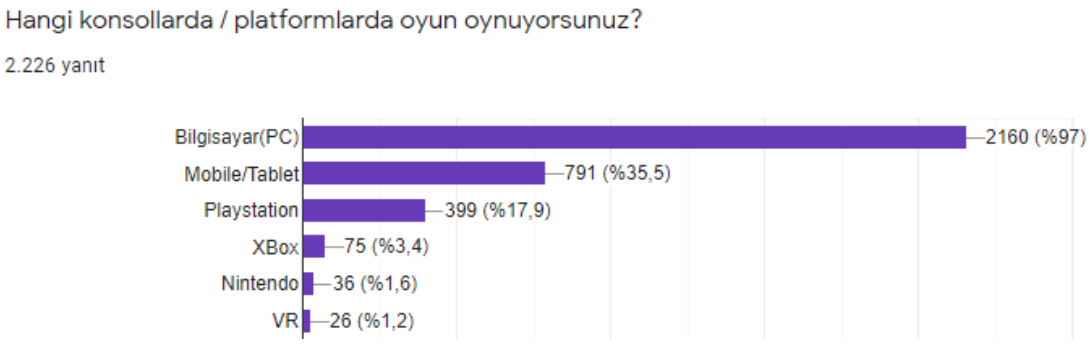
Do you play online games?

98.4% of the audience I sent the survey to play online games. Therefore, I can say that the survey reached the right audience.

How many years have you been playing online games?

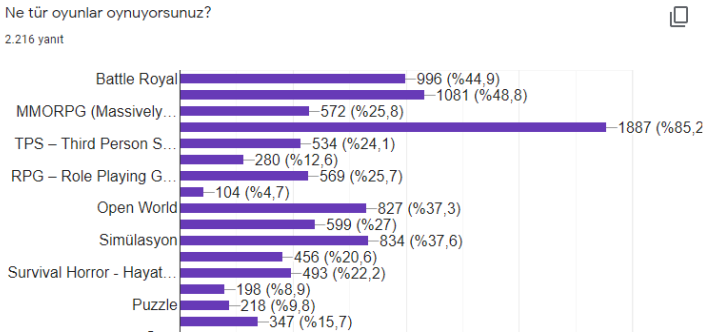
According to the survey we have delivered to the audience playing computer games; there is a balanced distribution of the audience playing computer games. The number of people who have just started playing games and those who have been playing games for years are very close to each other. This is why we can say that the new player audience will increase even more.

What consoles / platforms do you play games on?



According to the survey we conducted with the audience playing computer games; the majority of the audience playing computer games play games on Computer (PC). The number of people playing games on mobile devices is also quite high.

What kind of games do you play?



According to the survey we conducted with the audience playing computer games; the types of games played by the audience playing computer games are shown in the graph above. We can say that the audience we reached generally does not focus on a single type of game but plays more than one type of game.

Have you ever attended a live e-sports event as a spectator?

According to the survey we sent to the audience playing computer games; 30% of the audience playing computer games have attended a live e-sports event. We will examine it in more detail in the other question.

If you haven't participated yet, would you like to participate?

According to the survey we conducted with the audience playing computer games; 69.7% of the audience playing computer games had not attended a live e-sports event, but 80% of the same audience wanted to attend a live e-sports event. If enough dissemination is achieved, an active live audience can be formed.

Have you participated in an amateur or professional e-sports tournament?

According to the survey we conducted among the computer game players, 30% of the computer game players participated in an amateur tournament.

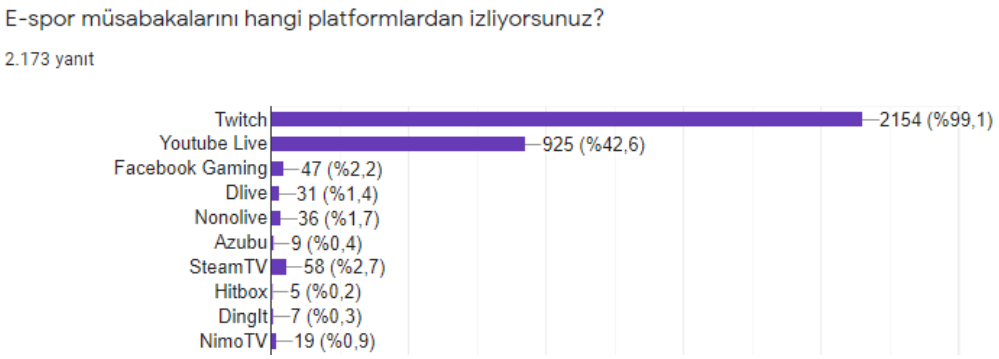
Do you think e-sports is a real sport?

According to the survey we conducted among the computer game players, 80.1% of the computer game players think that e-sports is a real sport.

How often do you watch e-sports competitions?

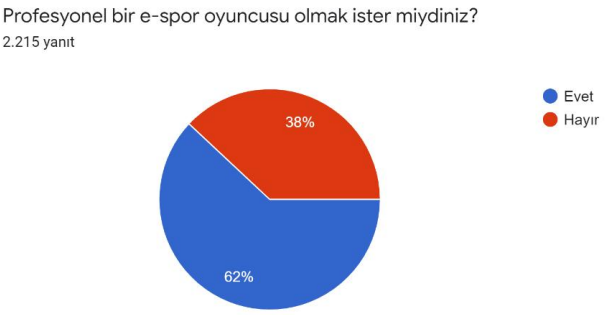
According to the survey we conducted with the audience playing computer games, it is seen how often the audience playing computer games watches e-sports competitions. We can say that 63.2% of the audience mostly follows the competitions.

On which platforms do you watch e-sports competitions?



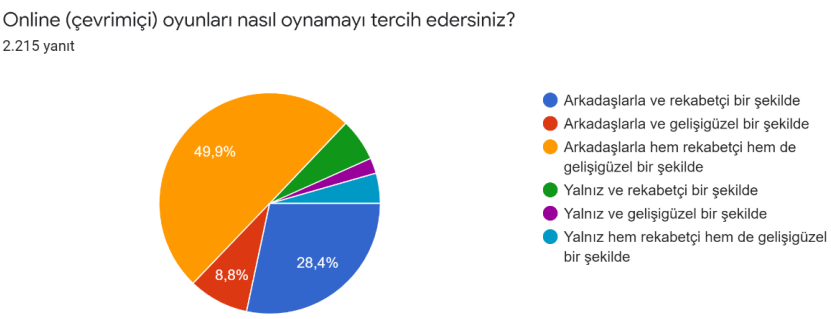
According to the survey we conducted with the audience playing computer games; a large portion of the audience playing computer games follows the competitions on the Twitch platform. It seems that Youtube Live has a significant audience.

Would you like to be a professional e-sports player?



According to the survey we conducted among the computer game players, 62% of the computer game players want to be e-sports players.

How do you prefer to play online games?



The gaming styles of the audience we reached can be seen in the survey above. If we look at the majority, the audience that wants to play games alone is quite small. They usually prefer to play games with friends.

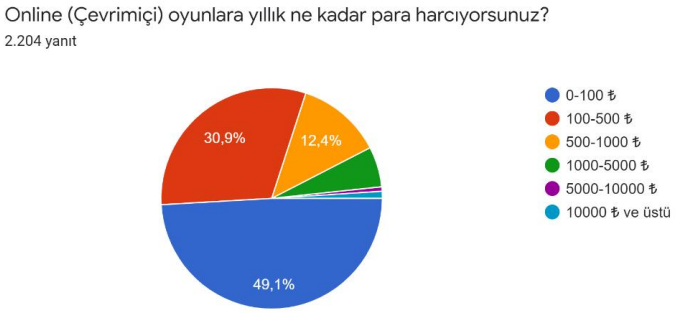
Do you think e-sports should be considered a professional sport like 'traditional' sports?

According to the survey we conducted with the audience playing computer games; 71.8% of the audience playing computer games think that e-sports can be seen as a traditional sport. This shows how much e-sports will develop in the future.

Do you think e-sports are sustainable?

According to the survey we conducted among the video game players, the majority of the video game players think that e-sports will develop and grow even further.

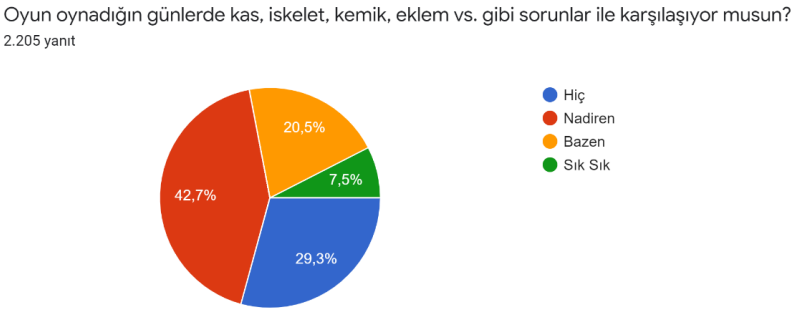
How much money do you spend on online games annually?



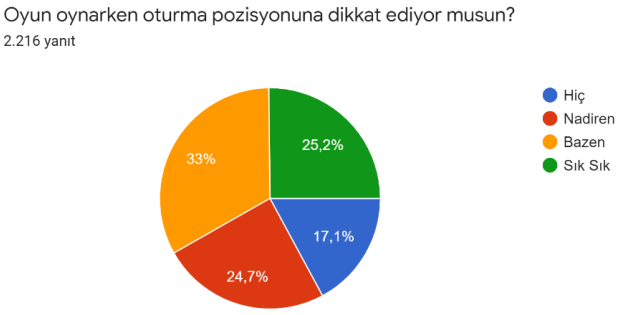
According to the survey we conducted with the audience playing computer games; 49.1% of the audience playing computer games spend very little money on games. 29% of the audience spends a significant amount of money.

Do you experience problems such as eye pain, eye fatigue, vision problems, etc. on the days you play games?

Do you experience any problems such as muscle, skeleton, bone, joint etc. on the days you play games?



According to the survey we sent to the mass playing computer games; health problems such as muscle, skeleton, bone, joint etc. rarely occur in the mass playing computer games. 28% of the mass feels these pains and their health is affected.*Do you pay attention to your sitting position while playing games?*



We know that the majority of pains such as muscle, skeleton, bone, joint etc. are related to the sitting position. As we see in the survey results, the number of people who pay attention to their sitting position is quite low.

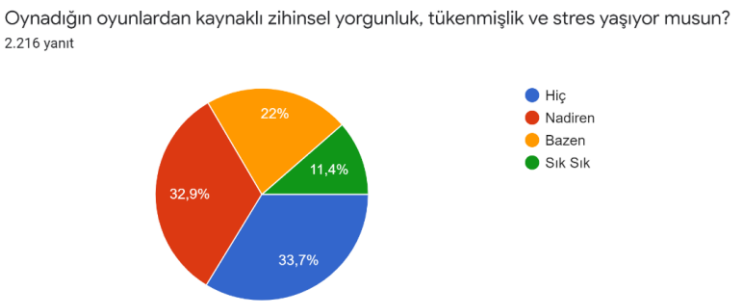
Do you use an ergonomic chair in your gaming setup?

The percentage of people using ergonomic and orthopedic chairs is quite low, so it can be said that pain in muscles, skeleton, bones, joints, etc. will increase.

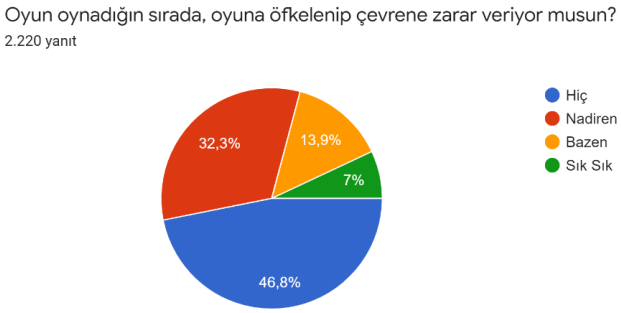
Do you experience eating disorders on the days you play games?

Do you experience sleep disorders on days when you play games?

Do you experience mental fatigue, burnout and stress due to the games you play?



While playing a game, do you get angry at the game and harm those around you?



According to the survey we conducted with the audience playing computer games; only 46.8% of the audience playing computer games do not get angry because of the game and do not harm the environment. The remaining large audience can harm themselves and the environment.

Discussion

The findings of this study highlight significant insights into the perspectives and behaviors of computer game players regarding e-sports, shedding light on its growing importance as a professional and social phenomenon. Firstly, the survey results reveal a strong interest in e-sports among young gamers, with 71.8% recognizing it as a professional sport and 62% expressing aspirations to become professional players. This aligns with the increasing acceptance of e-sports as a legitimate discipline, comparable to traditional sports. The recognition of e-sports as a career path reflects its evolution from a recreational activity to an industry offering diverse professional opportunities, including roles such as players, coaches, analysts, and event organizers. Secondly, the high level of engagement with online gaming and e-sports content underscores the central role of digital platforms such as Twitch and YouTube Live. The fact that 63.2% of participants frequently watch e-sports competitions highlights the importance of live streaming in fostering community engagement and enhancing the visibility of the industry. This trend suggests that streaming platforms are not just entertainment hubs but also critical tools for promoting e-sports and connecting global audiences.

The study also emphasizes the demographic concentration of e-sports enthusiasts, with 93% of participants being under 24 years old and predominantly male. This demographic skew raises important questions about inclusivity and the potential to attract a more diverse audience, including female gamers and older individuals. Strategies to address this gap could include targeted outreach, creating inclusive gaming communities, and encouraging representation within the e-sports ecosystem. Another noteworthy finding is the participants' preference for PC gaming, which remains the dominant platform despite the rise of mobile gaming. This preference can be attributed to the competitive edge, precision, and advanced features offered by PC systems, which are particularly advantageous for e-sports titles. However, the growing popularity of mobile gaming presents an opportunity for the industry to broaden its reach and cater to a more casual audience. Health-related challenges associated with gaming were also highlighted, with a significant portion of participants reporting

issues such as eye strain, musculoskeletal discomfort, and poor posture. This underscores the need for educational initiatives and ergonomic interventions to promote healthier gaming practices. Additionally, the relatively low adoption of ergonomic chairs and attention to proper sitting posture among gamers suggests an area for improvement in fostering long-term well-being within the community. The enthusiasm for live e-sports events, with 80% of participants expressing interest in attending, demonstrates the potential for these events to strengthen the sense of community and engagement among fans. However, the relatively low percentage (30%) of participants who have attended such events indicates a gap that could be bridged through better accessibility, increased promotion, and affordable ticketing options. Finally, the study reveals that e-sports is not only viewed as entertainment but also as a sustainable and growing field. Most participants believe in its continued development, suggesting optimism about its future trajectory. This positive outlook aligns with broader industry trends, including increasing investments, expanding tournament offerings, and the integration of e-sports into educational institutions.

In conclusion, this study highlights the dynamic and rapidly evolving nature of e-sports, driven by strong youth engagement, digital innovation, and growing professional opportunities. Addressing challenges such as inclusivity, health concerns, and accessibility will be critical for ensuring its long-term sustainability and success. Future research could explore strategies to diversify participation, enhance health awareness, and leverage technological advancements to further enrich the e-sports ecosystem.

References

Argan, M., Ozer, A.,& Akin, E. (2006).”Electronic Sports: Attitudes and behaviors of cyber athletes in Turkey”. Journal of Sports Management and Information Technologies. 1(2): 1306-4371

Coskun, Engin, and Mesude Canan Öztürk (2016). "Steam world: an evaluation of digital game blogs." Gümüşhane University Faculty of Communication Electronic Journal. 4(2): 667-702

Hamari, J.& Sjöblom M.(2015). “What Is eSportsandWhy Do People Watch It?” Internet Research.27(2):211-232.

Karahisar, T. (2014). “ The status of the digital game industry in Turkey”. International Art, Design and Manipulation Symposium, 21-23 November 2013, Sakarya: Sakarya University Faculty of Fine Arts Publications: 107-115.

Mustafaoğlu, R. (2018) e-Sports, Sports and Physical Activity, National Journal of Sports Sciences, 2(2), 84-96

Wagner, M. G. (2006). On the Scientific Relevance of eSports.. In HR Arabnia (ed.), International Conference on Internet Computing (p./pp. 437-442)

Analysis of Self-identified Institutional Values among High Research Capacity HBCUs

Verleen McSween-Missole

University of the Virgin Islands, U.S. Virgin Islands, U.S.A., https://orcid.org/0009-0001-0153-8588

Abstract: Among Historically Black Colleges and Universities (HBCUs), only 10 percent of institutions currently meet the criteria for designation as a "high research activity institution (R2)", as designated by the Carnegie Classification of Institutions of Higher Education. Despite this occurrence, other Minority Serving Institutions (MSIs) also have aspirational goals to expand their capacity to fund and conduct quality research, as well as develop critical infrastructure to achieve sustainability of their research efforts. Engagement of a diverse set of institutional types is needed to expand national research capacity in STEM and maintain the competitive advantage of the U.S. in STEM innovation and prepare faculty and students from underrepresented backgrounds for the future STEM workforce. A better understanding of the core values of high research capacity institutions may provide greater insight into the factors that contribute to their effectiveness in building institutional research capacity and maintaining sustainability of their efforts, while providing a road map for other MSIs to achieve success in research and development. Thematic analysis was utilized to evaluate the core values of 11 high research capacity HBCUs as noted in their respective institutional strategic plans. Analysis revealed 7 emergent themes that characterize these institutions. The two most frequent themes were Community and Excellence. Additional themes included Respect/Integrity, Innovation, Social Responsibility, Accountability, and Diversity & Inclusion. This collection of shared values may be one of the key factors leveraged by R2 HBCUs to promote research capacity building. This insight may provide a model for value- based decision making to support research capacity and sustainability at MSIs and broaden participation of faculty and students from underrepresented backgrounds in STEM-related research.

Keywords: Historically Black College and University (HBCU), Research Capacity Building (RCB), Carnegie Classification of Institutions of Higher Education (CCIHE), Institutional values

Citation: McSween-Missole, V. (2024). Analysis of self-identified institutional values among high research capacity HBCUs. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024--International Conference on Social and Education Sciences* (pp. 121 -132), Chicago, IL, USA. ISTES.

Introduction

There are approximately 101 Historically Black Colleges and Universities (HBCUs) within the U.S. (NCES, n.d.) HBCUs are institutions of higher education established prior to 1964, with a principal mission of serving the educational needs of the African American community (NCES, 2010). Among HBCUs, only 10 percent of

institutions (11 institutions) currently meet the criteria for designation as a “high research activity” institution (CCIHE, n.d.-b), while no HBCUs have attained the designation of “very high research activity” institution (CCIHE, n.d.-c). Despite this occurrence, these “high research activity” or R2 HBCUs and other Minority Serving Institutions (MSIs) have aspirational goals to expand their capacity to fund and conduct quality research, as well as develop critical infrastructure to achieve sustainability of their research efforts.

These 11 R2 doctoral institutions, as designated by the Carnegie Classification of Institutions of Higher Education, are characterized as having total research expenditures of more than 5 million dollars and having awarded a minimum of 20 research/scholarship doctorates (CCIHE, n.d.-a). While “Very high research activity” or R1 doctoral institutions meet the same criteria, in addition to having a higher level of research activity as assessed by a research activity index that considers several factors correlated to research: “research & development (R&D) expenditures in science and engineering; R&D expenditures in non-S&E fields; S&E research staff (postdoctoral appointees and other non-faculty research staff with doctorates); doctoral conferrals in humanities, social science, STEM (science, technology, engineering, and mathematics) fields, and in other fields (e.g., business, education, public policy, social work)” (CCIHE, n.d.-a). However, under the soon to be revised and more succinct CCIHE framework in 2025 (CCIHE, n.d.-d), some current R2 institutions may receive the designation of R1 (Zhang, 2024; NSTC, 2024; Fletcher et al., 2024).

Research capacity building (RCB) is the process of enhancing the ability of individuals and institutions to develop, implement, and sustain high- quality research and research infrastructure.

The National Science and Technology Council (NSTC) is tasked by the Executive Branch of the U.S. government to coordinate science and technology policy across federal entities that engage in research and development (NSTC, n.d.). Its 2024 report, “Advancing Research Capacity at High Research Activity Historically Black Colleges and Universities” identified 7 barriers to navigating federal funding that hinder the advancement of research and development in STEM fields at HBCUs. These barriers included: difficulty identifying funding across a diffuse and complex federal funding terrain; insufficient technical assistance; limited opportunities to build institutional capacity; limited clarity on how institutions build capacity; partnerships that are non-mutually beneficial; bias in the review process; and limited post-award information that HBCUs can use to inform funding opportunity selection (NSTC, 2024). Many of these challenges are also faced by other minority serving institutions (NSTC, 2024). To address these identified challenges, NSTC proposed practices that can be adopted by federal agencies to strengthen and enhance research capacity at HBCUs (NSTC, 2024). These recommendations included: Strengthen outreach and engagement activities; provide comprehensive technical assistance and training; increase the flexibilities and expand the funding available to support institutional capacity; demystify the funding process and support clearly defined pathways for building research capacity; Facilitate effective and equitable partnerships; combat biases during proposal review; and prioritize transparency (NSTC, 2024).

Research capacity building can be impacted by multiple factors related to research performance (Bland & Ruffin, 1992; Aydin, 2017). Bland & Ruffin (1992) identified 12 interdependent factors that promote high research productivity. Among these factors were "clear goals that serve a coordinating function" and "research emphasis" (Bland & Ruffin, 1992). Similarly, Aydin (2017) identified 51 factors, both internal and external, that impact research performance or research productivity. Among these were "leadership characteristics", "departmental culture supporting research", "institutional expectations regarding research". In a comparative study between high- and low- research performance groups, Edgar and Geare (2013) noted that features of high-performance research groups included achievement orientation, the extent to which norms and values are perceived to be shared, the commonality of research goals among departmental colleagues, and willingness to work toward achievement of shared research goals. One strategy for ensuring the development of clearly defined goals and expectations for institutional research productivity and performance is institutional strategic planning. The NSTC report noted that "all R2 HBCUs have included goals in their strategic plans to advance HBCUs' research capacities" (2024).

The strategic planning process and its outcomes may be influenced by an institution's strengths, weaknesses, threats, opportunities, (Helms & Nixon, 2010; Benzaghta et al., 2021) and values (Mueller, 2015; Hinton, 2022). Although values or a value statement is often an optional component of strategic plans, the strategic planning process should be grounded in and aligned with organizational values (Williams, 2002; Mueller, 2015; Hinton, 2022). Institutional values may guide value-based decision-making that informs the goal orientation of institutions (Fitzgerald & Desjardins, 2004; Mueller, 2015), such as the generation and implementation of aspirational goals related to research capacity building.

The R1 distinction has the ability to attract and retain research faculty, generate new research collaborations, and facilitate quality research experiences for undergraduate and graduate students. Although there are currently no R1 HBCUs, this subset of R2 institutions is at the forefront of research and innovation (Fletcher et al., 2024) and have embedded in their institutional strategic plans approaches and strategies to catapult them into the R1 designation (NSTC, 2024). These institutions can serve as a model for other minority serving institutions to strategically plan to enhance their research capacity and infrastructure which may promote greater equity in their access to research and funding opportunities. Engagement of a diverse set of institutional types is needed to expand national research capacity in STEM and maintain the competitive advantage of the U.S. in STEM innovation and prepare faculty and students from underrepresented backgrounds for the future STEM workforce.

A better understanding of the core values of these institutions may provide greater insight into the factors that contribute to their effectiveness in building institutional research capacity. These institutions may have shared values which are leveraged to promote research capacity building. This collection of values may be potentially emulated by other minority serving institutions that experience challenges in expanding their research capacity. The current article seeks to address the question, what are the emergent values that characterize high research

activity HBCUs? How can these institutional values impact research capacity building at minority serving institutions?

Method

HBCUs that met the criteria for R2 designation were identified using the institutional search tool on the Carnegie Classification of Institutions of Higher Education's website. An online search for the current or the most recent strategic plans of all R2 HBCUs was conducted. The strategic plans of each institution were reviewed to identify sections of the document that clarified the core institutional values of the respective institution. Self- identified institutional values were collated and Delve CAQDAS (computer- assisted qualitative data analysis software) was utilized as the tool to facilitate qualitative analysis via inductive coding. A single grader reviewed the text to ensure familiarity with the content prior to analysis, subsequently initial codes were generated. These codes were then analyzed and sorted into categories. The emergent categories were identified as emergent themes.

Results

Utilizing data from an institutional search on the CCIHE website, R2 institutions were found to represent approximately 3.38% of all institutions of higher education. Of this small cohort, R2 HBCUs represent only 8.27% of all R2 institutions nationwide. R2 HBCUs included: Prairie View A&M University, Southern University and A&M College, University of Maryland Eastern Shore, Tennessee State University, North Carolina A&T University, Morgan State University, Florida A&M University, Clark Atlanta University, Jackson State University, Howard University, Texas Southern University.

Thematic analysis of institutionally self- identified values contained in the respective strategic plans of the 11 high research activity HBCUs led to the identification of 7 core values across these institutions: Respect/Integrity, Community, Innovation, Social Responsibility, Excellence, Diversity & Inclusion, and Accountability. Institutions were found to have a variable number of established values, the maximum number of values for any institution was 8, while the minimum number was 5 (mean= 5.8; stdev= 1.4). Some institutions simply listed their values, while others provided short descriptions of how the institutions exemplified the value. Only 2 institutions made reference to their identity as an HBCU: University of Maryland Eastern Shore and Jackson State University. Both institutions viewed their HBCU status from an asset-based lens, for example, University of Maryland Eastern Shore noted the value of HBCU culture and its importance in building a supportive community structure.

Only 5 of the 11 institutions referred to research in the description of their identified values. Morgan State University, Jackson State University, and Howard University referenced research within a list of other activities that promote institutional goals, while Clark Atlanta University and Texas Southern University indicated their

research -centric approach, indicated by terminology such as “research- focused” and “research- driven”, respectively.

Institutions that made direct reference to their present R2 classification within their strategic plans included: Clark Atlanta University, Tennessee State University, and Jackson State University. Whereas institutions that noted their aspirational goal or intention to strategically transition to R1 status included: Tennessee State University, Morgan State University, North Carolina A & T University, Florida A&M University. Other institutions did note their intention to increase research activities and implement support structures to expand research capacity at their respective institutions.

The current study identified several common values that characterize high research activity HBCUs. Although these values are not unique to R2 HBCUs, they provide insight into how these core values can be potentially leveraged by these institutions to expand their research capacity and ensure sustainability of their efforts. The most frequent theme was community followed by excellence, accountability, respect/integrity, diversity/inclusion, social responsibility, and innovation (See Figure 1; (x-axis: frequency of theme; y-axis: theme)).

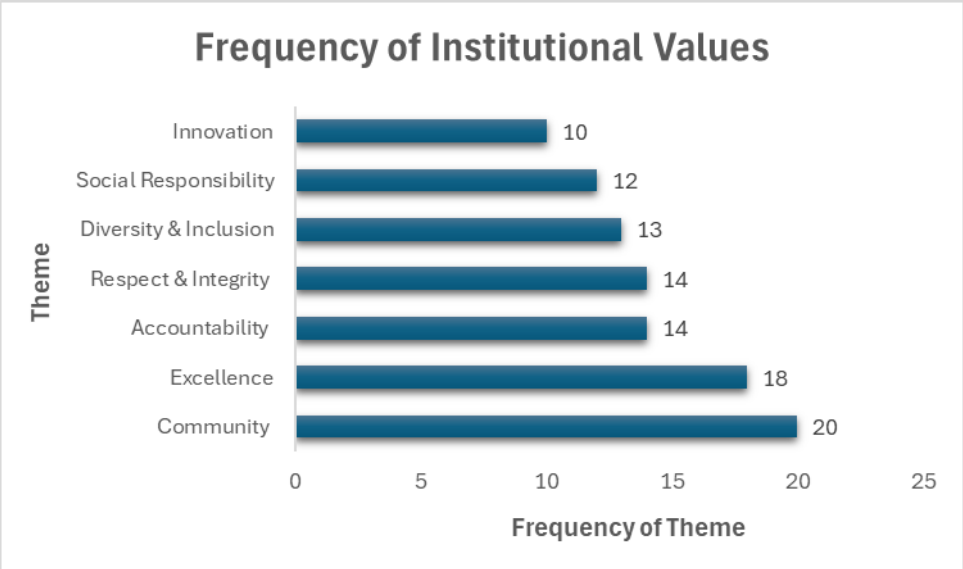


Figure 1. Histogram Of Emergent Themes from Self- Identified Institutional Values of R2 Hbcus.

Discussion

The following discussion provides insight into how value- based decision making at the institutional level can support research capacity and sustainability at MSIs and broaden participation of faculty and students from underrepresented backgrounds in STEM-related research.

Community

Community, the most frequent theme, was centered around HBCU identity, being "people- centric" or "student-centered". The idea of community involved not only creating community but serving the community. UMES described the university community as a family and noted unifying principles among the community such as work, support and celebration, while JSU "committed to creating a community" characterized by "nurturing", welcoming, and affirming "of persons from diverse backgrounds and experiences" and supporting these stakeholders in "the realization of their potential". Community was created through collaboration. TSU stated, "teamwork is our strength" and "working together, we achieve more" and linked the value of being research-driven to collaboration and excellence. SU A&M College noted "we are stronger and more effective when we work together as a team". CAU linked "collaboration and unity" among university stakeholders, such as students, faculty and staff as having the potential to add "to the University's body of knowledge". Similarly, UMES exemplified collaboration through "pursuing opportunities to work together across all parts of the campus". JSU also created community around the learning environment which integrates teaching, research, and service. Likewise, the TSU community adopts "a culture that enriches the learning experience, enhances critical thinking, and promotes a desire for life- long personal development.

Community provides an inclusive and supportive environment for scientists of color and other diverse backgrounds to be part of a thriving scientific community and promote a sense of belonging among groups that may currently be underrepresented in specific STEM disciplines. Community also facilitates networking, opportunities for mentorship, and networking among scholars in the same field and scholars in different disciplines that participate in team science to build interdisciplinary teams. This collaborative approach encourages sharing of resources and expertise across MSIs to support institutions that may lack research capacity in specific research areas. This community is further expanded to include other non-minority serving institutions, industry, and government partners that can collaborate to tackle challenging research questions that have a critical broader impact on communities of color, such as health disparities and environmental justice.

Excellence

Excellence, both institutional and academic, was a key characteristic among high research capacity HBCUs. Institutions sought to continually pursue excellence in numerous areas which included but were not limited to research, scholarship, teaching, academics, and workforce development. SU A&M College noted how integral excellence is to their overall success as an institution by describing it as the "hallmark of our endeavours", while HU and MSU explained that it undergirds their campus approaches and is integrated into "all aspects of the University's operation", respectively. Phrases that affirmed this sentiment included, "resolved in our commitment to...excellence", "making excellence a habit"; "committed to excellence"; "commit to high quality in all we do to achieve our noble cause" and "pursues excellence", TSU, HU, CAU, and MSU, respectively. This ethos is summed up by TSU as "united in everything we do, unbeatable at what we do, and unrelenting in

our approach to progress". It also "pursues excellence" by "making excellence a habit" and "ensuring excellence is at the forefront of our minds every day".

Demonstrated excellence in STEM research can lead to high quality and high-impact contributions to STEM fields. High standards of performance for faculty, students, and research centers can lead to enhancement in the number of successful grant proposals and peer- reviewed articles, as well as projects that move from research and development into tangible products that generate additional revenue for the institution. Such high caliber research can attract additional research faculty that have national recognition and expertise in their fields, which will continue to generate more funding for the institution. This level of excellence can further support training for graduate students at both the master's and doctoral level, increase the number of awarded doctoral degrees, as well as contribute to the development of new graduate programs in emerging fields of research. These outcomes can enhance student recruitment and retention for advanced degrees in STEM disciplines and contribute highly skilled researchers and professionals to meet the needs of the national STEM workforce.

Accountability

Accountability encompasses taking responsibility for actions or decisions. TSU noted a resolution to be successful in goal attainment and demonstrate accountability in its actions, while HU reaffirmed its commitment to transparency in governance and accountability. Some institutions linked accountability to effective leadership, stewardship, or high standards of performance. SU A&M College also linked accountability to "evidence- based planning and assessment".

Accountability for research outcomes and utilization of resources, which include research personnel, infrastructure and funding, are critical components of sustaining and expanding research capacity. Institutions must exercise effective stewardship, transparency, and fiscal responsibility in the administration of both federal and private funding to support research initiatives. Continual assessment of the progress of research initiatives is essential to maintaining the engagement of stakeholders that contribute to the success of institutional research efforts. Consistent reporting and completion of expected outcomes and deliverables as noted in grant proposals to funding agencies are a key consideration in receiving future funding from these agencies.

Respect & Integrity

To ensure success in reaching their aspirational goals, SU A&M College affirms a commitment "to professionalism, civility, and cooperation" as well as "to honor and preserve the individual dignity of everyone". This demonstrated respect extends to everyone "across the university system" and "across all levels of the university system". Similarly, MSU "treats each person equitably with respect and dignity in all situations". It also notes the anticipated code of conduct of members of its university community, for example, "honest communication, ethical behavior, and accountability for words and deeds". Other institutions also noted

expectations for their own moral conduct, NC A&T U demonstrates "moral character and unwavering ethical behavior", and SU A&M College conducts itself "in an honest, ethical and credible manner with an unwavering commitment to fairness and doing what is in the best interest of our students, faculty and staff". HU states that it "will reflect tenets of dignity and civility in all areas of engagement and support". Civil discourse enables respectful and productive conversations across differences. SU A&M College promotes "a culture of openness where individuals are encouraged to offer suggestions for improvement" aligned with the value of "courteous, ethical, and proactive two-way communication". Institutions acknowledge the benefits of "differing viewpoints", "diversity of thought", "all forms of differences, ideas and perspectives" and practice being "open-minded and tolerant of civil discourse", SU A&M College, TSU, CAU, F A&M U, respectively.

Respect for persons is a critical aspect of human subjects' research, and a crucial component to engaging communities of color in research participation considering the stigma that continues to persist due to historic exploitation of communities of color in scientific research, notably the Tuskegee Syphilis Experiment. Integrity and the broader application of research ethics supports the responsible conduct of research at institutions and compliance with federal guidelines. Research misconduct and non-compliance are detrimental, because either may block access to future funding opportunities and calls into question the reliability of research conducted at the institution. Civil discourse is important during critical and often uncomfortable conversations when science conflicts with societal values or worldviews. Engaging in civil discourse allows for the effective exchange of conflicting ideas, perspectives, and opinions among research groups. This approach can carry the conversation forward, enrich the literature of the respective field, and generate innovative ideas and lines of inquiry that evolve into strong grant applications that support further expansion of the institution's research capacity.

Diversity and Inclusion

Institutions embraced diversity of both people and ideas as a key asset leveraged to solve challenges and facilitate innovation. The importance of diversity or inclusion was highlighted with phrases such as "foundation of our university system", "essential to quality education", and leveraging differences as strengths. Terms such as "welcome", "embrace", "support", "commit" and "promote" communicated a notable appreciation of these values at the institutional level. HU noted an intentional alignment of its mission with the "nation's founding principles of equality, diversity and opportunity". MSU, NC A&T U, and CAU associated diversity or inclusion with a "global interdependent society", working together "for the advancement of the university and the world" and "collaboration".

Inclusion of diverse perspectives, experiences, and knowledge facilitates a strong culture of collaboration. Inclusion of individuals who are members of historically marginalized groups in STEM broadens participation of diverse students and faculty into the research community. These diverse teams can contribute to a multidisciplinary approach to solving complex challenges in emerging fields of research. Intra- and inter-institutional collaborations with diverse partners, in both industry and government can contribute to building sustainable research ecosystems that allow for effective sharing of resources and expertise.

Social Responsibility

Social Responsibility is an ethical concept that involves engagement of individuals and organizations for the benefit of the community or society. JSU noted that its HBCU identity "inspires and exemplifies positive societal change" and highlighted its belief in "the sanctity of the public trust". JSU set expectations for its own socially responsible conduct, such as, responding "to the needs of society to the best of its ability" and believing in and accepting its "duty to enhance each generation's capacity to improve the human condition". It further communicated its expectation that its graduates should do the same. SU A&M College engages in "doing what is in the best interest of our students, faculty, and staff". While HU strives for the development of "moral leaders who drive change and engage in scholarship that provides solutions to contemporary global problems, particularly ones impacting the African Diaspora".

Institutions can practice thoughtful planning that anticipates and minimizes the potential social and health impacts of engagement in research activities with vulnerable populations or the environmental impacts of developing physical infrastructure to support research activities. Strategically planned research agendas can also be constructed to meet the needs of the community, and address challenges faced by underserved populations. Such lines of research that have practical application to the immediate needs of the community can better engage community stakeholders, and secure funding from donors and funding agencies that value research initiatives that have a broader impact and promote the public good.

Innovation

Although innovation emerged as the least frequent theme in the analysis, it was still strongly highlighted by the institutions. TSU and CAU utilized terms such as "research- driven" "research- focused", respectively. SU A&M College emphasized being on a "fully engaged quest for improvement and innovation" and its intent to push "the boundaries of knowledge and possibility as we celebrate fundamental discoveries and practical applications alike".

Likewise, TSU and CAU describe their approaches as "innovative and entrepreneurial in deriving and advancing new ideas" and seeking to "ignite new possibilities in research and advance knowledge of humankind", respectively. TSU engages in "thinking beyond the obvious" and seeks to "demonstrate a higher level of creative thinking and use it to transform the world around us every day". Furthermore, MSU provides support for faculty, staff and students as they engage in scholarship around "the discovery and application of knowledge in teaching and learning and in developing innovative products and processes".

Innovation can promote an expansion of research capacity by engagement and adoption of new technologies, or the adaptation, refinement, or application of existing technology in a novel way. Integration of big data and artificial intelligence into existing workflows or the generation of entirely new applications for this emergent

technology can spur the creation of entirely new emergent lines of research and emergent research fields. MSIs can then become nationally recognized leaders in research, development, and application of this high-impact work and continue to make notable contributions to research in a myriad of STEM fields. National recognition and expertise on such a broad scale can promote access to additional funding to support the development of research infrastructure and personnel to continue to engage in high-capacity research.

Continued implementation of these 7 institutional values will have a positive impact on sustaining and expanding research capacity at these "high research activity" institutions. These values can be used to influence decision- making that will transition them into the "very high research activity" designation of the Carnegie Classification. This approach can set MSIs apart as regional and national leaders in research capacity building.

Limitations of the present study include the author's limited access to only publicly available and online versions of the strategic plans of the respective institutions. For example, some of the strategic plans covered different time intervals, and may have been close to the end of the life of the plan. Some institutions may presently be transitioning to new plans that incorporate additional or modified values that may further impact research capacity building. Some institutional strategic plans provided detailed descriptions of their values and how they applied them; however, others only listed their values. This consequentially may have reduced the richness of the data source.

Future studies regarding research capacity at minority serving institutions may investigate whether "high research activity" HBCUs share common strengths and opportunities that contribute to their research productivity and potential, or alternatively whether they share weaknesses and threats that may serve as barriers to building further research capacity, as well as an investigation of potential innovative solutions to combat these perceived challenges.

Conclusion

Although "high research activity" HBCUs represent only 10% of HBCUs nationwide, they can serve as effective models for research capacity building among minority serving institutions. The 7 core values of "high research activity" HBCUs may serve as critical drivers for the success of institutional goals to expand research capacity and infrastructure, as well as facilitate more equitable access to funding and sustainability of research capacity at minority- serving institutions.

Acknowledgements

This material is based upon work supported by the U.S. National Science Foundation under Grant No. 1946412.

References

Aydın, O. T. (2017). Research performance of higher education institutions: A review on the measurements and affecting factors of research performance. *Yükseköğretim ve Bilim Dergisi*, (2), 312-320. doi:10.5961/jhes.2017.210

Benzaghta, M. A., Elwalda, A., Mousa, M. M., Erkan, I., & Rahman, M. (2021). SWOT analysis applications: An integrative literature review. *Journal of Global Business Insights*, *6*(1), 54-72. https://www.doi.org/10.5038/2640-6489.6.1.1148

Bland, C. J., & Ruffin, M. T. (1992). Characteristics of a productive research environment: Literature review. *Academic medicine*, *67*(6), 385-97.

Callais, J., & Lawson, K. (2024). Impact of R1 classification on universities. *Applied Economics*, 1-13. https://doi.org/10.1080/00036846.2024.2364098

Carnegie Classification of Institutions of Higher Education. (n.d.-a). *Basic classification.* https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/basic-classification/

Carnegie Classification of Institutions of Higher Education. (n.d.-b). *Institution search: Basic doctoral universities: High research activity.* https://carnegieclassifications.acenet.edu/institutions/?basic2021__du%5B%5D=16

Carnegie Classification of Institutions of Higher Education. (n.d.-c). *Institution search: Basic doctoral universities: Very high research activity.* https://carnegieclassifications.acenet.edu/institutions/?basic2021__du%5B%5D=15

Carnegie Classification of Institutions of Higher Education. (n.d.-d). *2025 Research designations.* https://carnegieclassifications.acenet.edu/carnegie-classification/research-designations/

Edgar, F., & Geare, A. (2013). Factors influencing university research performance. *Studies in Higher Education*, *38*(5), 774-792. https://doi.org/10.1080/03075079.2011.601811

Fitzgerald, G. A., & Desjardins, N. M. (2004). Organizational values and their relation to organizational performance outcomes. *Atlantic Journal of Communication*, *12*(3), 121-145. https://doi.org/10.1207/s15456889ajc1203_1

Fletcher, T. L., Nicholson, S., Carr, C. A., Fletcher, T., & Boyd, B. (2024, June). Race to R1: An analysis of Historically Black Colleges or Universities (HBCUs) potential to reach Research 1 Carnegie Classification®(R1) status. *In 2024 ASEE Annual Conference & Exposition*. https://discovery.fiu.edu/display/pub302104

Helms, M. M., & Nixon, J. (2010). Exploring SWOT analysis–where are we now? A review of academic research from the last decade. *Journal of Strategy and Management*, *3*(3), 215-251. https://doi.org/10.1108/17554251011064837

Hinton, K. E. (2022). Components of a strategic plan: Align institutional mission, vision, and values through the strategic planning process. *Planning for Higher Education*, *50*(4), 30-33.

https://www.proquest.com/openview/c817d400fd9f2dbe08bb3f59b9f4e352/1?pq-origsite=gscholar&cbl=47536

Mueller, R. A. (2015). Do values drive the plan? Investigating the nature and role of organizational values in university strategic planning. *Tertiary Education and Management*, 21, 41-55. https://doi.org/10.1080/13583883.2014.998270

National Center for Education Statistics. (2010). *Status and trends in the education of racial and ethnic minorities.* U.S. Department of Education. https://nces.ed.gov/pubs2010/2010015/indicator6_24.asp#snapshot

National Center for Education Statistics. (n.d.). *College Navigator*. U.S. Department of Education. https://nces.ed.gov/COLLEGENAVIGATOR/?s=all&sp=4&pg=1

National Science and Technology Council. (2024). *Advancing research capacity at high research activity Historically Black Colleges and Universities*. https://www.whitehouse.gov/wp-content/uploads/2024/05/CoSTEM-HBCU-Report.pdf

National Science and Technology Council. (n.d.) The White House. https://www.whitehouse.gov/ostp/ostps-teams/nstc/

Williams, S. L. (2002). Strategic planning and organizational values: Links to alignment. *Human Resource Development International*, *5*(2), 217-233. https://doi.org/10.1080/13678860110057638

Zhang, R. (2024). Building up research capacity at minority institutions. Committee on the development of a plan to promote defense research at Historically Black Colleges and Universities, Tribal Colleges and Universities, Hispanic-Serving Institutions, and Other Minority-Serving Institutions. https://nap.nationalacademies.org/resource/27838/Zhang_Commissioned_Paper.pdf

International Conference on Social and Education Sciences

www.iconses.net October 17-20, 2024 Chicago, IL, USA www.istes.org

Enhancing the CPL Process in Business Education Through Advisor Support

Renata Kochut

SUNY Empire State University, USA, https://orcid.org/0009-0001-1555-225X

Thomas Brady

SUNY Empire State University, USA

Abstract: This paper examines the Individualized Credit for Prior Learning (CPL) process in business education. It highlights its role in accrediting students' experiential learning and bridging practical experience with academic credit. This research then recommends solutions that include AI tools, advisor training, and centralized resource hubs. Most promisingly, integrating AI tools helps identify skills, suggests alignment with academic competencies, and provides personalized feedback on students' submissions. It also passes through the ethical dimensions of responsible AI implementation, like data privacy, fairness, and transparency. These findings suggest that advisor support, coupled with AI-enhanced tools, would not only increase the quality of submissions but also make the process more effective and accessible. Integration of this technology into the targeted support strategies will help the iCPL process serve a broader student population and thus foster greater inclusivity and lifelong learning opportunities in higher education.

Keywords: iCPL, Prior Learning Assessment, Business Education, Advisor Support, Experiential Learning.

Citation: Kochut, R. & Brady, T., (2024). Enhancing the CPL Process in Business Education Through Advisor Support. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 133 -143), Chicago, IL, USA. ISTES.

Introduction

SUNY Empire State University defines Individualized Credit for Prior Learning (CPL) as the process by which the university evaluates a student's knowledge for possible college-level learning obtained through experiences outside the traditional college classroom, such as workplace training, personal research and special interests (SUNY Empire State University, n.d.). This process is very important for bridging the gap between practical experience and academic achievement through recognition, validation, and awarding credits for real-world learning. It creates a much more flexible, inclusive, and accessible means of completing degrees by helping students turn their professional and personal experiences into recognized academic achievements. The iCPL process also lets students complete their education in a shorter time because they can skip courses they have already mastered through their experiences, allowing them to focus on more advanced topics that align with

their career goals. This enhances student engagement and promotes a deeper understanding of the subject matter, as learners can apply their knowledge in practical settings. In addition, many professionals who have gained knowledge throughout their years of work but without formal credentials find that this approach validates their skills and opens new doors for career advancement. This process lets students customize their learning pathways based on academic requirements, individual experiences, and career goals. This flexibility encourages lifelong learning and empowers individuals to take charge of their education, ultimately leading to a more skilled and adaptable workforce. Incorporating prior learning credits in higher education also lowers tuition costs. Fewer courses lead to reduced expenses and reduced opportunity costs. Instead of learning the knowledge that students already possess, they can use their time of work, leisure, or learning new skills. This, in turn, makes higher education more accessible to a broader range of people, including those who may have previously felt excluded from traditional educational systems, such as non-traditional students, veterans, and often people with disabilities. The CPL can be used not only for the professional learning experience. Students can earn college-level credits for the expertise they gain through hobbies, volunteer work, or community engagement, which promotes a holistic approach to education that values diverse backgrounds and perspectives. This more holistic view of learning recognizes that education does not always happen within formal settings; other environments may enrich one's life and that of their community.

Literature Review

Research on credits for prior learning focuses primarily on its significance in recognizing and accrediting experiential learning, benefiting students, employers, and society. The CPL process allows learners to gain academic credit for knowledge and skills obtained outside traditional educational settings, such as work or military experiences (Lipinski et al., 2023) (Bergman & Favoroso, 2020). Cherrstrom et al. (2023) find that using prior learning assessment primarily benefits non-traditional students, who often show high amounts of analytical thinking and are highly motivated; this aligns well with their drive for achievement and recognition. Another part of the literature focuses on the assessment methods. The CPL process can be conducted through several assessment methods, including portfolio-based evaluations, examinations, and equivalency determination. These methods are critical to ensure that learning recognition is rigorous and valid. (Lipinski et al., 2023; Treis Rusk and Smith, 2022). Algorithmic extraction of skills from learners' artifacts and course syllabi has been explored to improve the accuracy of CPL. However, careful guidance and faculty involvement are required to ensure course-level correspondence. (Welsh & Ruda, 2024). Institutions like Lancang Kuning University have implemented CPL programs to improve educational accessibility and lifelong learning opportunities, recognizing learning from formal, non-formal, and informal education (Junaidi & Irwanda, 2023). Moreover, the research has shown that CPL can also provide positive job market outcomes, including increased employment opportunities, wage levels, and job formality, and it might have more favorable effects for women than men in specific contexts (Nakata et al., 2021). The authors have argued that women reported higher employment opportunities, wages, confidence in their abilities, and job prospects, among other related things, compared to their male counterparts. While this offers many benefits, CPL also presents epistemological

challenges and raises questions of knowledge ownership, which require continuing dialogue and adaptation in educational practices (Abdulrauf, 2022; Apps, 2021). Abdulrauf (2022) asks what is legitimate knowledge and how it is measured. He argues that the traditional assessment of knowledge relies heavily on standardized testing and formal credentials of education, which may not fully capture the experiential learning of the individual. He adds that by bringing their prior learning for assessment, learners dispute the conventional view that knowledge can be gained only through formal education. The author also admits, in the conclusion, that recognizing prior learning offers opportunities for a more inclusive and equitable educational landscape. Finally, as CPL becomes more standardized, it is expected to play a crucial role in enhancing educational attainment and addressing the evolving needs of the workforce (Bergman & Favoroso, 2020).

The current studies recognize that advisors play an essential role in the CPL process as they help facilitate recognizing and integrating students' previous experiences into their current higher education. The integration of advising with CPL assessment is particularly beneficial for adult learners returning to education, as presented by the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant evaluations. This study highlights the importance of advising in enhancing the effectiveness of PLA strategies (Palmer et al., 2021). As practitioners, advisors often help students apply holistic approaches to assessment processes that are tailored to fit students' needs, ensuring that assessment is not only about metrics but also that students are supported and receive feedback throughout the process (Moss et al., 2016). In Irish higher education, advisors contribute to recognizing prior learning by helping to navigate the policies and practices that support lifelong learning, thereby encouraging re-entry into formal education (Goggin & Sheridan, 2014). Advisors also play a crucial role in shaping the professional development of supervisors in higher education. They make sure that the recognition process aligns with the institution's requirements and each individual's unique learning experiences, therefore transforming professional identities and existing agency (Halttunen & Koivisto, 2013). Another example of Recognition of Prior Learning (RPL) showed how important the role of advisors is in technical and vocational education and training (TVET) in Australia. Knight (2005) finds they not only guide learners through the RPL process but also assist learners with documentation of their knowledge, provide one-on-one sessions to discuss learning experiences, make sure that the assessment standards are maintained, navigate policies and funding issues, and work to increase awareness and encourage participation on RPL process. The literature shows that advisors are pivotal in ensuring that CPL assessment is a transformative experience, enhancing student motivation, engagement, and academic outcomes while also addressing the broader challenges of time-to-graduation and educational costs (Starr-Glass, 2016).

Importance of CPL in Business Education

In today's rapidly changing job market, business education provides individuals with the skills necessary to adapt and thrive. On-the-job experience helps understand business concepts and fosters critical thinking, problem-solving, technology familiarity, and adaptability - skills essential for success in the business world. One of the major advantages of recognizing work experience and prior learning in business education is that it

benefits adult learners and professionals in many ways. This approach validates their existing knowledge, supports lifelong learning, and makes education more inclusive and effective. Looking closer at how real-world experiences are integrated into the curriculum, we would find that such practices may increase student engagement and retention, ultimately preparing a more competent workforce. For example, hands-on management experience gives learners very important leadership skills. Individuals gain practical experience in team leadership, conflict resolution, strategic decision-making, and driving change within an organization by directly applying their knowledge to real-life situations. This form of experiential learning allows individuals to develop skills needed for decision-making under pressure, team building, and adaptability—all those traits that are quite hard to learn from theory. Also, the theoretical framework in finance imparts an applied knowledge of financial markets, investment approaches, risk management, and hands-on real-time data analysis. This prepares students to maneuver through the complex financial landscape with decision-making abilities that could significantly influence their organizations' success.

The CPL Process at SUNY Empire State University

In order to be eligible for the Individualized Credit for Prior Learning Assessment at SUNY Empire State University, students have to fulfill several requirements. First, a student must be actively enrolled in one of the University's degree programs. The prior learning for which the student is applying must align with the degree plan. In particular, it should align with the program's guidelines and learning objectives. The learning assessed would need to be at the college level and represent a new learning. This learning often involves application and requires critical thinking, evidences the ability to analyze, synthesize, and integrate information. Importantly, this prior learning cannot overlap with any credits the student has already received or plans to earn in upcoming courses. These criteria mean that CPL can profoundly affect the student's academic goals.

The Individualized Credit for Prior Learning program at SUNY Empire State University recognizes that college-level learning can occur in many types of professional and personal experiences, provided they represent substantial development of knowledge and skills. Credits are not granted for the experience but for the learning that has been accomplished through the jobs in which skills have been developed in a field such as business, management, leadership, technology, or creativity. Among many, this can include management positions that require decision-making, team leadership, strategic planning, and entrepreneurial ventures with a business planning and financial management requirement. Also, professional certifications (like PMP or CPA), licenses gained through extensive study, and continuing education via non-credit professional courses are used in the learning assessment.

Moreover, volunteer experiences, especially in leadership or job training positions, military training that covers specialized skills, independent research, and creative accomplishments in fields like the arts or public speaking, can qualify for CPL. Finally, learning from non-accredited programs demonstrating significant, documented learning is another example of how students can gain college-level knowledge without sitting in a traditional

classroom. The steps involved in identifying and documenting college-level learning for CPL at SUNY Empire State University ensure that the knowledge the University evaluates meets academic standards. First, students work with an academic mentor/advisor in exploring experiences and identifying areas of learning that may be eligible for credit toward their degree plan. Through reflection and self-evaluation, students focus on knowledge gained at a college level, focusing on learning that can be verified rather than simply showing student experience.

Students write a detailed description of the learning, backed by relevant evidence such as certificates or work samples, and recommend a title, level of their knowledge, and number of credits for each area of learning. These documents are submitted through the online PLA Planner system and again reviewed by a mentor/advisor, who forwards them to the Office of Prior Learning for evaluation. The Office of Prior Learning assigns a qualified evaluator to interview the student to determine the depth and applicability of the student's learning. After the interview, the evaluator completes a credit recommendation report documenting the knowledge, specific credit distributions, and classifications. Finally, the faculty committee reviews the recommendation, and if it passes, the credits are officially put into the student's degree plan. This ensures the student gets recognition for prior learning experiences and creates a more personalized and effective educational path. During that process, the role of the student's advisor becomes very important as they walk the student through the steps and explain the requirements to prepare them properly for the evaluation.

The Role of Advisors in the CPL Process at SUNY Empire State University

Advisors play an essential role in assisting students in recognizing and expressing the relevant learning outcomes from their work experiences, which can be quite difficult. For example, an advisor, often a faculty member, who can be an expert in economics, mathematics, or humanities, has to read through students' résumés and discuss his or her experiences to determine whether they have the knowledge that can translate into college credits in fields that are entirely different than their educational expertise. This sometimes requires encouraging students to reflect on their leadership roles, project management experiences, or particular skills they have gained in their jobs. To give the best-informed advice, advisors often need to search online catalogs to find college-level studies that match student’s learning. They also need to provide clear, actionable feedback geared toward helping students address weaknesses and improve the clarity of the description of knowledge to meet the assessment standards. This could include suggesting ways to improve writing style or recommending more impactful examples of experiential learning.

To further assist students, advisors create or provide templates and rubrics for Individualized Credit for Prior Learning essays. These resources help students shape their stories about experiences in learning and comprehension, ensuring that they meet the academic standards, learning outcomes, and university policies. Advisors also help students break down the iCPL process into smaller, manageable tasks and establish deadlines

for each phase of the evaluation. Lastly, they guide students through reflective activities that prompt them to examine how their experiences have influenced their learning and academic development.

Challenges and Limitations for Advisors in the CPL Process

Advisors in the individualized credit for prior learning process face several challenges and limitations (Figure 1) that hinder effective implementation. One of the greatest challenges is finding the right balance between guiding students and encouraging independence. Advisors try to inspire students to take ownership of their learning by offering just the right support to deepen their understanding while, at the same time, urging them to be actively involved in the process. Reaching this balance helps students express and reflect on their experiences in a way that will meet academic expectations.

On top of that, the CPL process is quite lengthy and involves a deep commitment by advisors to sufficiently support students. Much of an advisor's time is spent guiding students through learning description writing and reviewing related documentation, not to mention providing numerous rounds of feedback. This ongoing process gives students needed support but causes a substantial time burden for advisors. Also, connecting prior learning to academic requirements can be very complicated. Advisors must ensure the knowledge and skills presented by students align with their degree programs and educational goals. Such alignment is important to ensure that students' prior experiences meet the high academic standards expected in higher education. Another challenge advisors face pertains to the readiness and awareness of students regarding the process. Many students need time and guidance to understand the CPL process and the technology that is used to facilitate the evaluation process. Advisers may play a crucial role in clarifying for students each step of the process: from documentation and evaluation to using specific web-based tools, so that they might feel adequately prepared to meet the demands of the program. Much of the struggle an advisor will encounter is in identifying and then expressing how a student's professional and life experience is comparable to college-level academic credit.

One of the significant challenges advisors often face is identifying and conveying how a learner's professional and personal experiences can be converted into college-level academic credits. Many adult learners have years of practical experience that can be hard to match with theoretical concepts or academic learning objectives. Advisors have to bridge the gap by connecting practical knowledge to academic competencies in a way that lays out a clear path toward receiving credits. Moreover, advisors have to be aware of industry trends, certifications, new technologies, and changes in the job market demand to make sure that the credits awarded are valid and useful for learners in their future careers. It also allows advisors to align students' skills and knowledge with relevant academic content and standards. Finally, advisors need to tailor their support strategies to meet the diverse needs of students from various educational, cultural, and professional backgrounds. This requires flexibility and awareness to offer personalized guidance that aligns with each student's circumstances, ensuring that all learners can effectively navigate the CPL process.

As a result, institutions must consider how to make this process seamless yet still ensure that quality learning and support are maintained between students and their advisors.

Figure 1. Challenges and Limitations for Advisors in the CPL Process

Addressing Challenges in the CPL Process

Improving the Credit for Prior Learning process in business education can benefit students by enabling them to gain academic credits for professional and personal experiences. Yet, the process can create some challenges for students and advisors. Addressing these challenges, therefore, requires solutions that can improve communication, technology-enabled tracking, and collaborative practices. Students should be incentivized to reach out for further help, as well as share their experiences. Effective solutions will offer comprehensive support to both advisors and students to streamline the CPL process. The institutions should provide continuous training and professional development for the advisors to help them remain at the forefront of CPL best practices, industry trends, and technological advances. With the rapid evolution of industry standards and academic requirements, structured learning opportunities make it easier for advisors to identify and assess learning from different fields. This informed guidance allows advisors to assess knowledge and skills impartially, making sure that the students receive adequate credit for their experiences (Sava & Shah, 2015; Garnett & Cavaye, 2015). Moreover, by training in effective communication and evaluation techniques, advisors are prepared to meet students of diverse backgrounds, which makes the CPL process fair and more consistent. In addition to advisor training, developing online tools and resources specific to the CPL process will be crucial. Online materials such as videos, workshops, or step-by-step instructions about documenting and presenting the knowledge gained from experiences are useful in providing clear guidance and reducing students' confusion and anxiety. When these resources are available to students, they can independently navigate the process, leading to higher-quality submissions and confidence in how they present their learning. Also, accessibility of resources

such as tutorials, FAQs, templates, and guides is crucial for a well-performing CPL program. Having these materials available to students throughout the entire process helps ensure that students have all the support they need at each step, minimizing confusion and improving the accuracy and completeness of their submissions. These resources serve as reference tools, helping students organize their essays and learning descriptions to meet academic standards and institutional requirements. As a result, this support takes the pressure off advisors by preparing students better and leading to fewer rounds of required rewrites. Another way institutions can support advisors is by creating a centralized CPL resource hub that acts as a one-stop shop with the necessary resources, guidelines, sample learning descriptions, and frequently asked questions. This portal should serve as an independent information hub for students, simplifying the process and giving advisors more time on other complex issues. Also, immediate access to in-depth resources helps create a more student-led learning process, which enables the advisors to provide more focused guidance. Also, improving communication between advisors and students can accelerate the CPL process. Providing clarity in communication enables students to better understand what is expected of them and any key deadlines, as well as allows advisors to provide timely and meaningful feedback. Establishing clear communication minimizes miscommunication and helps students feel supported. If students know ahead of time that they may come to their advisor with questions, they are more likely to do so, avoiding difficulties that would otherwise slow the process. Another important strategy involves the use of standardized evaluation rubrics. Rubrics help to evaluate prior learning in a fair, balanced, and objective manner, and institutions can develop and utilize them for this purpose. These standardized rubrics make it easier to grasp how to demonstrate college-level learning, clarifying for both advisors and students what is required to receive credit. These rubrics also present transparency in the evaluation process, increasing the credibility and reliability of the CPL program.

Additionally, institutions should implement customized advising strategies to address the unique needs of diverse student groups. To do so, providing professional development opportunities underlining understanding and supporting non-traditional and adult learners provides advisors with the skills to assist each student in achieving success, regardless of their background or experience level. Very often, adult learners bring valuable professional and life experiences, and personalized advising helps effectively connect these experiences with academic requirements. Advisors should be able to guide students through CPL process in a way that recognizes how each student is different, and thus, each path is different, which in turn sets up the opportunity for success for each student. One of the recent developments that can improve the Credit for Prior Learning process is the use of AI tools (e.g., Chat GPT, Gemini, or Copilot). AI tools can analyze students' resumes and personal backgrounds to identify college-level knowledge. This means that relevant skills and knowledge have a much better chance of being accurately identified, helping advisors focus their work on knowledge with the highest likelihood of earning credits. AI can also be beneficial in matching students' experiences with academic competencies and degree requirements, providing a clearer picture of how their prior learning aligns with their chosen programs. By analyzing the depth and breadth of learning, AI can recommend how many credits should be requested in the evaluation process, the learning level (introductory, intermediate, or advanced), and if this is liberal arts or applied learning. In addition, it can identify any educational gaps a student may have - areas in

which additional coursework or training will be needed to meet degree requirements. Moreover, AI can support advisors and students by providing bespoke recommendations for improving documentation—for instance, by suggesting fuller descriptions of particular learning outcomes or requesting further evidence for validated statements. AI offers a more efficient and individually tailored CPL process by assisting students in mapping their experiential history with their academic goals through the creation of individualized learning plans. This incorporation of AI into the CPL process not only empowers students to better articulate their learning but also increases the accuracy and reliability of credit evaluations. Although AI tools can provide significant benefits to the Prior Learning process, they also present important ethical challenges. One of the issues is ensuring that those evaluations supported by AI are fair and transparent.

It's essential to ensure that AI algorithms are developed to examine previous learning fairly and are monitored and adjusted to prevent unexpected discrimination against age, race, gender, or socioeconomic background. Transparency is also crucial in the process in order to help build trust in the system. Therefore, students should understand how artificial intelligence works and how tools analyze their experiences and generate recommendations. Privacy is another important issue that needs to be considered. Since AI scans personal CVs and backgrounds, institutions need to establish robust data security to protect sensitive student data. Finally, while AI suggestions can assist advisors in their work, the final decisions in assessing each student or learner should come from a qualified advisor and evaluator to strike a balance between technological efficiency and human insight, ensuring each student's unique learning experience is assessed both thoroughly and ethically.

Conclusion

The Credit for Prior Learning process presents a significant opportunity for students as it allows them to turn their past professional and personal experiences into academic credits, creating a more flexible and inclusive experience. However, this process has challenges, particularly for advisors, to balance guiding and fostering independence. They must also handle time-consuming tasks, align prior learning with academic standards, and adjust to varied student needs. Confronting these challenges requires innovative strategies like offering comprehensive training for advisors, creating centralized resource hubs, and incorporating AI tools. In this respect, AI tools could potentially bring tremendous value to the CPL process by helping with the accurate identification of skills and knowledge, recommending mapping to academic competencies, and providing focused feedback on submissions. If thoughtfully implemented - while keeping in mind data privacy, fairness, transparency, and other ethical concerns - AI can assist institutions in supporting both advisors and students. Having a balance between AI and human oversight ensures holistic evaluation of each student's unique learning.

Additionally, universal rubrics and personalized advising strategies are essential to maintain consistency and equity in assessment to be both accessible and equitable. With resources such as tutorials, templates, and a CPL resource hub that exists as centralized resources, students can be effectively guided through the process and document their learning in an independent and effective way. Also, merging technology with more targeted

support methods enhances the quality of the CPL process while supporting lifelong learning and student success. As higher education continues to evolve, refining the CPL process will play a crucial role in acknowledging varied forms of learning, cultivating a flexible workforce, and fostering a more inclusive academic environment.

References

Abdulrauf, B. M. I. (2023). Accreditation and Recognition of Prior Learning in Higher Education. *Handbook of Open, Distance and Digital Education*. https://doi.org/10.1007/978-981-19-2080-6_44

Apps, M. A. J. (2022). *Accreditation and Recognition of Prior Learning in Higher Education*. https://doi.org/10.1007/978-981-19-0351-9_44-1

Bergman, M., & Favoroso, V. (2021). *Enhancing Educational Attainment Through Prior Learning Assessment*. https://doi.org/10.4018/978-1-7998-1928-8.CH008

Cherrstrom, C. A., Boden, C. J., & Sherron, T. (2023). Nontraditional Students and Credit for Prior Learning—Analytical Thinking, Clout, Drives, and Motives. *The Journal of Continuing Higher Education*. https://doi.org/10.1080/07377363.2023.2222247

Clarke. J. B., Warr J. G. (1997). *Academic validation of prior and experiential learning: evaluation of the process.* Journal of Advanced Nursing, 26(6):1235-1242. doi: 10.1046/J.1365-2648.1997.00437.X

Garnett, J., & Cavaye, A. (2015). *Recognition of prior learning: opportunities and challenges for higher education*. https://doi.org/10.1108/JWAM-10-2015-001

Goggin, Deirdre, Sheridan, Irene, O'Leary, Phil and Cassidy, Stephen (2015) *A Current Overview of Recognition of Prior Learning (RPL) in Irish Higher Education (Focused Research Report No. 2).*

Halttunen, T., & Koivisto, M. (2014). *Professionalisation of Supervisors and RPL*. https://doi.org/10.1007/978-94-017-8694-2_11

Janakk, Lisa (2011) *A management model for the recognition of prior learning (RPL) at the University of South Africa*, University of South Africa, Pretoria, http://hdl.handle.net/10500/5801

Junaidi, J., & Irwanda, A. A. (2023). *The implementation of recognition of prior learning at Lancang Kuning University*. *Diklat Review*. https://doi.org/10.35446/diklatreview.v7i3.1377

Knight, B. (2006). *Assessment for recognition of prior learning in technical and vocational education and training in Australia: Where to go from here?* International Association for Educational Assessment. Retrieved from https://iaea.info/documents/assessment-for-recognition-of-prior-learning-in-technical-and/

Lipinski, T., Nelson, S. B., Spiteri, L., Wolfram, D., & Zahrt, C. (2023). *Prior Learning Assessment*. https://doi.org/10.4135/9781452276151.n320

Moss, L., Brown, A., Malbogat, L., & Tsomko, T. (2016). *Assessment Strategies in the Recognition of Prior Learning: The Practitioner's Perspective*. PLA Inside Out: An International Journal on Theory, Research and Practice in Prior Learning Assessment, 5. Retrieved from https://plainsideout.org/index.php/home/article/view/95.

Nakata, S., Sharma, U., Rahman, T., Rahman, M., & Aziz, M.-U. (2021). Effects of Recognition of Prior Learning on Job Market Outcomes. *Research Papers in Economics*. https://doi.org/10.1596/1813-9450-9644

Palmer, I., Nguyen, S., & Love, I. (2021). Supporting Student Connection to Prior Learning Assessment: The Role of Advising. *New Directions for Community Colleges*. https://doi.org/10.1002/CC.20437

Rusk, Diane & Smith, Lauren. (2022). Utilizing Prior Learning Portfolios to Rebundle Formal and Informal Learning. *Advances in Higher Education and Professional Development Book Series*. https://doi.org/10.4018/978-1-6684-3809-1.ch00710.

SUNY Empire State University (n.d.). *Prior learning for mentors and advisors*. SUNY Empire State College. Retrieved 11/3/2024, from https://sunyesc.sharepoint.com/sites/PriorLearningforMentorsandAdvisors

Welsh, A., & Ruda, A. (2024). Exploration of Skillification and Its Use in Awarding Credit for Prior Learning. *The Journal of Continuing Higher Education*. https://doi.org/10.1080/07377363.2023.2279808

Multilingual Educators: Identity and Literacy

Eli Garza

California State University, USA, https://orcid.org/0000-0002-5898-7501

Gilberto Barrios

California State University, USA, https://orcid.org/0000-0002-5898-7501

Abstract: This paper examines the ways in which multilingual educators view the development of their own professional identity as teachers of reading and literacy. Teachers who themselves possess biliteracy knowledge and skills are well-positioned to leverage their own understandings of language and literacy to engage their students' development in making meaning and effective expression. This study explored the extent to which teacher development of their identity as literacy educators incorporates their own linguistic diversity. The study focused on the ways practicing and preservice multilingual teachers view the influence of their biliteracy knowledge and skills on their role as teachers of English literacy, for all students both monolingual & multilingual. The study found that despite their potential advantage, multilingual educators frequently experience barriers that hinder them from recognizing the value of their biliteracy knowledge and skills to their role teaching English reading. This study found that development of the multilingual teacher's identity includes addressing these challenges. In addition, it found that embracing one's own linguistic diversity promotes educators' ability to leverage it as a professional, particularly within the context of literacy education.

Keywords: Education, Multilingual teachers, Literacy, Teacher professional development

Citation: Garza, E. & Barrios, G. (2024). Multilingual Educators: Identity and Literacy. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 144 -148), Chicago, IL, USA. ISTES.

Introduction

Education departments at both national and state levels in the USA look to increase the numbers of teachers of color and multilingual educators, by recruiting and retaining more multilingual educators (Carver-Thomas, 2018, Narrajo, 2023, Ceja-Williams & Nungaray, 2024,). "The U.S. Department of Education's Office of English Language Acquisition (OELA) has invested in recruiting, training, and retaining more educators to meet the needs of our nation's increasingly multilingual students (Ceja-Williams, B. & Nungaray, D. 2024). Among these efforts, one area of emphasis is on teacher training, specifically the professional development of bilingual educators (OELA, 2022) to meet the needs of English learners in America's schools. Professional development can "create opportunities" for bilingual individuals "to build successful professional careers as teachers"

(Narrajo, 2023). These efforts should adapt to address the assets and challenges of multilingual educators. A recent report by The Century Foundation explains that teacher education programs "are largely designed to prepare monolingual, English-dominant educators…" and they argue for the need "to amend systems so that talented, trained, motivated young bilingual adults can find their way to programs that better support the emerging bilingualism of young ELs" (Williams & Zabala, 2023). Central to this transformation is programs that value, acknowledge, and build upon the linguistic & cultural funds of knowledge and skills (Moll, et al., 1992) that multilingual educators bring with them to their professional development be that at the pre-service level or in-service level. While a great deal of research has been done around the benefits of culturally and linguistically responsive pedagogy for children in today's diverse classrooms (CDE, 2014), there is a lack of literature on how the professional development of multilingual educators use these same additive approaches.

Bilingual educators have an inherent wealth of knowledge and skills at their disposal for teaching literacy, including English literacy, to all students, including students for whom English is not their first language and bilingual students. Bilingual educators have biliteracy capacities that they use their daily lives as part of their lived experience that are also useful for literacy instruction. These include metalinguistic awareness and cross-linguistic knowledge and skills. For example, bilingual educators can use their capacities for translanguaging to support literacy learning in the classroom (Garcia & Wei, 2014). Similarly, they can use their biliteracy for contrastive analysis, highlighting similarities and differences between languages and teaching for transfer of literacy skills across languages (CDE, 2020).

The biliteracy of multilingual teachers (MLTs) is a valuable resource and a well-spring of potential advantages for the multilingual teacher's identity as a literacy educator. This initial study was part of a larger multi-year project exploring the professional development of MLTs. It focused on what MLTs think & understand about how their own experiences with linguistic diversity relate to their professional identity in their role as literacy educators.

Methods

This qualitative study used a Grounded Theory approach to analyzing the written texts for themes. The participants wrote responses to prompts on the topic of their multilingual and literacy teacher identity. These written responses were gathered and examined, including several close readings by both researchers. An inductive approach was used to identify & code the data for salient repeated words and repeating ideas. Key themes based on these were identified. Generalization of themes informed the development of the main conclusions used to answer the research questions.

Participants

Participants in the study (N=75) were all multilingual teachers (MLTs) who were bilingual and biliterate

individuals teaching in K-12 public school settings. These MLTs taught students in their classes who were bilingual and monolingual, as well as students who were classified as English learners. The participants in this study were enrolled in literacy professional development classes.

Data Collection

All participants in this study were enrolled in literacy professional development classes in which they engaged in readings and were given opportunities to write reflections based on prompts. Prompt choices included reflecting on their identity as multilingual, bilingual individuals and literacy educators. This included opportunities to reflect on their own linguistic and literacy experiences as well as their experiences with teaching literacy. The participants' responses to these prompts generated anonymous texts. These texts were gathered to be examined in this study.

Results

MLT experiences as English learners generated three key themes. Here is each theme and a representative quote. First, as English learners they experienced a deep desire for reading and a love for reading but found reading very difficult. Reading did not seem attainable due to language barriers reading experiences in English as a second language (L2). *"I have loved to read since I was a kid. English is my second language. Although I love to read, it was something I had difficulty with growing up. Even when I couldn't read the printed text, I would pretend to read.*"

Second, as English learners they experienced feelings of antipathy toward reading due to the struggles with language. The language barriers associated with reading in English (L2) produced anxiety, pressure, feelings of failure, lack of confidence. "*As an EL, I always struggled with my reading. In general, I felt pressure from everyone around me because I wasn't proficient. I hated reading and the anxiety that would come with it because I knew I was going to botch my words. I knew that I wasn't proficient enough to read the sentences clearly." "Growing up I always disliked reading. I only read books when it was obligated in school. Since Spanish was my first language, it was very difficult for me to comprehend the text. Most importantly I couldn't enjoy the content I read."*

Third, as English learners they experienced lack of positive, fun experiences with reading and being read to. Reading was sometimes not accessible in their first language (L1) nor in English (L2). *"I was never read to growing up from anyone in my family. My parents didn't read to me not even in Spanish because they were also learning how to speak and write in another language. They only knew how to speak their native language, Zapotec, and only got to attend school up to second grade.*"

MLT experiences as bilinguals/biliterate individuals generated three key themes. Here is each theme and a

representative quote. First, as bilinguals they experienced reading in their first language (L1) that modeled literacy. They had L1 literacy opportunities with their family as a child. These L1 reading models provided meaningful examples of literacy. *"I grew up hearing stories from my dad. My dad would deliver his stories so descriptively that I could vividly picture them. For this reason, I had very high standards for delivering stories to students." "My mother always made sure I had access to many books, and she was always playing music in our home. I feel that the experiences with my mom as a child instilled a love of reading and helping other people."*

Second, they had a deep understand their students' struggles with reading. They could recognize that their students struggles were similar to what their own had been. "*As a former EL student, I recognize in my own students their struggle of learning a new language and learning how to read it." "The adversity I have had to face has made me the person I am today. When I was a student, I always yearned to see someone who looked like me as the teacher. I know how important representation is to students whose shoes I was once in."*

Third, they were profoundly aware of how their first language to second language experiences shaped their teacher identity. They were convinced that these experiences with their linguistic diversity was a core factor in their teacher identity. *"My teacher identity is also influenced by my own educational journey and being a former emergent bilingual is a big part of that identity. This EB background has also helped me cultivate a unique perspective and relationship with reading."*

Discussion

The main question for this study asked if & how MLTs' own experiences with linguistic diversity influence their perceptions of their identity & role as teachers of reading/literacy. By generalizing the themes, the results of this study show that MLTs' own experiences of being an "English learner" and a bilingual/bicultural individual can shape MLT perception of identity as a literacy educator in both negative & positive ways. Despite the potential advantage of their biliteracy knowledge & skills to their role as literacy educators MLTs' experiences with their own linguistic diversity may complicate their ability to recognize its value. First, MLT identity as a literacy educator is profoundly informed by their own experiences with their linguistic diversity, (i.e., English Learner, bilingual, bicultural). Second, MLT literacy teacher identify incorporates their experiential knowledge in ways that both help them tap their biliteracy knowledge (i.e., understanding their students' struggles) and in ways that hinder them from tapping their biliteracy knowledge (i.e., low confidence). Third, MLT identity may vaguely but not clearly incorporate a working understanding of the potential advantages of their biliteracy knowledge & skills for teaching reading/literacy.

Conclusions and Implications

Given the results of this study, the authors have concluded that professional development for MLTs needs to

embrace a culturally and linguistically responsive pedagogy that values, acknowledges and builds upon the funds of knowledge that multilingual educators bring with them. Specifically, MLTs would benefit from professional development that engages with them in the follow four ways. 1) Acknowledges MLTs' personal experiences with their linguistic diversity & the insights gained from them; 2) Focuses on identifying the potential advantages of MLTs' biliteracy knowledge & skills for teaching literacy; 3) Teaches them to use literacy instruction strategies that draw from their biliteracy knowledge & skills as well as highlights their insights drawn from experience; 4) Focuses on increasing MLT competence & confidence. This study is the initial phase of the research and informs the next phase which will pursue researching the kind of professional development for MLTs described above.

References

California Department of Education (CDE). (2014). *The ELA/ELD Framework Chapter 9: Access and Equity.* California Department of Education, Sacramento, CA. Retrieved from https://www.cde.ca.gov/ci/rl/cf/documents/elaeldfwchapter9.pdf

California Department of Education (CDE). (2020). *Improving Education for Multilingual & English Learner Students.* California Department of Education, Sacramento, CA. Retrieved from https://www.cde.ca.gov/sp/ml/documents/mleleducationch1.pdf

Carver-Thomas, D. (2018). *Diversifying the Teaching Profession Through High-Retention Pathways (research brief).* Learning Policy Institute. Retrieved from https://learningpolicyinstitute.org/product/diversifying-teaching-profession-brief

Ceja-Williams, B. & Nungaray, D. (2024, October). *The Talent Before Our Very Eyes: Paving the Way for Future Bilingual Educators.* NCELA National Clearing House for English Language Acquisition (NCELA), Bethesda, MD Retrieved from https://ncela.ed.gov/blog/2024-10-15-awareness-the-talent-before-our-very-eyes-paving-the-way-for-future-bilingual

Garcia, O & Wei, l. (2014). *Translanguaging*. NY: Palgrave MacMillan.

Moll, L.C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms. *Theory Into Practice*, *31*(2), 132-141.

Narrajo, I. (2023, September). *Recruiting more Bilingual Teachers: The Challenges and Solutions.* Education Week. Retrieved from https://www.edweek.org/teaching-learning/recruiting-more-bilingual-teachers-the-challenges-and-solutions/2023/09

Office of English Language Acquisition (OELA). (2022, May). *Title III National Professional Development Program.* Washington, DC.

Williams, C. P. & Zabala, J. (2023, August). *How to Grow Bilingual Teacher Pathways: Making the Most of U.S. Linguistic and Cultural Diversity*. The Century Foundation. Retrieved from https://tcf.org/content/report/how-to-grow-bilingual-teacher-pathways-making-the-most-of-u-s-linguistic-and-cultural-diversity/

H5P Integrated Online Course Delivery for an Interactive Learning Experience

Wei Zhang
The University of Akron, Akron, Ohio, USA

Abstract: Driven by new modes of information dissemination in this digital age and propelled by the necessity for online course delivery during the recent pandemic, online eduation, the current form of distance education, is not only the trend but the reality of teaching and learning today. It utilizes the internet and computer technology to offer flexible, expanded learning experience to students. Quality online course delivery, like the traditional in-person instruction in a classroom, requires good pedagogical practices and techniques to engage students in the learning process. Video lectures enriched with embedded interactive activities are considered an effective approach to increase teaching presence and contributes to an engaging learning experience. This paper illustrates the use of this approch with H5P integrated online modules in a college level linguistic course delivered asynchronously to students in the United States. H5P is a plugin with enriched HTML 5 content to existing lecture videos that enables interactions between the instructor and students. It brings together the learning materials such as lecture videos, handouts, and hyperlinks as well as instructional activities such as Q&A, quizzes, discussion boards, and surveys for a seamless learning experience. Video lectures with H5P integration provide high levels of interaction and engagement that approximate a physical classroom. The effectiveness of this approach was assessed with student learning outcomes in two comparable courses delivered face-to-face in a classroom and asynchronous online.

Keywords: online learning, interactive learning experience, H5P

Citation: Zhang, W. (2024). H5P integrated online course delivery for an interactive experience. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 149 -156), Chicago, IL, USA. ISTES.

Introduction

Driven by new modes of information dissemination in this digital age and propelled by the necessity for online course delivery during the recent pandemic, online learning, the current form of distance learning, is not only the trend but the reality of teaching and learning today. Since the first 100% online course was offered in 1981 (Harasin, 2000), online educatoin has shown an upward trajectory that has sustained after a pamdemic induced spike in 2020. According to the most recent data released by the National Center for Education Statistics (2023), among the 18.95 million students enrolled in degree-granting postsecondary institutions in the United States in Fall 2022, 53.4% of them were taking at least one online class with 26% taking online classes exclusively. At

the undergraduate level, 63% of a total of 15.5 million students pursuing a 4-year or 2-year degree took at least one online class with 23% taking online classes exclusively, up by 28% and 9% respectively from Fall 2019. As students become more and more accustomed to taking online classes and as online course offerings become more and more common, it is very likely that online classes will overtake the traditional in-person instruction in the classroom as how education happens in the near future.

Online classes can be delivered synchronously and asynchronously. Synchronous online classes are delivered with the instructor and students meeting online at a virtual space. It allows instant feedback to students and direct interaction between the instructor and students and among peers, fostering a sense of connection in students and easier to deploy for instructors (Giesbers, Rienties, Tempelaar, & Gijselaers, 2014; Henriksen, Creely, & Henderson, 2020; Stuart et al., 2022; Watts, 2016). Asynchronous online classes, on the other hand, offer maximal flexibility and convenience, not requiring that the instructor and students to meet at a designated time at a designated virtual space. The self-pacing nature of asynchronous online classes enables students to access the learning materials at a time and place of their choice and allows more time to contemplate, reflect, and absorb the content as well as developing essential skills such as time management and autonomy (Stuard et al., 2022), but the lack of direct communication with the instructor and among peers might also lead to a sense of disconnect, confusion, and misinterpretation of the learning materials (Mladenova, Kalmukov, & Valova, 2020).

Quality online course delivery, like the traditional in-person instruction in a classroom, requires good pedagogical practices and techniques to engage students in the learning process. Past research has suggested that a high level of student engagement indexes improved learning outcomes (Soffer & Cohen, 2019; Stuart et atl, 2022; Watts, 2016). In this respect, synchronous online class delivery might seem to have an inherent advantage over asynchrnous online class delivery since it approximnates the in-person classes more (Henriksen et al., 2020), but being present online in real time does not guranteee that a student is actively engaged in the learning process, same as sitting in a classroom physically. The essence of the disucss migh not be on the modality of course delivery as being synchronous online or asynchronous online, but the content and the activities built into a course. Asynchronous online classes, with the appropriate instructional design and organization as well as support to student, can be equally engaging, leading to increased success in learning.

A key factor in increased student engagment in online classes is teaching presnce. Teaching presence is defined as “the design, facilitation, and guidance of cognitive and social processes for the realization of personally meaningful and educationally worthwhile learning outcomes” (Wang 2022, p. 140). Taking it as an index of student engagement in online learning, Wang (2022) conducted an online questionnaire survey with 1,328 college students in China to look into the correlation between the following five dimensions of teaching presence: design and organization, discourse facilitation, direct instruction, assessment, and technological support. The survey results indicated that design and organization, discourse facilitation, assessment, and technological support were positively correlated with students’ behavioral and cognitive engagement and direct

instruction and technological support contributed more to students' emotional engagement.

In asynchronous online course delivery, videos are often used to increase teaching presence. They can be used in many different forms, but the three most commonly used are video announcements, instructional videos, and video feedback. Lowenthal (2022) conducted a survey and interview study to explore students' perception toward these three forms of asynchronous videos. This mixed-methods sequential explanatory study found that instructional videos were preferred, followed by video feedback, and video announcement while all three forms of asynchronous videos were perceived to be contibuting to teaching presence. The results converge with other studies (e.g., Borup et al, 2012, 2013; Lowenthal et al., 2020; Phirangee, 2016; Sheridan & Kelly, 2010) to show that increased instructor presence, presenting the instructor as "real" and "there" (Lowenthal, 2022, p. 375), lead to an overall more satisfactory learning experience for students. Furthermore, with technology advancement, asynchronous video lectures can be further enhanced with embedded interactive activities to offer opportunities for students to consolidate their understanding of the content, participate in discussions, and ask questions to increase their agency in the learning process. It can be an effective approach to improve teaching presence and provide an engaging learning experience.

To contribute to the increasing amount of literature on teaching efficiency and effectiveness of online education, this paper describes the use of video lectures enriched with H5P enabled interactive activities in a college level linguistic course delivered asynchronously to students. The H5P integrated online modules bring together the learning materials such as lecture videos, handouts, and hyperlinks as well as instructional activities such as Q&A, quizzes, discussion boards, and surveys for a seamless learning experience. The effectiveness of this approach was assessed with student learning outcomes in two classes delivered in person and asynchronous online respecitvely.

Method

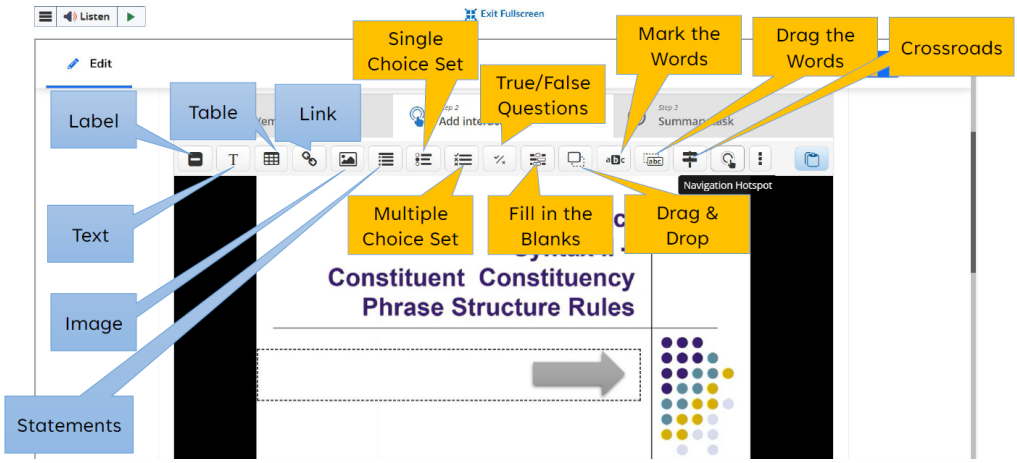
Context

The two linguistics classes chosen to investigate the instructional effectiveness of the H5P integrated video lectures were offered as a split-level class to both undergraduate and graduate students. One of them was taught in person in Fall 2018 and the other was delivered asynchronously online in Fall 2022 by the same instructor (the author) using the same textbook and PowerPoint lectures. The students completed the same set of worksheets of linguistic problems and four chapter quizzes with the same questions. For a preliminary examination, the learning outcomes were measured by the average scores of the chapter quizzes. The chapter quizzes included questions in three formats: multiple choice, true or false, and matching questions. They were taken online and were graded automatically. The Fall 2018 in-person class had 25 students enrolled and 18-20 of them took the chapter quizzes. The Fall 2022 asynchronous online class had 21 students and all of them took the chapter quizzes.

H5P Integrated Online Module Creation

H5P is a plugin with enriched HTML 5 content to existing lecture videos that enables interactions between the instructor and students (H5P, 2024). It is compatible with the commonly used learning management systems (LMS), such as Blackboard, Brightspace, Canvas, Moodle, and Sakai. Once a video lecture is uploaded to the LMS, a set of H5P tools can be applied to a video at specific points.

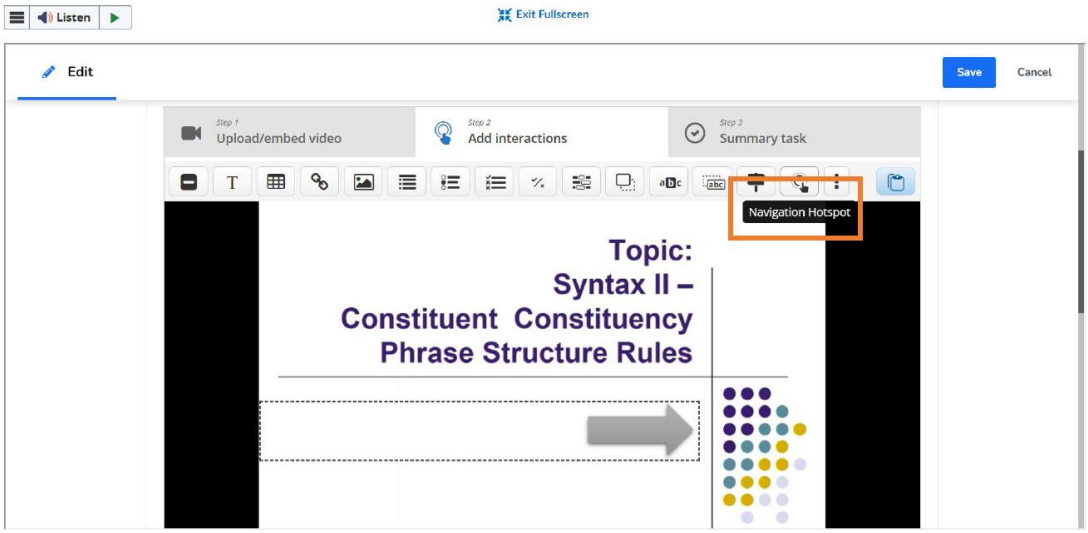
The H5P tools can be classified into two functions: screen enrichment and content enhancement. As shown in Graph 1, the screen enrichment tools are marked in blue and the content enhancement tools that can be added directly to a video are marked in orange. The screen enrichment tools can be overlaid directly on the screen for a specific period of display time without stopping the video, including labels, texts, tables, web links, images, and statements. The content enhancement tools can be added to stop the video at specific points to allow a variety of activities to be inserted for students to complete before the video proceeds. The activities include one or a set of single-answer multiple choice questions, one or a set of multiple-answer multiple choice questions, one or a series of true or false questions, fill in the blank questions, drag or drop an image or words to designated places on the screen, mark the words on a sentence on the screen, drag the words from a word bank to designated places on the screen, and crossroads, or options, for instance, to watch a video explaining a problem in detail or to read related articles.



Graph 1. H5P Tools

Another content enhancement tool that will direct students to complete activities hyperlinked out of the video is the hot spot tool. İt is the most versatile tool among all the H5P tools. As shown in Graph 2, once a hot spot is created, it can be placed on any place on the screen as a dotted shape. The edit function of the hot spot allows the video to be stopped and jump to a specified time in the lecture, such as the next slide. At the same time, a second hot spot can be created with a hyperlink to take students to other functions on the LMS, such as handouts, quizzes, discussions, surveys, and assignments to access supplemental materials or activities, or any places on the web with an URL, such as Googel Docs, Youtube videos, or web pages before coming back to the

video lecture to proceed to the other content.



Graph 2. H5P Hot Spot

Online Course Implementation

Given that asynchronous online classes are predominantly delivered in a text-based format (Lowenthal, 2022), students might be unfamiliar with the H5P enriched interactive video lectures. For the linguistics class to be delivered asynchronous online, the first online module that students watched was an overview of the course with illustrations of the different H5P tools to be used to familiarize the students with the format. During the week, an office hour was also designated to troubleshoot any problems, such as browser or device incompatibility and other questions to ensure the technology worked well for every student and to alleviate the anxiety induced by this new format of course delivery. As a result, all students were able to navigate the online modules without any issues for the rest of the semester.

Data Collection and Analysis

Student performances in the four-chapter quizzes were examined in the two linguistics classes as a preliminary comparison. The LMS used by the university generates the maximum score, minimum score, average, mean, median, mode, and standard deviation for each quiz. Given the small sample sizes, only the average scores were collected and analyzed.

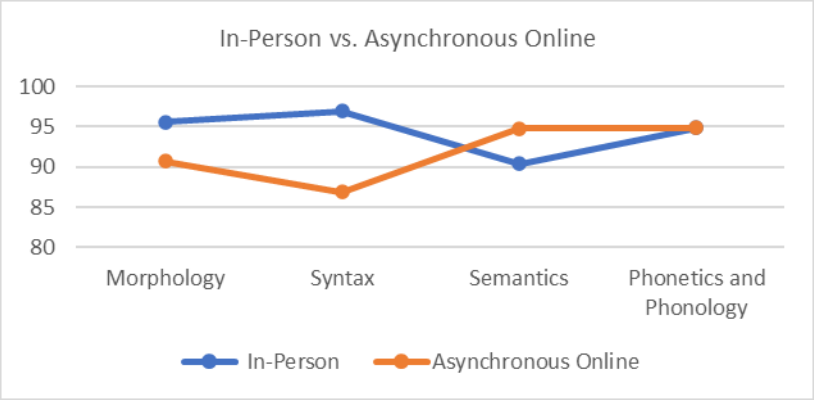
Results and Discussion

The average scores of the four-chapter quizzes in the two linguistics classes were presented in Table 1 and

Graph 3 below. Compared to the in-person class, the asynchronous online class had a slightly lower average score in the first quiz, a decisively lower score in the second quiz, a slightly higher score in the third quiz, and essentially the same score in the fourth quiz. As noted earlier, not all students in the in-person class took the chapter quizzes while all students in the asynchronous online class took the quizzes. Generally speaking, participation indexes student engagement. The students in the asynchronous online class seemed to be more involved in the class than students in the in-person setting. In spite that their average score in the second syntax quiz was 10% lower than that of the in-person class, they outperformed the in-person class in the third semantics quiz and kept abreast with the in-person class in the fourth phonetics and phonology quiz, showing an upward moving trend. Given the high level of engagement of students in the asynchronous class and their upward trajectory of the quiz scores, the preliminary results of the learning outcomes of this class show that the H5P integrated online modules can be used effectively to engage students in the asynchronous online course.

Table 1. Learning Outcome: Average Quiz Scores

Class / Quiz	In-Person (%)	Asynchronous Online (%)
Morphology	95.62	90.71
Syntax	96.95	86.89
Semantics	90.39	94.76
Phonetics and Phonology	94.89	94.86



Graph 3. Learning Outcome Comparison: Average Quiz Score

Conclusion

As online education becomes more of the norm of course delivery in higher education today, instructors and students both need to adapt to this new form of teaching and learning. This paper documents the author's effort in using H5P enriched interactive online modules to improve student engagement in an asynchronous online learning setting. The learning outcome data clearly showed that students in the asynchronous class were

engaged in the learning process. The lower quiz scores, in comparison to those of the in-person class, might be confounded by other factors, including the fact that some students in the in-person class did not take the quizzes, potentially avoiding poor performance in the quizzes. The particularly low average score in one of the quizzes, on the other hand, calls for further examination of the design and organization of the online modules. Nevertheless, interactive video lectures provide high levels of interaction and engagement that best approximate a physical classroom. It is a plausible approach that can potentially steer the direction of online course delivery.

References

Borup, J., West, R. E., & Graham, C. R. (2012). Improving online social presence through asynchronous video. *Internet & Higher Education, 15*(3), 195–203. https://doi.org/10.1016/j.iheduc.2011.11.001

Borup, J., West, R. E., & Graham, C. R. (2013). The influence of asynchronous video communication on learner social presence: A narrative analysis of four cases. *Distance Education, 34*(1), 48–63. https://doi.org/10.1080/01587919.2013.770427

Giesbers, B., Rienties, B., Tempelaar, D., & Gijselaers, W. (2014). A dynamic analysis of the interplay between asynchronous and synchronous communication in online learning: The impact of motivation. Journal of Computer Assisted Learning, 30, 30–50. https://doi.org/10.1111/jcal.12020

Harasim, L. M. (2000). Shift happens: Online education as a new paradigm in learning. *The Internet and Higher Education, 3*,41–61.

Henriksen, D., Creely, E., & Henderson, M. (2020). Folk pedagogies for teacher transitions: Approaches to synchronous online learning in the wake of COVID-19. Journal of Technology and Teacher Education, 28(2), 201–209.

H5P Group. (2024). H5P. [Computer software]. Retrieved from https://h5p.org.

Lowenthal, P. R. (2022). Exploring student perceptions of asynchronous video in online courses. *Distance Education, 43*(3), 369-387. https://doi.org/10.1080/01587919.2022.2088479

Lowenthal, P. R., Borup, J., West, R. E., & Archambault, L. (2020). Thinking beyond Zoom: Using asynchronous video to maintain connection and engagement during the COVID-19 pandemic. *Journal of Technology and Teacher Education, 28*(2), 383–391.

Mladenova, T., Kalmukov, Y., & Valova, I. (2020). COVID-19: A major cause of digital transformation in education or just an evaluation test. TEM Journal, 9(3), 1163–1170. https://doi.org/10.18421/TEM93-42

National Center for Education Statistics. (2023). Fast facts: Distance learning. Retrived from https://nces.ed.gov/fastfacts/display.asp?id=80

Phirangee, K. (2016). Students' perceptions of learner-learner interactions that weaken a sense of community in an online learning environment. *Online Learning, 20*(4), 13–33. https://doi.org/10.24059/olj.v20i4.1053

Sheridan, K., & Kelly, M. A. (2010). The indicators of instructor presence that are important to students in online courses. *Journal of Online Learning and Teaching, 6*(4), 767–779.

Soffer, T., & Cohen, A. (2019). Students' engagement characteristics predict success and completion of online courses. *Journal of Computer Assisted Learning, 35*(3), 378–389. https://doi.org.ezproxy.uakron.edu:2443/10.1111/jcal.12340

Stuart, J. et al., (2022). *Asynchronous and synchronous remote teaching and academic outcomes during COVID-19. Distance Education, 43*(3), 408-424. https://doi.org/10.1080/01587919.2022.2088477

Wang, Y. (2022). Effects of teaching presence on learning engagement in online courses. *Distance Education, 43*(1), 139-156. https://doi.org/10.1080/01587919.2022.2029350

Watts, L. (2016). Synchronous and asynchronous communication in distance learning: A review of the literature. *Quarterly Review of Distance Education, 17*(1), 23–32.

Mitigating Bias in Automated Lending Systems: A Data Imbalance Approach

Muna Abdelrahim
Jackson State University, USA, https://orcid.org/ 0009-0005-6158-4059

Dr. SungBum Hong
Jackson State University, USA, https://orcid.org/0000-0001-6752-101X

Dr. Tor A. Kwembe
Jackson State University, USA, https://orcid.org/0000-0003-4720-2323

Abstract: Artificial Intelligence (AI) algorithms are playing an increasing role in automated lending decision-making systems as promising solutions to reduce the cost of credit and increase financial accuracy and inclusion. However, ML models remain essentially a black box, and racial and gender discrepancies and biases in the decision-making processes are well-documented, with people of color or females are likely to be denied mortgages compared to White and male applicants with similar financial backgrounds. In this research we aim to 1) detect the exitence and persistence of bias in the lending systems, and 2) address data imbalances in the sesnsitive attrinutes as an approach to mitigiate bias. We used 1) multi-directional approaches to detect and quantify bias, focusing on treating dataset imbalances to enhance algoirthm fairness in lending systems, 2) Explainable AI (XAI) tools SHAP to provide transparency and explanation to the ML algorithms outcomes. Our research showed that 1) there is a noticeable distribution disparity in the sensitive attributes in relation to loan approval, 2) a more balanced distribution leads to fairer outcomes. Thus, we may conclude that this endeavor has the potential for reshaping the lending practices to enhance ethical standards in the financial industry.

Keywords: Artificial Intelligence, Fairness, Lending, Imbalance, XAI

Citation: Abdelrahim, M., Hong, S. & Kwembe, T., A. (2024). Mitigating Bias in Automated Lending Systems: A Data Imbalance Approach. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024--International Conference on Social and Education Sciences* (pp. 157 -173), Chicago, IL, USA. ISTES.

Introduction

Automated Lending process

Automated lending, or what some might call “Digital Lending”, represents the contemporary face of lending. It is a technological infrastructure or software platform used by financial institutions to streamline and automate the process of issuing loans. Artificial Intelligence (AI) has become increasingly prevalent in the financial

industry, offering quick and efficient loan approval processes. The volume and variety of available datasets promote the utilization of the information to analyze and understand the trends in the market and individuals to help in setting policies and making future decisions. The growth of global financial technology (fintech) across the main activities such as payments, insurance, planning, lending and crowdfunding, trading and investments, data and analytics, and security, is more than 18 times from 2005 to 2016 (FSB, 2017). This shift in mindsets and paradigms leads to agility performances of the companies that accelerate business results when exercising rapidly, focused, and flexibly (Vassileva-Hadjitchoneva, 2019). Also, humans do not always act rationally in complex situations of information asymmetry, such as credit lending. And borrowers also behave in their benefits to obtain credit and lower interest rates influencing the appraisal process and misreporting financial status. Quite obvious is that when the decision-making is not accurate for some reason, the default costs increase. Moreover, it causes missed revenue due to rejections of creditworthy customers (Vassileva-Hadjitchoneva, 2019). Digitization and automation of operations create new opportunities for smarter decision-making, but like any other system, it comes with its pros and cons (Boute et al, 2020). Since the decision-making process is so complicated, it is hard for people to understand why a specific result was obtained, therefore it becomes difficult to determine whether the decision thus made was fair.

Bias vs Discrimination

Bias refers to 'judgment based on preconceived notions or prejudices, as opposed to the impartial evaluation of facts' (Hellstrom et al, 2020). In AI, refers to the tendency of the algorithm to favor certain groups based on certain characteristics in the training dataset. Discrimination in AI algorithms occurs when biased decision-making leads to unfair treatment of individuals based on their characteristics, such as race, gender, or ethnicity. The term "fair AI" refers to the probabilistic decision support that prevents disparate harm (or benefit) to different subgroups. In automated lending, the outcomes of the algorithms touch people's lives and needs, and needless to say, they must be socially and legally fair. Biases can reside in any stage of the ML cycle (Feuerriegel et al, 2020). Figure 1 demonstrates the sources of bias and how it can reside throughout different stages of the ML process (Surresh & Guttag, 2021).

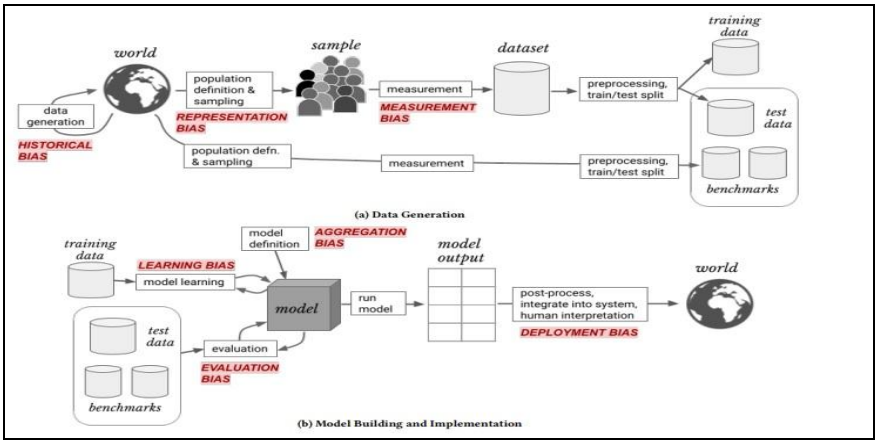


Figure 1. Bias in the ML life cyle

The papers by Mehrabi et al., (2022) and Barocas & Selbst (2016) look deeply into the issues of bias and how can they be fixed, also showing how AI applications can be impacted by different types of biases. To address this, Suresh and Guttag (2021) in their framework identifies seven sources of harm that can introduce bias as follows:

1. Historical Bias: arises from historical underrepresentation of minority group patterns in the data set.
2. Representation Bias: when the development sample underrepresents some part of the population, or under-representative of certain groups leading to imbalanced classes.
3. Measurement Bias: when choosing, collecting, or computing features and labels to use in a prediction problem is unfair.
4. Aggregation Bias: when a one-size-fits-all model is used for data in which there are underlying groups or types of examples that should be considered differently.
5. Learning bias: when modeling choices amplify performance disparities across different examples in the data.
6. Evaluation Bias: when the benchmark data used for a particular task does not represent the use population.
7. Deployment Bias: when there is a mismatch between the problem a model is intended to solve and how it is used.

Explainable AI (XAI)

Explainable AI (XAI) is a research field in the world of AI. XAI tools are developed to make AI systems understandable to human stakeholders (Langer et al, 2021). AI algorithms are considered black boxes, where even data scientists cannot control or see how exactly the algorithm came out with a certain outcome. XAI is fundamental in breaking the idea of black-box algorithms. By enhancing the understandability and the transparency of the algorithm behavior, stakeholders can understand the reasons behind a certain algorithm outcome, this will increase the trust in the algorithm and make room for industry enhancements and development. For the goals of this research, we will apply the SHAP (Shapley Additive exPlanations) to understand the outcomes of Automated lending AI algorithms. It assigns each feature a “Shapley value” representing its contribution and importance to the produced prediction (Lundberg & Lee, 2017).

Therefore, our objectives of this research are to a) detect the existence and persistence of bias in the lending systems, b) address data imbalances in sensitive attributes as a strategy for mitigating bias c) evaluate algorithmic performance when trained on biased data, and d) identify the most effective methods for investigating and mitigating bias.

Method

Data Collection

It is crucial to collect data that is inclusive, has volume, variety and varsity to meet our research goals. After

careful search and for the purpose of our study, we decided to use the HMDA dataset, which was made publicly available by the Home Mortgage Disclosure Act (HMDA) (Consumer Financial Protection Bureau's website; Home Mortgage Disclosure Act). HMDA data have been used in various studies to outline and understand recent mortgage trends. They span 90% of all loan origination and rejections in the United States, and include applicant demographic data and loan specific data. The data sample collected for this research is the HMDA.txt files of six southern states of the United States: Alabama, Louisiana, Mississippi, Georgia, Texas, and Florida for three years 2014, 2017 & 2020. The data sets we have extracted have (2,578,186 rows ,45 columns), (3,052,113 rows, 78 columns) and (5,327,434 rows, 99 columns) for the years 204, 2017 & 2020 respectively, of a total of 10M+ records. The collected data sample allows to understand the changing trends of lending across the years, and help in assessing the exsistence and persistance of bias. The span between the selected years, allows us to explore shifts in lending practices and potential biases and persistence.

Data Pre-Processing

Data Cleaning and handling missing data

Several steps are taken in data pre-processing phase in order to maintain the quality of the dataset and to prepare the features to serve the purpose of our research. The extent of missing data would dictate whether the missing value will be replaced by imputation (by the median value) or rather omitted. Such features are often removed during the process of data pre-processing. Outliers are removed or transformed prior to analysis if they are likely to affect the outlier analysis. Since we are aiming at reducing potential racial and gender biases in automated lending systems, the sensitive attributes race and gender are of great importance of our focus.

Data Processing

First we will focus on the target column, 'action_taken'. This column indicates the decision taken on the loan application. HMDA collected data had 8 different categories of action_taken (see Table 1).

Table 1. HMDA Action taken feature categories and values

Code	Categories	2014	2017	2020
1	Loan originated	1,230,460	1,493,670	2,715,209
3	Application denied	493,471	486,746	707,044
6	Purchased loan	402,328	459,900	630,095
4	Application withdrawn by applicant	252,512	374,854	740,857
2	Application approved but not accepted	104,208	87,106	142,723
5	File closed for incompleteness	83,508	138,777	293,988
7	Preapproval request denied	130	218	4323
8	Preapproval request approved but not accepted	91	66	2876

After careful studying of the different categories, we decided to exclude categories 7 and 8, as they make up only a tiny fraction of the entire dataset in all three years. which we consider highly insignificant. We also, dropped categories 4 and 5 because they don't provide clear information on whether the status of the loan. The remaining categories (1, 2, 3, 6) were combined into two groups: Categories 1, 2, and 6 were labeled "Approved" coded as 1, while category 3 was labeled "Denied" coded as 0. The new coded groups are stored in a new column 'loan_status' with binary classification of 0 or 1. Then we filtered entries for races other than White (code 5) and Black (code 3), and we only considered individuals identified as males code (1) or females (code 2).

Data Exploration and Visualization

Quantitative statistical analysis is perfromed to provide insight into the diversity of the dataset, and to explore the distributions of the sensitive attributes and the target, in order to outline possible imbalances in the dataset. Quantitative analysis is a very useful technique in a dataset bias analysis, more specifically in the contribution of techniques to the relationship between features and the sources of bias. (Batista et al, 2008; Guyon & Elisseeff, 2003). For qualiative analysis data will be represented in plots and graphs. Python 3.11 modules and libraries will be used for the analysis and coding.

Bias Detection

It is crucial to have a multi-dimensional approach to detect bias in lending datasets. Quantitative bias analysis approaches will help in developing the direction and uncertainty associated with sources of bias (Lash et al, 2014). The distribution of the data groups is an important indicator of data balance. Imbalances where the majority class significantly outnumbers the minority class can cause machine learning models to favor the majority and misclassify the minority class (Tasci et al, 2022). Also, the models' perfromance evaluation can shed a light of how fair the algorithm outcomes are across different groups. Bias metrics, for example Equal Opportunity Metric (EOM), is veryimportant to quantify disparities in the outcomes.

Model Training

To set a baseline for models' performance analysis, three different models are trained prior to any fairness intervention. Logistic Regression (LR), Decision Tee (DT), and Random Forest (RF) models will be trained to assess bias in lending systems decisions due to their perspective strength, and they offer unique benefits for investigating bias in automated lending systems. Logistic regression provides interpretability and fairness measures, decision trees offer transparency and direct fairness interventions, while random forests offer robustness through ensemble learning and feature importance analysis (Hosmer et al 2013). The algorithm performance and accuracy are evaluatied in relation to bias detection.

Results

Data Exploration

The processed datasets for HMDA 2014, 2017 and 2020 years consist of (1,633,862 ; 14), (1,808, 519 ; 12) and (2,892,074 ; 16) entries and features respectively. 2014 data indicates that out of 1,633,862 applications, 396,833 (24.28%) were denied, and 1,237,029 (75.72%) were approved. This pattern is consistent across 2017 were 21.1% denied to 78.9% approved, and 2020 18.2% denied to 81.8% approved, with slight variations in approval rates. Figure 2 captures the overall stability of approval rates across the years.

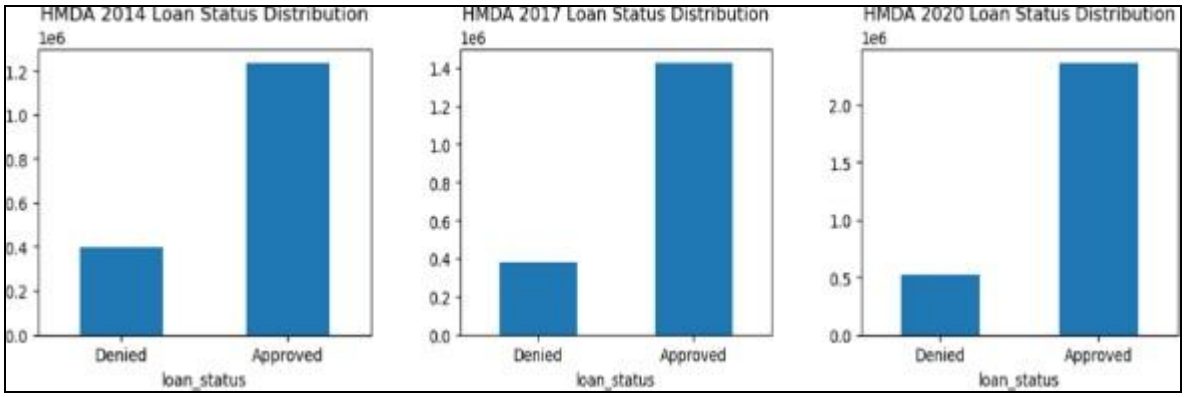


Figure 2. Loan Status Distribution

Now we want to look in depth into the distribution of our sesitive attributes, 'applicant_race' and 'applicant_sex', and their relation to the approved loans (see figure 3). There is a noticeable pattern of number of male applicants (blue) exceeding the female applicants (orange). Male applicants make an average of 67% of the applicants compared to only 33% of females across the three years of study. We can relate this to socio-economic factors. However, Fianacial institutions have a responsibility to ensure equitable access to credit.

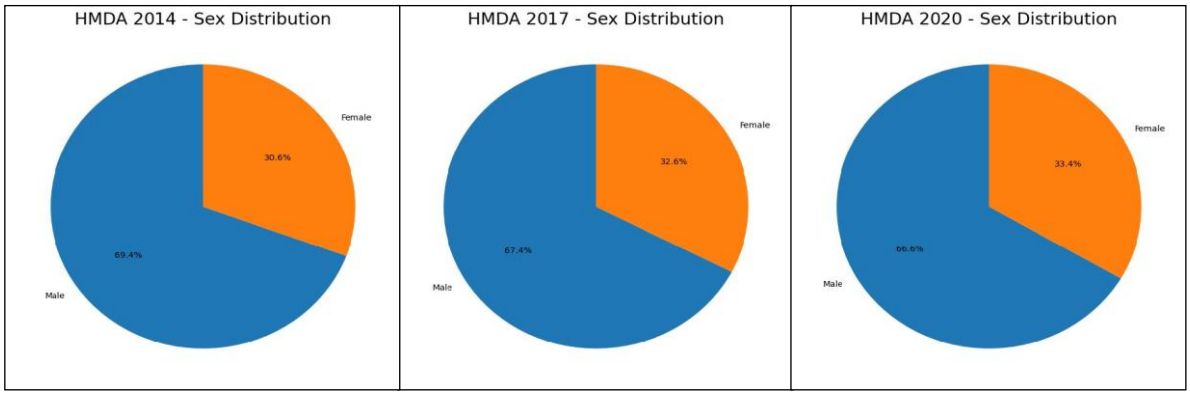


Figure 3. 'applicant_sex' Distribution

Also, the racial distribution data reveals a significant disparity between White (blue) and Black (orange) applicants (see figure 4). White group makes in average 86% of the loan applications compared to only 14% for

Black applicants across the three years. The racial and gender disparities raises a serious concern, with the racial disparities being more recognized than gener.

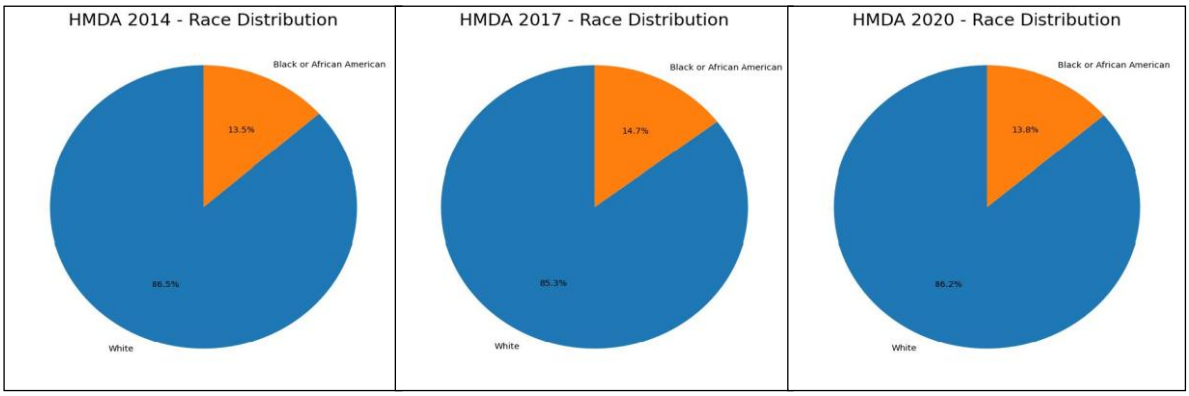


Figure 4. 'applicant_race' Distribution

Statistical Analysis

Breaking down the distribution of the approval rates among the sensitive features, race and sex, the approval rate in 2014 for group males was 77.5% compared to only 71.7% for females. The pattern continues in 2017 and 2020 (see table 2). We can say that the gender gap in loan approvals remains substantial. Similar findings are shown for applicant_race (see table 3), where the approval rate of White applicants across the three years remained significantly higher than Black applicants.

Table 2. 'applicant_sex' vs 'loan_status' Distribution

Year	Approved Applications	Males Approved	Total Males	%	Females Approved	Total Females	%
2014	1,237,029	878,000	1,133,103	77.5%	359,029	500,759	71.7%
2017	1,427,152	980,970	1,218,907	80.5%	446,182	589,612	75.7%
2020	2,366,706	1,599,779	1,925,393	83.1%	766,927	966,681	79.3%

Table 3. 'applicant_race' vs 'loan_status' Distribution

Year	Approved Applications	White Approved	Total White	%	Black Approved	Total Black	%
2014	1,237,029	1,100,206	1,413,048	77.9%	136,823	220,814	62.0%
2017	1,427,152	1,250,535	1,543,125	81.0%	176,617	265,394	66.5%
2020	2,366,706	2,080,630	2,494,044	83.4%	286,076	398,030	71.9%

Disparities in racial and gender distribution indicate a concerned data imbalance. Data imbalances is very

challenging in big data classification systems (Fernández et al, 2017). It highly indicates the existence of bias in the dataset and in the lending system outcomes. In our research the sensitive attributes distribution will be the metric for bias detection and quantifying in the dataset, and the major indicator when assessing the effectiveness of the mitigation strategy.

Feature Selection for Model Training

Feature selection plays a critical role in bias detection in ML learning algorithms. A careful selection of features helps to reduce noise, prevent proxies, and improve interpretability on the outcomes (Brownlee, 2019). The independent set will include the sensitive attributes and additional related features. A multi-directional approach of feature selection was followed to ensure integrity and accuracy. ANOVA and p-value tests were implemented to identify the importance of features to loan predictions. We also applied a correlation threshold to manually calculate the statistical correlation with the target attribute. This method was described in the literature that supports the idea of importance of correlation-based feature selection (Hall, 1999). The threshold value of ±0.055, which represents almost the mid-point of the correlations of our data of range [0,0.1], was based on studies confirming that a moderate correlation with a value of 0.5, where correlations range [-1,1] indicates a moderate yet enough linear relationship for feature relevancy. It also desirable over a high correlation that might indicate multicollinearity (Dormann et al, 2013; Guyon & Elisseeff, 2003). After analyzing the outcomes from the described methods of the three years (2014, 2017 & 2020), and without giving any priority to any method, the independent features set is loan_purpose, owner_occupancy, applicant_sex, and applicant_race, wiht 'loan status' as the target. Our approach for feature selection aims to provide a systematic and logical foundation in the continuous efforts to detect and mitigate bias in automated lending systems. Also, establishing a guideline for researchers in different fields researching the same issues.

Model Training and Evaluation

Establishing a baseline line for fairness in learning AI algorithms is critical in assessing the effectiveness of our approach to mitigate bias. 1) train the three models on each dataset separately, 2) evaluate the performance and accuracy of each model, and 3) assess algorithm performance in terms of fairness through precision and recall values. It is helpful to identify the model with best performance, given imbalanced and biased dataset, while maintaining effectiveness. The confusion matrix breaks down the predictions into true positives true negatives false positives, and false negatives (Jayaswal, 2021; Brownlee, 2020). The confusion matrix helps us spot bias by looking at the model predictions across different demographic groups and see if there are gaps in how well it performs. It provides a detailed breakdown of the predicted values compared with the actual ones (Tharwat, 2021). **Precision** is the ratio of true positives observations to the total number of predicted positives [TP / (TP+FP)]. It is a crucial measure where false positives, approving a loan to a borrower who is likely to default, carry a high cost. (Buckland & Gey, 1994; Torgo & Ribeiro, 2009; Armah et al, 2014). **Recall** is the ratio of true positive observations to the total number of actual positives [TP / (TP+FN)]. When the goal is to expand the

market share by approving as many qualified applicants as possible, false negatives when the automated systems wrongly deny a loan for a qualified applicant become very costly. **F1-score** a single measure that accounts for both precision and recall [2 (Precision * Recall)/ (Precision + Recall)], is important to ensure that neither precision nor recall is disproportionately prioritized. We have compared the evaluation of the learning algorithms' performance for the three years (see table 4).

Table 4. Evaluation of Algorithms

	2014			2017			2020		
	LR	DT	RF	LR	DT	RF	LR	DT	RF
Accuracy	0.7553	0.7634	0.7634	0.7893	0.7934	0.7934	0.8185	0.8222	0.8222
Precision	0.7619	0.7719	0.7719	0.7893	0.7972	0.7972	0.8185	0.8270	0.8270
Recall	0.9845	0.9759	0.9759	1	0.9903	0.9903	1	0.9899	0.9899
F1	0.859	0.8625	0.8625	0.8824	0.883	0.883	0.900	0.901	0.901

The F1-score increased over the years per model, not only reflecting better precision, but also better recall. However, the high recall still show a bias towards the majority class. Since Decision Tree and Random Forest models perform at the same exact levels, so with confidence we can eliminate Random Forest from our further investigation.

The Equal Opportunity Odds Metric (EOM)

The Equalized Opportunity metric (EOM) a bias detection metric, gives insight on how the model performs across different demographic groups. (Hardt, et al, 2016; Feldman et al, 2015) based on the true positives rate or recall for each group. The EOM is a basic indicator of group equity. It measures the difference in true positive rates (TPRs) between the protected (females and Black), and non-protected (males and White) groups [EOM = $TPR_{protected\ group} - TPR_{non\text{-}protected\ group}$]. If it is closer to zero, it indicates pretty good equity between the two groups, but, the further it is from zero, the higher the possibility of unfairness. The baseline EOM values when models are trained on the imbalanced dataset and before any fairness intervention are calculated (see table 5). The values being far from 0, illustrated give us a clear indication of non-equity between the two groups, and how unfairly they are treated. Wiht the disparities in race is higher and more pronounced than those in sex.

Table 5. Equal Opportunity Metric Values - Baseline

Equal Opportunity Metric (Sex) (Female to Male)	**2014**	**2017**	**2020**
Logistic Regression	-0.435102977	-0.374724	-0.3519034
Decision Tree	-0.434453841	-0.375079	-0.3579452
Equal Opportunity Metric (Race) (Black to White)	**2014**	**2017**	**2020**
Logistic Regression	-0.79436052	-0.7524902	-0.758249652
Decision Tree	-0.770968183	-0.7598608	-0.754750693

Explanatory AI (XAI)

XAI techniques help to understand how the algorithms processed the data and resulted in the given predictions (Nguyen et al, 2021). Feature importance scores or SHAP (SHapley Additive exPlanations) was explained in Aas et al, 2021 and Salih et al, 2024. The assigned SHAP value for each feature (expressed by a vertical bar) provides an overall explanation on the impact of each feature on the overall performance of the algorithm. Since Decision Tree model has the best perfromance,its predictions will be explained by the SHAP tool to invistigate the features impotance and sinficance in reaching a certain outcome.

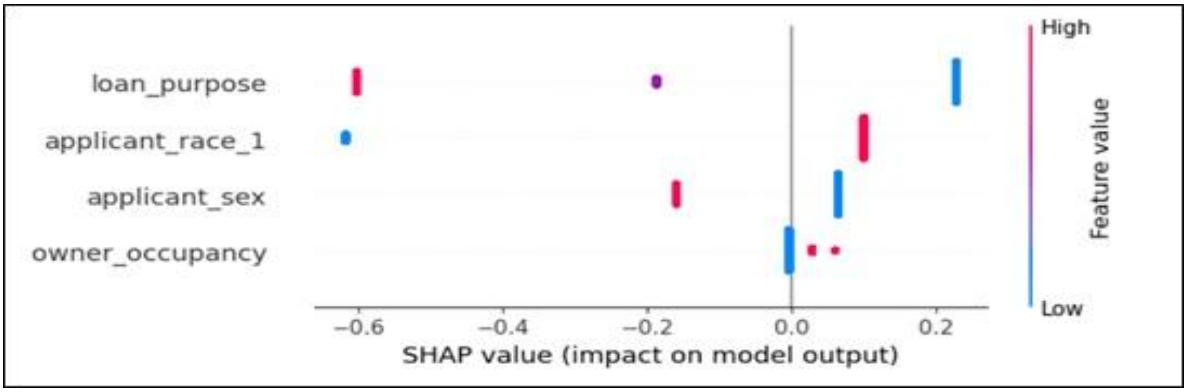


Figure 5. SHAP value for Decsion Tree Model

Figure 5 above demonstrates the overall interpretation of Decision Tree outcomes. It highlights the features that are highly important for the model to come up with a denial or approval of the loan application. The lower the value for sex (male =1), represented by blue bar, and the higher the value of race (White = 5) represented by red bar, the higher the probability the loan will be approved. The SHAP diagram confirms the potential of gender bias (favoring males) and racial bias (favoring White). And emphasize the importance of race and sex in the algorithm outcomes.

Given the results so far, we can confirm that the HMDA data has imbalance issues which lead to potential bias in the lending decision process. Since disparity in race is more prounced than sex, our approach to address imbalances to improve fairness will focus on 2017 ‘applicant_race’.

Bias Mitigation

Proposed Strategy

In our research, we proposed a novel fairness intervention to treat dataset imbalances detected in the dataset. We combined the sensitive feature ‘applicant_race’ with a non-sensitive feature with a wide distribution and is not highly correlated with neither the sensitive nor the target attributes. The ‘applicant_income’ correlation coeffecient with both attributes was 0.03, less than the mid-point, and income plays an important role in lending decisions in real world. Therefore, our non-senstive attribute will be’applicant_income’. We anticipated that the

distribution of the generated feature from aggregating race and income will be more balanced, thus less biased. This approach will break the direct influence between the sensitive feature on the model predictions while maintaining its information. We opted from eliminating the sensitive feature as a remedy, because it may lead to a loss of predictive power according to Rothenhäusler et al, 2021 and Kusner et al, 2017. This strategy will not only preserve the overall predictive power of the model but will hopefully enhance fairness by ensuring that decisions are less directly influenced by sensitive characteristics.

Before combining race and income attributes, we explored the distribution of the 'applicant_income'. The resulted distribution, as shown in figure 6 – left, was not normally distributed. To fix this, we transformed the values of the attribute to the algorithmic values generating a new feature labeled 'log_applicant_income'. The Distribution of the new column shows a normal distribution, as shown in figure 6 - right.

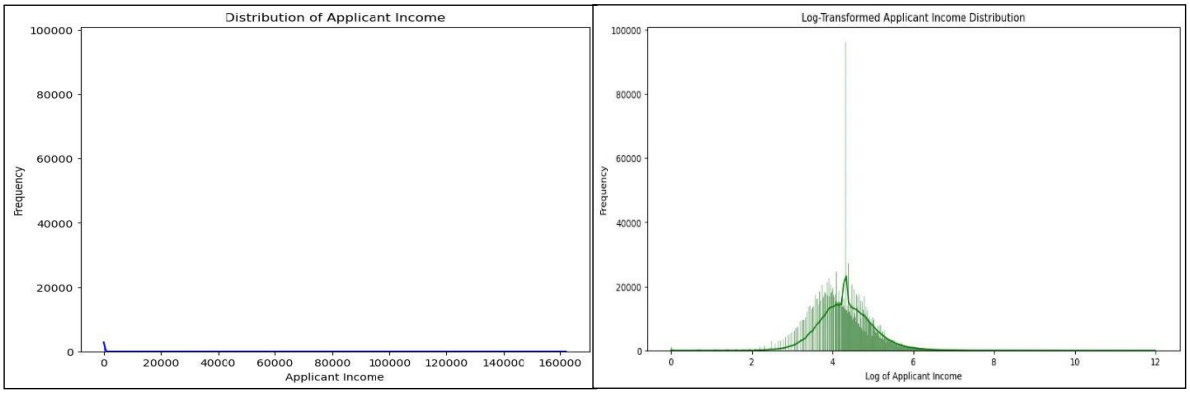


Figure 6. 'applicant_income' (left) vs 'log_applicant_income' (right) Distribution

The aggregation methodology will be as follows, 1) break the log_applicant_income values into brackets based on the 25th , 50th and 75th percentiles values as shown in figure 7. This methodology provides a logical and systematic way that can be expanded for any other feature if needed. Then 2) aggregate each group of applicant_race with each income bracket. As a result, each race group will have 4 income brackets (1: less than the 25^{th}, 2: between 25^{th} & 50^{th}, 3: between 50^{th} & 75^{th}, 4: more than 75^{th}). 3) store the new generated categories in a new column labeled 'race_cat'. The new column is coded as shown in the Python code figure 8.

```
count    1.808519e+06
mean     4.331388e+00
std      6.976978e-01
min      0.000000e+00
25%      3.912023e+00
50%      4.317488e+00
75%      4.736198e+00
max      1.199535e+01
Name: log_applicant_income, dtype: float64
```

Figure 7. Summary Statistics of 'log_applicant_income'

```
def categorize_race_income(row):
    if row['applicant_race_1'] == 3:
        if row['log_applicant_income'] < 3.91:
            return 31
        elif 3.91 <= row['log_applicant_income'] < 4.32:
            return 32
        elif 4.32 <= row['log_applicant_income'] < 4.74:
            return 33
        else:
            return 34
    elif row['applicant_race_1'] == 5:
        if row['log_applicant_income'] < 3.91:
            return 51
        elif 3.91 <= row['log_applicant_income'] < 4.32:
            return 52
        elif 4.32 <= row['log_applicant_income'] < 4.74:
            return 53
        else:
            return 54
    else:
        return 'Other'
```

Figure 8. Python Module to Combine Race and Income

Assessing Strategy

We can conclude from the new loan approval distributions demonstrated in figure 9, that the approval rate for the aggregated feature, with eight groups, is more balanced than 'applicant_race', with only two groups, where previously Black had a rate of 66.5% compared to 81% for White applicants. The new rates show an improvement with a noticeable reduction in parity between groups especially within the same income bracket. We can comfortably anticipate the learning models, retrained on the new groups instead, will be fairer.

```
Loan approval rates for each category:
 race_cat
31    0.531238
32    0.715167
33    0.748637
34    0.772572
51    0.687516
52    0.811623
53    0.855272
54    0.878058
Name: loan_status, dtype: float64
```

Figure 9. Approval Rate for New Combined Categories

Models Re-evaluation

The impact of the aggregated attribute on the learning models' performance needs to be re-assessed. We replaced the 'applicant_race' with the new column keeping the rest of the independent features unchanged. The performance results of the models when re-training on more balanced data is evaluated (see table 6). The algorithms performance on a more balanced data showed slight improvement when compared to the performance on imbalanced data.

Table 6. Model's Performance Comparison Results

	Logistic Regression	Decision Tree
Accuracy	Decreased slightly from 0.7893 to 0.7868	Improved slightly from 0.7934 to 0.7978.
Precision	Improved from 0.7893 to 0.7923	Improved from 0.7972 to 0.8090.
Recall	Decreased slightly from 1.0000 to 0.9893.	Decreased slightly from 0.9903 to 0.9736.
F1-Score	Increased from 0.8822 to 0.8799	Increased from 0.8833 to 0.8837

Accuracy changes are very minor in both models. Overall, recall decreased slightly, the precision improved, indicating better performance in terms of correctly identifying positive cases after the fairness intervention. The F1-score for both models almost stayed the same, indicating that both models maintained a good balance between precision and recall. In terms of fairness, the EOM results showes a significance improvement (see table 7). The new values are much closer to 0, indicating that the disparity in TPRs between the protected and non-protected groups has been significantly reduced.

Table 7. Equal Opportunity Metric with Balanced Data

EOM	Logistic Regression	Decision Tree
Imbalanced 'applicant_race'	-0.7525	-0.7599
Balanced 'race_cat'	-0.0864	-0.1016

In terms of bias, **Logistic Regression** shows a slight edge in reducing race bias based on the EOM, making it slightly better model in terms of fairness. For m**odel Performance, Decision Tree** performs better in terms of accuracy and precision, which are critical for model reliability. The reduction in recall can be a trade-off for improved precision, suggesting that the model is less likely to be over optimistic in making positive predictions.

Discussion

The tension between accuracy and fairness remains perhaps the oldest trade-off in the field (Zanna & Sano 2024). What we've shown rather clearly in this research is that automated lending systems do indeed have racial and gender bias. Our proposed approach in addressing the dataset imbalances, as one of the reasons for biased outcomes, was based on the work of researchers for example "Foundations of data imbalance and solutions for a data democracy" by (Kulkarni et al, 2020) who discussed that dealing with imbalanced data is a prevalent problem while performing classification on the datasets. This problem contributes to bias while making decisions or implementing policies. We theoretically showed that in order to train a fair classifier, the parity in the related features distribution and their correlation with model prediction should be minimized (Zhao et al, 2022). In this work, We considered a mitigation strategy to reduce bias, enhancing fairness by targeting imbalances in the "applicant_race" data. Our mitigation strategy was the aggregation of values in the "applicant_race" column with another column not highly correlated with loan_status or with race but logically

relevant to the determination for loan approval. Based on the given criteria, the incomewas selected and the percentiles-25th, 50th, and 75th-to segment applicants by income bracket. This is a statistically logical way, which allows for easy extension to other variables in future analyses if that would be necessary. We succeeded in implementing a novel and challenging approach of breaking the link between the sensitive attribute and the model prediction. We managed to find related features towards training fair and accurate classifiers without the direct knowledge of the sensitive attribute yet maintaining its information indirectly in the data sample (Zhao et al, 2022). The model evaluation analysis we did showed that between the two models, Logistic Regression tended to perform slightly better in terms of fairness because it treated applicants relatively more equitably across races. Focusing on (EOM), as it is one of the most popular notions of fairness (Yu et al, 2024), and this research showed that EOM is a better bias metric than algorithm's performance evaluation, we showed that for both Logistic Regression and Decision Tree models, the Equal Opportunity Metric proved that the implemented approach is effective in producing much fairer outcomes. Updated metric values were closer to zero for both Logistic Regression and Decision Tree models, which is indicative of decreased bias.

Conclusion

This research highlights the effectiveness of our proposed bias mitigation strategy in enhancing fairness in automated lending systems. The approach of combining race with income, rather than eliminating sensitive features entirely, proved beneficial in reducing bias while preserving model performance. The substantial reduction in EOM values is a significant step toward treating protected groups more equitably. Future work will focus on determining which model performed better with the more balanced dataset to further guide the choice of classifier in practical applications.

Our proposed mitigation approach, which addressed the dataset imbalances in relation to race and loan_status, by creating a new feature combining 'applicant_race' with 'applicant_income' instead eliminating the sensitive feature applicant_race, and using the new column model training, resulted in the a significant reduction in the magnitude of the Equal Opportunity Metric from around -0.75 to nearly 0.08 (for LR) and from around -0.76 to 0.10 (for DT) which demonstrates a significant improvement in fairness, meaning that the models now treat the protected group (Black) much more equitably in terms of true positive rates. Also, we can suggest that with the primary goal of this research to minimize bias, **Logistic Regression** would be preferable for 2017. However, it is worth mentioning that if model performance (accuracy and precision) is equally important, Decision Tree might be better, as it balances bias reduction with stronger overall performance.

Recommendations

The proposed approach opens several avenues for future research. Scholars could explore other sensitive attributes, such as gender or disability status, in combination with race and income to further refine fairness metrics. Additionally, investigating the applicability of this method across different domains and datasets could

validate its robustness and generalizability. Future research could also focus on developing computational tools and algorithms that seamlessly integrate these multi-dimensional fairness considerations into real-world applications.

Acknowledgements

We would like to express our heartfelt gratitude to Drs. Hong and Kwembe for their invaluable guidance and encouragement throughout this research journey. We are particularly grateful to the organizers of the International Conference on Social and Education Sciences (2024) for providing a platform to present this work. The opportunity to share our findings and engage with fellow scholars has been instrumental in refining our ideas and advancing our academic growth.

References

Aas, K., Jullum, M., & Løland, A. (2021). Explaining individual predictions when features are dependent: More accurate approximations to Shapley values. Artificial Intelligence, 298, 103502.

Armah, G. K., Luo, G., & Qin, K. (2014). A deep analysis of the precision formula for imbalanced class distribution. *International Journal of Machine Learning and Computing*, *4*(5), 417-422.

Barocas, S., & and Selbst, A.D. (2016). Big Data's Disparate Impact Published by California Law Preview, Inc Stable URL: https://www.jstor.org/stable/24758720

Batista, Gustavo E. A. P., et al. "A study on the use of correlation coefficients for the analysis of data dependencies in software engineering datasets." Empirical Software Engineering 13.4 (2008): 419-449.

Boute, R., Van Mieghem, J. A., & Gijsbrechts, J. (2020). Digital Lean Operations: Smart Automation and Artificial Intelligence in Financial Services. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3747173

Brownlee, J. (2019). How to choose a feature selection method for machine learning. Machine Learning Mastery, 10, 1-7.

Brownlee, J. (2020). How to calculate precision, recall, and F-measure for imbalanced classification. Machine learning mastery, 1.

Buckland, M., & Gey, F. (1994). The relationship between recall and precision. Journal of the American society for information science, 45(1), 12-19.

Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G., ... & Lautenbach, S. (2013). Collinearity: a review of methods to deal with it and a simulation study evaluating their performance. Ecography, 36(1), 27-46.

Feldman, M., Friedler, S. A., Mojsilovic, A., & Scheidegger, C. (2015). "Certifying and Removing Disparate Impact." Proceedings of the 21st ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 259-268.

Fernández, A., del Río, S., Chawla, N. V., & Herrera, F. (2017). An insight into imbalanced big data classification: outcomes and challenges. Complex & Intelligent Systems, 3, 105-120.

Feuerriegel, S., Dolata, M., & Schwabe, G. (2020). Fair AI, Challenges, and Opportunities. Business & Information Systems Engineering, 62(4), 379–384.

FSB, Financial Stability Board. (2017). Financial stability implications from fintech: Supervisory and regulatory issues that merit authorities' attention. https://www.fsb.org/wp-content/uploads/R270617.pdf

Guyon, I., & Elisseeff, A. (2003). An introduction to variable and feature selection. *Journal of machine learning research*, *3*(Mar), 1157-1182.

Hall, M. A. (1999). Correlation-based feature selection for machine learning (Doctoral dissertation, The University of Waikato).

Hardt, M., Price, E., & Srebro, N. (2016). Equality of opportunity in supervised learning. Advances in neural information processing systems, 29.

Hellstrom. T, Dignum, V., & Bensch, S. (2020). Bias in Machine Learning - What is it Good for? arXiv:2004.00686v2 [cs.AI] 20 Sep 2020

HMDA Data Browser. Available online: https://ffiec.cfpb.gov/data-browser/data/2020?category=states (accessed on 6 February 2022).

Hosmer Jr, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). Applied logistic regression. John Wiley & Sons.

Jayaswal, V. (2021). Performance metrics: confusion matrix, precision, recall, and F1 score. Medium.

Kulkarni, A., Chong, D., & Batarseh, F. A. (2020). Foundations of data imbalance and solutions for a data democracy. In *Data democracy* (pp. 83-106). Academic Press.

Kusner, M. J., Loftus, J., Russell, C., & Silva, R. (2017). *Counterfactual fairness*. In *Proceedings of the 31st International Conference on Neural Information Processing Systems* (pp. 4066–4076). Curran Associates Inc.

Langer, M., Oster, D., Speith, T., Hermanns, H., K'astner, L., Schmidt, E., Sesing, A., & Baum, K. (2021). What Do We Want From Explainable Artificial Intelligence (XAI)? arXiv:2102.07817v1 [cs.AI].

Lash, T. L., Fox, M. P., MacLehose, R. F., Maldonado, G., McCandless, L. C., & Greenland, S. (2014). Good practices for quantitative bias analysis. *International journal of epidemiology*, *43*(6), 1969-1985.

Lundberg, S. (2017). A unified approach to interpreting model predictions. arXiv preprint arXiv:1705.07874.

Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2022). A Survey on Bias and Fairness in Machine Learning, USC-ISI arXiv:1908.09635v3 [cs.LG] 25 Jan 2022

Nguyen, H. T. T., Cao, H. Q., Nguyen, K. V. T., & Pham, N. D. K. (2021). Evaluation of Explainable Artificial Intelligence: SHAP, LIME, and CAM.

Rothenhäusler, D., Meinshausen, N., Bühlmann, P., & Peters, J. (2021). Anchor regression: Heterogeneous data meet causality. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, *83*(2), 215-246.

Salih, A. M., Raisi-Estabragh, Z., Galazzo, I. B., Radeva, P., Petersen, S. E., Lekadir, K., & Menegaz, G. (2024). A perspective on explainable artificial intelligence methods: SHAP and LIME. *Advanced Intelligent Systems*, 2400304.

Suresh, H., Guttag, J. (2021). A Framework for Understanding Sources of Harm Throughout the Machine Learning Life Cycle. arXiv:1901.10002v5 [cs.LG] 1 Dec 2021

Tasci E, Zhuge Y, Camphausen K, Krauze AV. Bias and Class Imbalance in Oncologic Data-Towards Inclusive and Transferrable AI in Large Scale Oncology Data Sets. Cancers (Basel). 2022 Jun 12;14(12):2897. doi: 10.3390/cancers14122897. PMID: 35740563; PMCID: PMC9221277...

Tharwat, A. (2021). Classification assessment methods. Applied computing and informatics, 17(1), 168-192.

Torgo, L., & Ribeiro, R. (2009). Precision and recall for regression. In *Discovery Science: 12th International Conference, DS 2009, Porto, Portugal, October 3-5, 2009 12* (pp. 332-346). Springer Berlin Heidelberg.

Vassileva-Hadjitchoneva, J. B. (2019). Efficient Automation of Decision-making Processes in Financial Industry: Case Study and Generalised Model. Journal Name, 2413, 42-52.

Yu, Z., Chakraborty, J., & Menzies, T. (2024). FairBalance: How to Achieve Equalized Odds With Data Pre-processing. IEEE Transactions on Software Engineering

Zanna, K., & Sano, A. (2024). Enhancing Fairness and Performance in Machine Learning Models: A Multi-Task Learning Approach with Monte-Carlo Dropout and Pareto Optimality. arXiv preprint arXiv:2404.08230.

Zhao, T., Dai, E., Shu, K., & Wang, S. (2022, February). Towards fair classifiers without sensitive attributes: Exploring biases in related features. In Proceedings of the Fifteenth ACM International Conference on Web Search and Data Mining (pp. 1433-1442).

International Conference on Social and Education Sciences

www.iconses.net October 17-20, 2024 Chicago, IL, USA www.istes.org

Meanings Attributed to Rugs in Turkish Culture

Özkan Akman

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

Yasemin Bayraktar

Süleyman Demirel University, Turkey, https://orcid.org/0000-0002-8110-7779

Abstract: Although rug culture has been present in many geographies of the world for centuries, it has a special place and value in Turkish culture with its diversified meanings. This study presents a panoramic perspective of the rug in Turkish culture. Starting from the meaning of the rug and its expansions in Turkish culture, the study discusses the meanings of the rug in different fields and disciplines, and what the rugs represent with their colors, textures and especially symbols. This article, which discusses the meaning of weaving training of rugs in handicrafts courses, the meanings of symbols, motifs and colors, also focuses on the meanings of colors, love, folk songs and symbols. The interaction of rugs and culture, in other words, the levels at which rugs, as an important part of culture, exist in Turkish culture have been revealed. Again, how the rug is used and emerged in the art branches of the culture has also been expressed. The relationship between women and rugs in the East and Turkish culture in particular has also been revealed. In addition, the history of rugs in Turkish history is also emphasized. In addition to the relationship between geography and rugs, religion and rugs, the meanings of rugs in cultural heritage have been revealed. In the same time, the message values carried by the rugs are also discussed. As a notion, the expansions of love, longing and other emotions expressed in rugs have been analyzed. In this article, where the meanings of animal and plant symbols in rug motifs are explained, a holistic view has been tried to be put forward. Thus, starting from the concept of kilim, the place and meaning of kilim in Turkish culture has been revealed from a holistic perspective with the inductive method.

Keywords: Rug, Turkish Culture, Symbols, Education, History, Literature, Geography, Motifs.

Citation: Akman, Ö. & Bayraktar, Y. (2024). Meanings Attributed to Rugs in Turkish Culture. In V. Akerson, O. Akman, & M. L. Ciddi (Eds.), *Proceedings of IConSES 2024-- International Conference on Social and Education Sciences* (pp. 174 -196), Chicago, IL, USA. ISTES.

Introduction

In Turkish culture, rugs are one of the traditional handicrafts of the Turks owning a long history. Rug (Kilim *Tr.*) is a type of carpet made by hand on a loom, where patterns are embroidered on a flat and hard ground. The word *kilim*, which entered the Turkish language from Persian, is the name given to a thick, hair or wool weaving, usually patterned, pile-free, thick, laid on places such as floors and couches. In Turkish culture, rugs

are characterized by the unique designs of each region. Traditionally, rugs were often used to cover the floors of houses, as bedspreads or wall decorations (Akpınarlı, 2011). Turkish rugs are made from natural materials and usually use wool or felt yarns. Rug weaving is generally considered a women's craft and many Turkish women have passed down this traditional handicraft from generation to generation, having learned it from their families. The colors and patterns used in rugs reflect the richness of Turkish culture and each rug differs according to regional culture and traditions (Akpınarlı & Arslan, 2018).

As Western culture began to explore Eastern culture, rugs attracted the attention of the West in the 19th century and the concept of orientalism came to the fore. Although Asian, Persian and Anatolian rugs are considered by Western culture to be products of the same geography, Turkish rugs have their own unique characteristics. The rug attracted the attention of the West with its adventures from the homes of the Turkish people to the Ottoman palaces and then especially took its place in the homes of Western travelers.

Today, Turkish rugs have a huge fan base around the world and are considered a highly valued handicraft by art lovers. With interest from the past many people buy or specially order rugs to decorate their homes with these beautiful and unique art products. Turkish rugs, as part of the Turkish culture and handicraft tradition, are still today an important part of the country's rich cultural heritage (Arıoğlu and Aydoğdu, 2015). Rugs have an important place in various areas of Turkish culture. They have been used for many functional and aesthetic purposes in Turkish society for centuries. Rugs are hand-woven and can be considered as a transitional form between carpets and rugs (Bayraktaroğlu, 1991). Carpet has a thicker texture while rug is thinner and flatter.

Turkish rugs have a rich cultural heritage and each region has its own unique style and patterns. Rugs are produced in many countries and regions such as Anatolia, Iran, Caucasus, Afghanistan, Turkmenistan (Çakmakoğlu 2017). Rugs are considered an important symbol in Turkish culture and are used for many different purposes. They can be used for furnishing a house or for decorative purposes such as bags, pillows, coffee table covers and curtains. In addition, rugs are also used in special ceremonies such as weddings and funerals in Turkish culture (Çoruhlu, 2002). Turkish rugs are recognized worldwide and are especially popular in the world of art and design. The beautiful colors, motifs and textures of the rugs become wonderful pieces that can be used in modern home decorations (Deniz, 2000). These art products have been used in Turkish culture not only for decorative purposes but also for educational purposes. Especially in the past, training in traditional arts and crafts was provided by teaching the weaving and patterns of rugs (Durul, 1974).

Method

Research Design

This study is based on inductive analysis, one of the qualitative research methods. Through the perspectives and definitions of the concept of rugs, meanings according to different fields and disciplines were revealed and field research was conducted.

With the qualitative research method used to investigate social phenomena, the concept of rug was presented in a realistic and holistic way. The variables handled with a holistic approach, one of the qualitative research methods, were handled with their unity according to their sub-topics, and the results obtained were put forward by inductive method. In this study, which can be read as a theory-building study, the data collected by the screening method were analyzed and interpreted in accordance with a holistic approach. Since the main purpose of the inductive method is to reach concepts and relationships that can explain the collected data, the place of the concept of kilim in various disciplines with different variables was examined and a cultural interpretation was put forward.

The symbolic meanings of kilim (rug), which was chosen as the research problem, were revealed around the components of education, history, geography and culture in Turkish culture. The research and subject selection were made by purposive sampling method. With purposive sampling, natural and social events or phenomena are tried to be understood in the context of the selected situations, and the relationships between them are explored and explained (Büyüköztürk et al., 2021, p.103). In this context, the meaning, relationship and cultural expression of the concept of rug in the selected subjects and disciplines were investigated and revealed.

Results

Rug and Education

Even today, in some Turkish regions, rug weaving workshops are used in schools for handicraft classes. In addition, some foundations and associations offer rug weaving trainings to help young people learn this traditional art (Teker, 2011). The connection of rugs to education is not limited to weaving techniques. Rugs contain a variety of symbols, motifs and colors and offer the opportunity to learn about the meanings of these symbols, motifs and colors. For example, many symbols and motifs are used as part of national identity, such as the use of motifs from the Turkish flag in rugs (Nuran, 2002).

Rugs have a cultural significance not only in Turkish culture but also worldwide and are among the traditional handicrafts of many countries. Rug weaving requires a long and painstaking process and involves many skills and techniques. For this reason, rug weaving has an important place among traditional handicrafts and is important for the preservation of cultural heritage (Ögel, 1995). Rug weaving is also useful for education. Rug weaving is a complex process involving many skills, and this process can especially help children develop their manual dexterity. In addition, subjects such as mathematics, geometry, and the harmony of colors come into play during rug weaving, which allows students to better understand these subjects (Erbek, 2002). M

any schools in Türkiye, especially in rural areas, offer traditional handicraft classes such as rug weaving. These classes can help students preserve their traditional culture and handicraft skills, while also helping to increase their educational attainment (Teker, 2011). As a result, rug weaving is not only useful for the preservation of cultural heritage, but also for education. Therefore, teaching and practicing rug weaving contributes to

preserving traditional culture and increasing the level of education. Rugs are an important tool in Turkish culture not only for decorative purposes but also for education and cultural transmission. Rug weaving is used to provide training in traditional arts and crafts and to offer the opportunity to learn about symbols, motifs and colors (Nuran, 2002).

Meanings of Colors in Rugs

As in most of the visual arts, colors are of great importance in rug art. The colors, motifs and patterns of rugs may vary according to the culture and natural environmental conditions of the region where they are produced. The colors used in rugs help to determine the characteristics and meanings of the rugs (Yetkin, 1971). For example, the rugs produced in Turkmenistan usually use red, blue, black and white colors. These colors are symbols of the sun, water, earth and life, which have an important place in Turkmen culture. In addition, the use of these colors helps the rugs to be in harmony with the natural environment (Balyemez, 2006).

There is an interesting connection between emotions and rug colors. The colors of symbols in rugs and even the color of the rug itself express different emotions. For example, warm colors (red, orange, yellow) evoke a sense of energy and warmth, while cool colors (blue, green, purple) can evoke a sense of calm and peace. Patterns and colors in rugs can also determine their meaning and uses. For example, rugs used in weddings often have heart motifs in red, a symbol of love (Ergen, 2010).

The choice and intensity of colors used in rugs depends on the designer's foresight and taste. The harmony of colors with each other determines the beauty and harmony of the design. Different shades of the same colors can enrich the patterns on the rugs. The colors used in rugs are derived from natural sources. Traditionally, natural dyes obtained using plants, insects and minerals provide a rich range of colors for rugs (Çetin, 2020). In addition, the colors used in rugs also have symbolic meanings. For example, the color red means love, passion and warmth in Turkish culture, while the color green means nature, life and freshness. Colors can be used to tell a story created by the designer and to deepen the meaning of the rugs (Önder, 1968).

Colors are of great importance in rug art. While colors determine the meaning and character of the design, they also increase the aesthetic value of the design. While the colors used in rugs give clues about the natural environment and culture of the region, they also have symbolic meanings (Balyemez, 2006). The colors obtained by using natural dyes form the rich color range of rugs. Colors are of great importance in rug art. Colors help rugs to reflect cultural heritage, to be in harmony with the natural environment and to express different emotions. The colors and patterns of rugs are also important for the preservation of cultures and traditions (Ergen, 2010). Colors play an important role in the design and aesthetic value of rugs. The colors used in rugs are important elements that determine the meaning and character of the design. At the same time, the colors used in rugs give clues about the culture and natural environment of a region (Yetkin, 1971).

Symbolic Meanings of Love in Rugs

The place of rugs in traditional Turkish culture is very important and there are many symbols and motifs symbolizing love in this culture. Among the motifs used in the designs of rugs are patterns that symbolize love (Oyman, 2019). For example, in Turkish culture, there is a saying "the way of love is through rugs", which expresses the importance of rugs in Turkish culture and their connection with love. In some rugs, symbols such as heart motifs, couples standing side by side or holding hands are used to symbolize love (Kayabaşı, Bozkurt & Özkoca, 2016). In addition, rug weaving has also been used many times to express love. During rug weaving, a couple working together and helping each other can be seen as a symbol of love. And also, the fact that the threads used in rug weaving form a whole by weaving together can also be interpreted as a symbol of love (Oyman, 2019).

Love motifs and symbols in rugs emphasize the importance and value of love in Turkish culture. While the love motifs on rugs reflect the love and loyalty of couples to each other, working together during rug weaving also expresses the solidaristic and cooperative aspect of love (Yayan, 2010). Rugs are among the symbols used to express love in Turkish culture. While the love motifs on the rugs reflect the love and loyalty of the couples to each other, working together during rug weaving also expresses the solidarity and cooperation aspect of love.

The rugs reflect the importance and value of love in Turkish culture and also reflect the richness and diversity of Turkish culture. Rugs have an important place among traditional handicrafts in Turkish culture and around the world. The making of rugs requires a long and painstaking process involving many skills and techniques. Rugs are also known for their special meanings and symbolism, including "love" (Oyman, 2019).

In Turkish culture, rugs are often given as wedding gifts. Especially at weddings, rugs are prepared for the bride and groom, and most of these rugs have a love theme. In addition, symbols such as roses, tulips, stars and hearts are often used in Turkish rugs and these symbols are used to express love (Yayan, 2010). Rugs can also be specially designed to express love. For example, the names of two lovers can be embroidered on a rug or the initials of the lovers' names can be embroidered on the rug. These rugs are a romantic way of expressing love (Oyman, 2019).

The theme of love can also be woven into the process of rug weaving. Since rug weaving is a long and painstaking process, a rug embroidered with labor and love is a beautiful way to express love. During rug weaving, the colors, symbols and designs used in embroidery can also be specially chosen to express love (Yayan, 2010). As a result, the theme of "love" is often depicted in rugs, and in Turkish culture, rugs are often used as wedding gifts. In the process of making rugs, the theme of love can also be embroidered and the names or symbols of lovers can be embroidered on the rugs. Rugs can be a romantic and special way to express love (Oyman, 2019).

Fatih Kısaparmak's Folk Song "Kilim"

Fatih Kısaparmak is a Turkish musician and composer. He performs in the field of Turkish folk music and is also knowledgeable and passionate about rugs. Kısaparmak started weaving rugs in the 1980's and has been working in this field ever since. He uses traditional Turkish patterns and symbols in his rugs, but also designs in a modern style. He also organizes workshops on rug weaving and traditional handicrafts. Kısaparmak's work is known for his love and passion for Turkish culture and traditional handicrafts. He has created his own style by studying the characteristics of rugs from different regions of Türkiye and combining different techniques and patterns. For this reason, Kısaparmak's rugs stand in a unique place among rugs made in both a traditional and a modern style (Zırh, 2015). Kısaparmak has been interested in rugs since his childhood and is very interested in the art of rug in Turkish culture. He has many collections of rugs and has exhibited these collections throughout his music career. He has also made documentary films about rugs and emphasized the importance of rugs in Turkish culture. Kısaparmak has also created a different style by using rugs in his music career. In some of his songs, the unique rhythms and textures of rugs are used and these songs offer a different musical experience to listeners (Meydan, 2021).

Kısaparmak draws attention to the importance of rugs in Turkish culture and the difficulty of rug weaving, and aims to inform younger generations about rug weaving and preservation. He believes that rug weaving is an art and that this art should be passed on to future generations. Kısaparmak also gives importance to the promotion of rugs from different regions of Türkiye. He believes that rugs are not only a work of art but also a cultural heritage. For this reason, she researches the characteristics and symbols of rugs from different regions of Türkiye and shares this information with her students in her workshops (Apaydın & Soner, 2020). Fatih Kısaparmak, as a Turkish music artist and rug collector, has a great interest in the art of rugs in Turkish culture. He has created a different style by using rugs in his music career and contributes to the transfer of this art to future generations by informing young generations about rug weaving and preservation.

Fatih Kısaparmak composed a folk song called *Kilim* in the album Kilim/Nazlı Bebe in 1989. The composer, who is also known as "Çağdaş Ozan", "Bay Kilim" and "Türkü Baba" composed the folk song *Kilim* inspired by a story. According to the story, the exact source is unknown, once upon a time a shepherd falls in love with the daughter of the landlord he works for. The girl also loves the shepherd, but their reunion is not possible. The shepherd musters up the courage to speak to the landlord one day, but the he responds him with a beating. Her father calls his daughter and asks her about this situation, but she cannot answer out of fear. But she has deep feelings for the shepherd. To prevent this love, the father promises his daughter to an old man from a nearby village. When the dowry is delivered before the marriage, the old man looks at the woven rugs in the dowry and sees all forms of a deep love. Unable to tell anyone about her love for the shepherd, the girl has embroidered her love in the rugs she weaves motif by motif. Talking to the girl's father, the old man convinces him and the lovers come together.

Below is the Turkish original folk song and its English equivalent:

Sevdiğine sözü olan bir kilim dokur	Who has a promise to his beloved weaves a rug
Kilimin dilinden ancak anlayan okur	Only those who understand the language of the rug can read it
Sırlarımı verdim sana sevgimi verdim	I gave you my secrets, I gave you my love
Şu gönlümü kilim yaptım yoluna serdim	I made my heart a rug and laid it on your path
Ayıptır günahtır diye kilit vurdular dilime	They locked my tongue for shame and sin
Aşkı dokudum kilime anlıyor musun	I've woven love into the rug, do you understand?
Yetinmedim türkü yaktım, gayrı bu canımdan bıktım	I created a song, I'm tired of this life
Hani senin olacaktım dinliyor musun?	I was going to be yours, are you listening?
Kilim kalbin aynasıdır gönlün sesidir	The rug is the mirror of the heart, the voice of the heart
Her nakışı bir duygunun ifadesidir	Each embroidery is an expression of an emotion
Kilim sevgiliye çağrı aşka davettir	The rug is a call to the beloved and an invitation to love
Kimi renkler şikayettir kimi hasrettir	Some colors are complaints, some are longing
Ayıptır günahtır diye kilit vurdular dilime	They locked my tongue for shame and sin
Aşkı dokudum kilime anlıyor musun	I've woven love into the rug, do you understand?
Yetinmedim türkü yaktım, gayrı bu canımdan bıktım	I created a song, I'm tired of this life
Hani senin olacaktım dinliyor musun?	I was going to be yours, are you listening?
Ben şu gönül tezgahında kilim dokudum	I wove a rug on this loom of the heart
Erenlerin dergahında aşkı okudum	I read love in the lodge of the Eren
Töremizde kilim demek ilim demektir	In our tradition, rug means knowledge
Kilim sevdadır özlemdir derttir istektir	Rug is love, longing, trouble, desire
Ayıptır günahtır diye kilit vurdular dilime	They locked my tongue for shame and sin
Aşkı dokudum kilime anlıyor musun	I've woven love into the rug, do you understand?
Yetinmedim türkü yaktım, gayrı bu canımdan bıktım	I created a song, I'm tired of this life
Hani senin olacaktım dinliyor musun, anlıyor musun?	I was going to be yours, are you listening, do you understand?

In Turkish, various idioms are used to create folk songs. One of these is “türkü yakmak”, which means “to burn a song”. This idiom has a very deep meaning, because the genre “türkü” which means “a genre belonging to Turks” often contains heartbreaking stories. An “ozan” who creates a song has to burn before.

There are many phrases in the *Kilim* folk song about understanding and being understood. An inexpressible love finds expression in a concrete object, the rug itself. Since it is not possible for women to speak in societies where they have not yet gained the freedom of self-expression and choice, they express their thoughts and feelings through objects and behaviors. The object here is a rug and it carries the woman's secrets. It is about

concepts such as shame and sin being an obstacle to love. In fact, since there is a conflict between classes, it is not tolerated for the daughter of the rich landlord to get together and marry a shepherd. The young woman weaving her love and emotions into the rug expresses an emotion in each embroidery.

Some colors symbolize love, some an invitation to love, some a complaint and some a longing. The young woman whose tongue is locked also expresses the ontological meaning of love in the folk song. Rugs also mean knowledge in the tradition. And it contains a lot of knowledge. In the folk song accompanied by despair, a heartbreaking melody expresses all emotions.

The Messages of the Rugs

Rugs express many messages. The symbols, motifs and colors in rugs have many different meanings and can carry different messages for different societies and cultures. For example, in Turkish culture, rugs have many different meanings as well as being used for home decoration. The symbols used in rugs represent gods and heroes from Turkish mythology, natural phenomena and family values. Rugs are also used for many different purposes, for example, they are given as gifts on special occasions such as marriage proposals at weddings, wedding gifts, birthday gifts, and holiday gifts. Rugs can be used to express emotions such as love, respect and gratitude (Aydın, 2022).

Similarly, in other cultures, rugs carry messages through symbols and colors. For example, the symbols used in rugs made in Mexico represent events in Mexican history, natural phenomena and local mythology. Rugs reflect Mexico's cultural heritage and identity. In short, rugs carry many different messages through the symbols, motifs and colors they contain. Rugs can also be seen as artifacts that reflect the history, identity and traditions of a culture (Oyman, 2019).

Rugs can carry a message through their design and colors. For example, Turkish rugs often use roses, tulips, stars and other symbols, and these symbols, together with the colors used in the making of the rug, carry a message. Rugs can also be used to tell a story. The symbols and designs on the rug are specially chosen to tell a particular story (Arslan, 2019). Rugs can also reflect the history of a society or culture. Rugs provide information about the lifestyle of a society in the past. The colors, patterns and symbols used in the making of rugs give insight into the values, beliefs and lifestyles of that society. Rugs can also refer to a person or an event. For example, a person's name or portrait can be embroidered on a rug. Rugs can also be used for special events or ceremonies. At weddings, rugs are used as symbols of marriage, emphasizing the importance of marriage (Kökrek, 2014).

As a result, rugs are symbols of a culture, society and history. They can carry a message with their designs, colors and symbols. The symbols, patterns and colors used in the making of rugs give insight into the values, beliefs and lifestyles of a society. Rugs can also refer to a person or event and can be used for special events or ceremonies (Akoğlu, 2021).

Rugs and Symbols

Rugs are one of the traditional handicrafts, especially in Turkish culture, and are particularly recognized for their patterns and shapes. The shapes used in rugs can have many different meanings and carry symbolic meanings (Aytekin, 2011). One of the most common shapes used in rugs is the ellipse or half-ellipse. These shapes often represent the body of humans or the jaws of animals. Ellipse shapes are also considered a symbol of fertility and fertility. Another frequently used shape is triangles. Triangles are often used in rugs as symbols of mountains or houses. Triangular shapes used in rugs can sometimes also represent the human body. Square and rectangular shapes are also commonly used in rugs. These shapes often represent the layout of houses or gardens. At the same time, squares and rectangles can also be used to represent walls or outdoor spaces in some rugs (Dikmen, 2022).

Circles are also a common shape in rugs. Circles are often considered symbols of the sun or the moon. They can also represent the infinity and cycle of the universe. The shapes used in rugs carry symbolic meanings and often represent objects such as the human body, animals, houses, gardens, walls, outdoor spaces, the sun and the moon. The shapes used in rugs have many different meanings and have cultural, historical and symbolic significance (Kar, 2022). The shapes used in rug weaving play an important role in the creation of designs and symbols. Rugs are usually decorated with geometric patterns, flowers, animal figures and symbols (Sağ, 2012). Geometric patterns are one of the most frequently used shapes in rug weaving. These patterns usually consist of triangles, squares, stars, lines, circles and ellipses. Geometric patterns ensure that rugs are regular and symmetrical (Oyman, 2019).

Floral motifs are another design element frequently used in rug weaving. Roses, tulips, carnations and other flowers are popular motifs used in the making of rugs. These floral motifs are usually used in stylized forms and add color and vitality to the rugs (Sağ, 2012). Animal figures are also frequently used in rug weaving. These figures are usually used in stylized forms and represent animals such as snakes, wolves, horses, birds, camels, sheep and goats. These figures add a symbolic meaning to the rugs (Aytekin, 2011). Symbols are another design element used in rugs. These symbols reflect the values, beliefs and traditions of a society or culture. For example, the symbols of stars, hooks, hands and eyes are commonly used in Turkish rugs, and these symbols provide information about Turkish culture and beliefs (Aytekin, 2011). In conclusion, the shapes used in the design of rugs determine their aesthetics and symbolic meaning. Geometric patterns, flowers, animal figures and symbols are frequently used design elements in the making of rugs. With the use of shapes, rugs can be both aesthetically beautiful and rich in symbolic meaning (Sağ, 2012).

The Relationship between Rugs and Culture

Rugs reflect the social and cultural values of a society. For example, the symbols and designs used in Turkish rugs emphasize the unity and solidarity of the family. Similarly, the symbols and designs used in Iranian rugs

reflect the importance of Islamic beliefs and values (Özdemir & Çakmak, 2018). Rugs are important symbols that reflect the values, cultural identity and history of a society. Rugs are considered a valuable gift in many cultures because they are handcrafted and made with care. The designs, motifs and colors of rugs provide information about the beliefs, traditions and lifestyle of a society and help to pass these values from generation to generation (Begiç & Sarıcan, 2021).

Rug has an important place in many cultures and is attributed different values by different societies. Rug weaving represents a tradition that has been passed down from the past to the present in many cultures. Rug weaving is also seen as a symbol of women's hand skills and labor in many societies (Aytaç, 2007). In addition, rugs have a symbolic meaning in many cultures. For example, the symbols used in rugs in Turkish culture reflect the values, beliefs and traditions of the society. Again, in Turkish culture, the gift of rugs at weddings and other special ceremonies shows the value given to a person (Özdemir & Çakmak, 2018). Rugs also carry an economic value. In some communities, rug weaving is seen as a source of livelihood. The sale of rugs is also a part of tourism in many regions, thus contributing to the economy of the region (Begiç & Sarıcan, 2021). The fact that the materials used in the production of rugs are natural is also associated with sustainability and environmentally friendly values. The wool and cotton used in their production are considered renewable resources without harming the environment (Aytaç, 2007). As a result, rugs have different values in many cultures. Rug weaving is part of women's handicraft skills, traditions and symbolic meanings. Rugs also have economic, sustainability and environmentally friendly values (Begiç & Sarıcan, 2021).

The Relationship between Rugs and Art

Rug weaving is actually a handicraft and is considered an art form in many societies. The techniques, patterns and colors used in the making of rugs are so carefully selected and applied that they can be considered works of art (Davşancı, 2018; Türe & Ozturk, 2021).

Rugs are a subject of interest for many artists and designers. Many modern works of art have been inspired by rug patterns and colors. Rug patterns are also used in modern interior design and have an important place in the design world (Yetkin, 1971). In addition, some rugs are considered works of art in their own right. In particular, there are famous rug schools in different parts of the world. In these schools, rug weaving is taught and students develop their own style (Yetkin, 1971).

As a result, rug weaving is a craft and an art form. Rugs can be considered as works of art and part of modern design, and they can also be seen as works of art in their own right (Davşancı, 2018).

Rugs In Turkish Folk Songs

The folk song known as "Kilim Türküsü" is one of the most famous pieces of Turkish Folk Music. Since folk

songs usually have an oral tradition, the exact story of the "Rug Folk Song" is not known for certain (Doğan, 2012). However, the lyrics of the folk song are usually sung by a lover longing after a lover. The "rug" in the lyrics usually represents a rug woven or to be woven by the lover's longed-for lover (Aydın & Çinpolat, 2018). The "rug" motif in the folk song has an important place in Turkish culture. Rugs are handmade carpets and rugs traditionally used in Turkish culture. Sarıçiçek, M. (2015) Therefore, rugs are seen not only as a household item but also as a symbol of art and culture (Zırh, 2015). The composition of the "Rug Folk Song" is also very impressive and emotional. Although the composer of the folk song is not known for certain, it is generally accepted as an anonymous work. There are also different versions of the folk song in different regions (Şahin, Ölmez & Kılıçarslan, 2019). Although the full story of the Rug Folk Song is unknown, its lyrics and composition have an important place in Turkish culture (Çonoğlu, 2008). The folk song is among the most popular works of Turkish Folk Music with its reflection of feelings of love and longing and its impressive composition (Yegen, 2022).

Since rugs have an important place in Turkish culture, they are also featured in many songs and folk songs. The meaning and symbolism of rugs are also frequently depicted in Turkish folk music. Here are some examples:

- " Gurbet Yollarında Kilimler" - Written and sung by Aşık Veysel Şatıroğlu, this folk song touches upon the importance of rugs in Turkish culture and the difficulties of living in expatriation.
- "Kilim" - This song, sung by Müslüm Gürses, describes the feelings of a person who cannot bear the absence of a lover and talks about the warmth of rugs.
- "Kilimlerim Sende Kaldı" - This song, sung by Selda Bağcan, emphasizes the rugs that carry the memories of past loves.
- "Kilim" - Written and sung by Barış Manço, this song focuses on the meaning of rugs and their place in Turkish culture, while also referring to the unification of different cultures.
- "Kilim Türküsü" - Sung by Ali Ekber Çiçek, this folk song emphasizes the beauty of rugs and their importance in Turkish culture.

These songs and folk songs are examples that emphasize the importance of the rug tradition in Turkish culture. Since rugs are a common theme in Turkish folk music, there are many more songs and folk songs on this subject.

In Turkish culture, rugs are considered a motif that has a special place and is often associated with other art forms such as music, poetry and literature. For this reason, there are many songs and folk songs about Rugs in Turkish music.

Here are some Turkish folk songs and folk songs about rugs:

1. "Kilim" - Aşık Veysel Şatıroğlu
2. "Kilim" - Hüseyin Turan
3. "Kilimlerim Var" - Selda Bağcan
4. "Kilimlerim Kök Kök Örülmüş" - Ali Ekber Çiçek
5. "Yıllar Yılı" - Neşet Ertaş

6. "Kilim" - Feryal Öney
7. "Kilim" - Orhan Gencebay
8. "Kilim Desenli Şalvar" - İbrahim Tatlıses
9. "Kilimlerim" - Edip Akbayram
10. "Kilim" - Kubat

In these songs and folk songs, the beauty, patterns and colors of rugs are praised and it is emphasized that rugs have an important place in Turkish culture. In addition, the fact that rugs are woven by women's hands and are considered a traditional art is a common theme in these songs.

The Relationship between Rugs and Women

Rug weaving is a handicraft traditionally practiced by women. In the past, women used to contribute economically by making rugs in their spare time while doing household chores. Rug weaving was also seen as a form of social interaction between women (Davşancı, 2018). However, today rug weaving is practiced by men as well as women. Moreover, rug weaving is not limited to gender as it is an art and requires manual skill. Any person can learn how to weave rugs and practice this handicraft (Şemin, 2019). The design, choice of colors and weaving techniques of rugs are also is related to art and aesthetic values. Therefore, rug weaving is not only a handicraft, but also an art. In the field of art, there is equal participation of women and men (Davşancı, 2018).
For a Turk, the meaning of a rug is an important part of their culture and history. Rugs are often seen in Turkish society as a symbol of family life and the togetherness of the home Sarı, 2019). Rug weaving was also seen as a form of social interaction between women in the past and therefore in many Turkish families, rug weaving is a traditional activity (Şemin, 2019). Rugs also have a rich symbolism in Turkish society. The motifs and colors used in rugs are often linked to symbols specific to Turkish culture. For example, stars, flowers and geometric patterns are frequently used motifs in Turkish culture. The colors used in rugs also carry meaning and each color has a different symbolism (Davşancı, 2018).

As a result, although in the past it was a handicraft often practiced by women, today rug weaving is practiced equally by men and women. Since rug weaving requires art and manual skill, it is not limited by gender and can be practiced by anyone (Şemin, 2019).

Rugs In Turkish Literature

Rugs have been an important motif in Turkish literature. In Turkish literature, rugs are often used as a symbol of Anatolia's cultural richness, women's labor, nature and life (Savaşkan, 2016). For example, in the novel "My Name is Red" by Orhan Pamuk, one of the important names of Turkish literature, rugs are at the center of a family story and the meanings and symbols carried by rugs in Turkish culture are discussed. Rugs are also frequently used in Turkish folk literature. Especially in minstrel literature, rugs are used as a symbol of love and

longing for the beloved. In the poems of many lovers, the beauty, colors and patterns of rugs are described with praise.

In Turkish culture, rugs are not only important in terms of art and craftsmanship, but also have an important place in literature (Bulut & Keskiner, 2008). Rugs are considered a frequently used motif in Turkish literature and are used by many Turkish writers and poets in their works (Savaşkan, 2016). Turkish poet like Sezai Karakoç, Yavuz Bülent Bakiler, Bedri Rahmi Eyüpoğlu Metin Eloğlu use rugs in their poems as symbols and elements of folklore. Writers and poets of modern Turkish literature like Refik Halid Karay, Yusuf Atılgan, Adalet Ağaoğlu, Kemal Bilbaşar, Ziya Osman Saba used rug motifs in their art works. In these works, rugs are used as motifs or symbols. These symbols, which have a meaning related to tradition, began to appear more frequently in Turkish literature with the tendency towards works about the homeland and Anatolia. In these works, rugs are treated as an important part of Turkish culture and used with symbolic meanings.

Especially in Anatolian literature and folk literature, rugs are a frequent theme. Rugs are sometimes considered as symbols of freedom, and sometimes as symbols of feelings such as love, affection and devotion. Rugs also represent the efforts and endurance of Anatolian people to survive in harsh living conditions (Savaşkan, 2016). Some famous Turkish writers and poets have also included rugs in their works. For example, Orhan Kemal's novel "Eskici ve Oğulları" tells the story of collecting and reusing old rugs. Rugs play also an important role in Yaşar Kemal's novel "Ince Memed" (Akgül, 2020).

The place of rugs in literature is not limited to Turkish literature. For example, rugs appear as an important theme in the novel "Madame Bovary" by the famous French writer Gustave Flaubert (Yardımcıel, & Yılar, 2022). In short, rugs are considered an important theme and symbol in Turkish literature. For this reason, many writers and poets include them in their works and touch the imagination and emotional worlds of readers (Cunbur, 2021).

Rugs In Turkish History

The history of rugs in Turkish culture is quite deep-rooted. Turks have used rugs as a part of their lives throughout history. Rugs have an important place in the nomadic lifestyle and nomadic culture of the Turks. The first Turks knitted wool to make hides, tents, saddles, halters, bags, etc. for their animals, and they met their needs by using most of this wool in rug weaving (Özdemir & Çakmak, 2018). Rugs maintained their importance even after the Turks settled in Anatolia. The rich cultural texture of Anatolia contributed to the development and diversity of rugs. Turkmens living in different regions of Anatolia wove rugs for centuries, creating their own unique designs and patterns. These rugs both offer a visual richness and facilitate people's daily lives (Deniz, 1994).

Rugs have an important place in Turkish history. Especially during the Ottoman period, the production and trade

of rugs showed a great development. The Ottoman Empire was the world leader in the production and export of rugs. In this way, rugs became an important source of income for the Turkish economy (Aytaç, 2007). In addition to their importance in Turkish history, rugs are also a symbol of Turkish culture and identity. Turkish Rugs are known worldwide for their unique patterns, vibrant colors and craftsmanship (Deniz, 1994).

Historically, rugs have been an important tool used by Turks in many wars. For example, in many wars of the Ottoman Empire, rugs were used for sleeping soldiers and transporting the wounded. In addition, rugs were also used to meet the Turks' need for shelter (Deniz, 1994). Rugs also have an important cultural and social significance in Turkish history. Especially among the Turkmens living in Anatolia, the tradition of weaving rugs has continued very widely. The continuation of this tradition is considered a part of Turkish culture (Aytaç, 2007). Today, in Türkiye and other Turkish cultures, the tradition of rug weaving is still alive. While rugs remain a part of Turkish history, they are also considered a beautiful decoration material for many people in their homes (Aksoy, 2007).

As a result, rugs have a close relationship with Turkish history and culture. From the nomadic lifestyle of the Turks, until their settlement in Anatolia and the Ottoman Empire period, rugs have been a part of life and are still an important symbol of Turkish culture (Aksoy, 2007).

The Relationship between Rugs and Geography

There is a close relationship between rugs and geography. Rugs are usually designed in accordance with the climatic conditions, natural resources, vegetation and cultural characteristics of the region where they are woven. For this reason, each region has its own unique rug designs, and these designs may change when moving from one region to another (Boyraz, 2019). For example, rugs woven in the eastern regions of Türkiye generally use warm colors and geometric patterns, while cooler colors and floral patterns are preferred in the western regions. In addition, the quality of the wool used in rugs woven in different regions of Anatolia also varies (Kan, Gülçubuk, & Küçükçongar, 2012).

The relationship between rugs and geography is also linked to the way of life of nomadic Turks. In the nomadic lifestyle, rugs are used for the transportation of houses, tents, horses and goods. Therefore, the colors and patterns often used in the rugs of nomadic Turks are compatible with the vegetation and geographical features found in nature (Şahin, & Meral, 2012). The relationship between rugs and geographical features also includes a historical dimension. The tradition of rug weaving was carried to Anatolia along with the geographical and cultural characteristics of Anatolia during the migration of Turks from Central Asia to Anatolia. For this reason, the geographical features and cultural heritage of Anatolia are often used in rug designs (Boyraz, 2019).
Rugs are a handicraft that differ according to the geographies where they are woven. Especially rugs produced in different regions of Türkiye differ from each other with their weaving techniques, patterns and colors. Therefore, there is a close relationship between rugs and geography (Kan, Gülçubuk, & Küçükçongar, 2012).

For example, rugs in the eastern parts of Anatolia are generally known for their geometric patterns and vibrant colors. Turkmens living in this region traditionally weave rugs for use in daily life. In addition, the rugs in this region often use vibrant colors such as red, blue and yellow (Şahin, & Meral, 2012). In the western parts of Anatolia, on the other hand, rugs with floral patterns and pastel tones are produced. The rugs in this region are generally woven from finer yarns and contain more delicate patterns (Boyraz, 2019). However, the fact that the rugs produced in Türkiye vary according to geography is only one example. Similarly, rugs in other geographies may have different characteristics. For example, rugs in Iran have different weaving techniques and patterns than those in Türkiye (Kan, Gülçubuk, & Küçükçongar, 2012).

Rugs sometimes contain symbolic patterns that may carry hidden meanings. These symbolic patterns are sometimes family symbols or regional motifs and sometimes they can carry a coded message (Çalışkan & Koç, 2013). Especially in rugs woven by Turkmens living in Anatolia, it is known that some patterns are symbols of families or tribes. These symbolic patterns may represent the origin of the family or the profession of its members (Boyraz, 2019). It is also known that some rug patterns have been used as codes for communication throughout history. For example, during the Seljuk period, it is known that the words used for communication during the journey were expressed in symbols. These symbols helped caravans following the road to understand and communicate (Şahin, & Akova, 2019).

The meaning of the symbolic patterns on the rugs has been preserved, often passed down among the weaving families or the people of the region. These symbolic patterns are part of the cultural and historical heritage, as well as the artistic expression of the women who weave the rugs. Rugs are traditionally known to contain patterns with symbolic meanings. These symbolic meanings can be interpreted in different ways by people living in different geographies and their meanings may vary (Kan, Gülçubuk, & Küçükçongar, 2012). The symbols used in rugs are often related to the culture, history and natural environment of the region. For example, symbols such as horse, camel, flower and star are frequently used in the rugs of Turkmens living in Anatolia. These symbols are part of Turkmen culture and also refer to the natural environment of the region (Çalışkan & Koç, 2013).

The symbolic meanings of the rugs sometimes contain special meanings and can be used as a code. These codes are often used between families, in marriage ceremonies or during migration. For example, a family's surname or origin can be symbolically displayed on a rug, thus protecting the family's history and identity (Şahin & Meral, 2012). However, it is also possible that the symbolic meanings of rugs are not always clearly understood. Some symbols are traditional motifs that are unique to the region and are not easy to interpret. In this case, the meanings of the symbols are often passed down from generation to generation by being passed down among local people (Çalışkan & Koç, 2013). As a result, the relationship between rugs and geography manifests itself as a handicraft that differentiates according to the needs and preferences of people living in different geographies, as well as cultural and historical ties (Şahin, & Akova, 2019).

The Relationship between Rugs and Longing

The relationship between rug and longing in Turkish means "the connection between carpet and longing". This expression can express the emotional connection of traditional Turkish carpets on people. In Turkish culture, carpets are not only a household item but also important elements symbolizing history, tradition and art (Oyman, 2019). Therefore, people may identify with Turkish carpets and feel that they nostalgically evoke their longing for the past. Carpets are also important cultural artifacts that can be passed down from generation to generation, so they can carry deep emotional meaning for individuals and families. "The relationship between rugs and longing" is a Turkish idiom that translates into English as "the relationship between rug and longing" (Kılıç, 2009). This idiom may refer to the emotional connection that Turkish rugs have with people. Traditional Turkish rugs can have an emotional meaning for some people as they represent history, culture, and art, and can make people feel nostalgic and longing for old times or a simple lifestyle (Okca, & Öz, 2019). In Turkish culture, rugs are not ordinary carpets, they are passed down through generations within families and can have deep emotional meanings. The word "longing" usually means a strong desire or longing for something that is missed or lost, and in this context, the association with rugs may indicate a longing for Turkish culture and values.

Rugs and Cultural Heritage

Rug and heart are a Turkish idiom and is often used to refer to two things that are closely related. This idiom expresses that rugs in Turkish culture are not just a piece of decoration, but also appeal to the heart. From the weaving to the colors and patterns chosen, rugs can affect hearts with every detail and cause people to form emotional bonds. This idiom is often used to express that rugs are among the things that a person loves or values. It expresses that rugs appeal to the hearts in Turkish culture. This expression indicates that Turkish rugs are not only a floor covering material, but also carry artistic, cultural and emotional meanings. Since rugs are handcrafted, each one is unique and each one can be considered as an expression of an emotion. By creating a feeling of warmth, comfort and beauty, rugs can capture people's hearts and reflect their memories, emotions and dreams. Therefore, the expression "rugs and heart" implies that rugs have an important place in Turkish culture that appeals to people's emotional worlds.

There is a close relationship between rugs and Turkish folk culture. Turkish rugs are an important part of Turkish folk culture and have been used by Turkish people for many years. Since rugs are hand-woven and made of natural materials, they reflect the natural and simple structure of Turkish folk culture (Kavşut, Gündüz, & Başaran, 2022). Turkish rugs are woven with different techniques in many different regions, making them a unique reflection of Turkish folk art and culture. The motifs and colors used in rugs reflect the lifestyle, beliefs, traditions and natural environment of the Turkish people (Özbek, & Çevik, 2018). In addition, Turkish rugs are an important heritage passed down from generation to generation among families and reflect cultural values. The patterns and embroideries used in rugs can reflect the past memories, traditions and lifestyles of families.

Therefore, Turkish rugs are an important part of Turkish folk culture and are important to Turkish people both culturally and emotionally.

Rugs also have a close relationship with religion and beliefs in Turkish culture. During the Ottoman Empire, the making of rugs was often done in mosques, and rugs replaced carpets used for prayers. Therefore, rugs played an important role in the practice of the Islamic religion (Bayazit, Ceylan, & Saylan, 2012).

The Relationship between Rugs and Religion

Some of the motifs frequently used in Turkish rugs are symbols associated with the Islamic religion. For example, star and moon symbols have an important place in Islam and are frequently used in rugs. Also, various Islamic calligraphy motifs are frequently used in rugs, especially in the Ottoman period (Çatalbaş, 2011). On the other hand, the colors used in rugs can also be associated with religion. For example, the color green has an important place in Islam and is frequently used. In addition, the color red is frequently used in rugs because it carries meanings such as martyrdom and blood ties in Islam (Çelik, 2020).

The relationship between rugs and religion has an important place, especially in Islam. In Islam, it is necessary to have a floor on which to prostrate while praying. For this reason, rugs are often used for prayer in Islamic societies (Çelik, 2020). Turkish rugs are among the floor materials used for prayer in Islamic societies. Since rugs are hand-woven and made of natural materials, they are considered a natural and healthy floor material (Kar, 2022). In addition, the motifs and patterns used in rugs are considered a reflection of Islamic art. Since painting and depicting human figures are forbidden in Islam, geometric patterns, floral motifs and writings have an important place in Islamic art. For this reason, Turkish rugs are also considered a reflection of Islamic art (Çelik, 2020).

As a result, the relationship between rugs and religion is important due to the use of rugs in Islam and the fact that the motifs in rugs are a reflection of Islamic art. However, the relationship between rugs and religion is not limited to the use of rugs in Islam; rugs have been used in other religions in different ways and different religious symbols and motifs can also be used in rugs. (Çatalbaş, 2011).

Animal Figures in Rugs

Animal figures used in rugs are often important symbols with symbolic meanings. Animal figures may have different meanings depending on factors such as the geography, climate and culture of the region where they are used. However, in general, the meanings of commonly used animal figures can be as follows: (Özkartal, 2014).

1. Wolf: The wolf is a symbol of freedom, strength, courage, loyalty and independence. In addition, wolves can also be regarded as the protective symbol of society.

2. Horse: The horse is a symbol of speed, power, freedom, loyalty, courage and struggle. Horses are also used as traditional transportation animals, along with donkeys and camels.
3. Snake: Although the snake is usually a poisonous animal, it is also associated with positive symbols such as health and longevity. Snakes can also be used as symbols of rebirth and transformation (Can, & Kuru, 2023)
4. Lamb: The lamb is a symbol of innocence, mercy, goodness, peace and love. Lambs can also be considered a symbol of fertility and fertility.
5. Rabbit: The rabbit is often a symbol of speed, cunning and fertility. In addition, rabbits are also used as a symbol of rebirth and transformation (Özkartal, 2014)
6. Bird: Birds are often symbols of freedom, peace, love and fertility. Furthermore, birds can also be considered a symbol of spirituality and heaven.
7. Spider: The spider is a symbol of intelligence, creativity and regeneration. In addition, spiders are also used as symbols of fertility and abundance (Çelik, 2020).

In addition to these animal figures, each region may also have its own animal symbols. Therefore, the meanings of the animal figures used in rugs may differ according to the region and culture where the rugs are made (Oyman, 2019).

Plant Figures in Rugs

Plant motifs used in rugs are carry important symbolic meanings. Plant motifs may have different meanings depending on factors such as the geography, climate and culture of the region where they are used. However, in general, the meanings of commonly used plant motifs can be as follows: (Yolcu, 2021).

1. Flowers: Floral motifs are frequently used in rugs, symbolizing beauty, love, happiness and renewal of life. Also, flowers of different colors carry different meanings. For example, white flowers symbolize purity and innocence, while red flowers symbolize love and passion (Oyman, 2019).
2. Leaves: Leaf motifs, which are frequently used in rugs, symbolize the cycle of life, the beauty of nature and abundance. Also, green leaves are a symbol of vitality and health (Karakelle, 2014).
3. Trees: Tree motifs are frequently used in rugs, symbolizing deep-rooted loyalty, endurance and life. Also, different types of trees carry different meanings. For example, pine trees are symbols of strength and protection, while olive trees are symbols of fertility and peace (Şanlı, 2011).
4. Sun: Sun motifs are symbols of light, warmth, source of life and divine power. In addition, sun motifs can also be considered as symbols of vitality, health and hope (Mesara, 1998).
5. Stars: Star motifs are symbols of the beauty of the night sky, navigation and divine power. In addition, star motifs can also be considered a symbol of light, security and hope (Karakelle, A. (2014).
6. Tree of life: Tree of life motifs are symbols of the beauty of nature, the cycle of life and paradise. In addition, tree of life motifs can also be considered as a symbol of protection, health and fertility (Ali, & Karataş, 2011).

In addition to these plant motifs, each region may also have its own plant symbols. Therefore, the meanings of

plant motifs used in rugs may vary according to the region and culture in which the rugs are made (Gönen, 2008).

Discussion, Conclusion and Recommendations

The meaning and expansions of rugs in Turkish culture have a very wide spectrum. As a reflection of culture, it can be concluded that there is a treasure that exists through motifs and symbols in rugs. Each culture is a living organism that produces meaning within itself and has an integrity. Cultural heritage is a unity that shows existence and continuity not only in the past but also in the present. As seen in the article, the rugs that were adopted, developed and handcrafted by the Turkish people are not ordinary. In addition to being handcrafted, they have assumed many functions in different fields within Turkish culture. The continuation of rug weaving through education has ensured that the rugs woven on looms have survived to the present day. Rugs are not only items used as functional objects. They are also an art production. The reason why they are art productions is that they have created meanings with their colors, motifs and symbols. Emotions such as longing, love, resentment and hope are embroidered on the rugs, which have been an occasion to convey a message. Religious motifs and animal and plant motifs from Turkish mythology have also opened up new areas of use in different contexts according to the preferences of the rug weaver. The meaning of rugs has not only remained within themselves but has also inspired other works of art. These precious objects, which have been the source of folk songs, paintings, novels and poems, have also become the expression of history, geography and faith. It would be appropriate to say that there is no random formation in rug weaving. Rugs are especially important objects that convey certain messages and missions to others and to those after their own time. These products, which were widely recognized as part of Turkish folk culture, were perceived as orientalist objects by the West and also entered the Ottoman palaces and to western venues. As a result, rugs are objects of Turkish culture that produce meaning and carry an important mission both as ornaments and as a means of bonding as traditional hand weavings. These hand productions, which enable different disciplines within the continuity of culture, are still ciphers and works of art for enthusiasts today.

References

Akgül, A. (2020). Kırık Sacayağını Onarmak: Edebî Eleştiride Yazar, Metin ve Okur. *Dil ve Edebiyat Araştırmaları*, (22), 53-94.

Akoğlu, F. (2021). Orta Asya'dan Günümüze Karaköy Kilimleri. *Akademik Tarih ve Düşünce Dergisi*, 8 (4), 2094-2120.

Akpınarlı, H. F. (2011). Osmanlı Dokumalarında Kuş Motifinin İncelenmesi. *CİEPO-18 Erken-Osmanlı ve Osmanlı Araştırmaları*, Uluslararası Komitesi-15. 25-30 Ağustos 2008, s. 23-36, Trakya Üniversitesi Balkan Araştırma Enstitüsü Yayınları, Edirne.

Akpınarlı, H. F. & Arslan, A. (2018). İç Anadolu Bölgesi Düz Dokuma Yaygılardaki Figürlü Bezemelerin İncelenmesi. *Motif Akademi Halkbilimi Dergisi*. Cilt: 11, Sayı: 22.

Aksoy, M. (2007). Kültür Sosyolojisi Açısından Halı-Kilim Sanatı ve Etnografik Eserlerdeki Damgaların Dili. *38. ICANAS, 10*, 91.

Ali, A., & Karataş, M. (2011). Milas Halı ve Kilimleri için Kullanılan Yanış (Motif) Adlarının Dil İncelemesi. *Arış Dergisi*, (5), 6-11.

Apaydın, A. K., & Soner, A. L. G. I. (2020). Bağlama İçin Yazılmış Zeki Atagür Eserlerinin İcra Bakımından Analizi. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi*, *9*(3), 2856-2880.

Arıoğlu, I. E., & Aydoğdu Atasoy, Ö. (2015). Somut Olmayan Kültürel Miras Kapsamında Geleneksel El Sanatları ve Kültür ve Turizm Bakanlığı. *Electronic Turkish Studies*, *10*(16).

Arıoğlu, İ. E. & Aydoğdu Atasoy Ö. (2015). Somut Olmayan Kültürel Miras Kapsamında Geleneksel El Sanatları ve Kültür ve Turizm Bakanlığı. Turkish Studies-International Periodical for the Languages, Literature and History of Turkish or Turkic, 10 (16) 109-126. ISSN: 1308-2140, www.turkishstudies.net, DOI Number: http://dx.doi. org/10.7827/TurkishStudies.9058, Ankara-Türkiye.

Arslan, M. (2019). *Tarihsel Süreç İçerisinde Türk Kilimlerinin Teknik ve Desen Özelliklerinin İncelenmesi*. Master's thesis, Beykent Üniversitesi, Sosyal Bilimler Enstitüsü, İstanbul.

Aydın, İ., & Çinpolat, E. (2018). Ortaokul Türkçe Ders Kitaplarındaki Anlatı Metinlerinde Metinlerarası İlişkiler. *Sosyal Bilimler Araştırmaları Dergisi*, *13*(2), 161-177.

Aydın, T. (2022). Türk Halı ve Kilim Dokumalarında "El" Motifinin İzdüşümü. *Kafkas Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *29*, 167-184.

Aytaç, A. (2007). Balkanlar'daki Türk Kültürel Mirasına Bir Örnek: Makedonya Sultan II. Murat Camii ve Kilimleri. *Samsun Mübadele ve Balkan Türk Kültürü Araştırmaları Derneği I. Mübadele ve Balkan Türk Kültürü Araştırmaları Kongresi Bildirileri*, 98-106.

Aytekin, C. A. (2011). Geleneksel Türk El Sanatlarının Çağdaş Resim Tasarımına Etkisi: Hayat Ağacı Kilim Motifli Bir Güncel Sanat Uygulaması Örneği. *Arış Dergisi*, (5), 24-31.

Balyemez, E. (2006). *Iğdır İli Kilim Dokumalarının Özellikleri ve Dokuyucu Görüşleri*. Master's thesis, Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara.

Bayazit, M., Ceylan, U., & Saylan, U. (2012). Geleneksel El Sanatlarının Bölge Turizmine Etkisi: Güneydoğu Anadolu Bölgesi. *Batman Üniversitesi Yaşam Bilimleri Dergisi*, *1*(1), 899-908.

Bayraktaroğlu, S. (1991). Vakıflar Genel Müdürlüğü'nün Halı-Kilim Tesbit ve Tescil Çalışmaları. acikerisim.fsm. edu.tr: 8080/xmlui/bitstream/handle/ 11352/895/Bayraktaroğlu.pdf. (30. 03. 2018)

Begiç, H. N., & Sarıcan, A. (2021). Çamlıdere Yöresinde Unutulmuş Bir Kültürel Zenginlik: Avdan Kilimleri. *Arış Dergisi*, (19), 88-107.

Boyraz, M. (2019). Coğrafi İşaretli Ürünler: Afyonkarahisar. *International Journal Entrepreneurship and Management Inquiries (Journal EMI) Dergisi*, *3*(4), 26-46.

Buğrul, H. (2021). Doğal Çevre Bağlantılı Kültürün Hakkâri Geleneksel Dokuma ve Örgülerine Yansımaları. *Arış Dergisi*, (19), 44-67.

Bulut, A., & Keskiner, O. (2008). Hicri IV. Asır Arap Edebiyatının Önde Gelen Üç Büyük İnşa Kâtibi; İbnü'l-Amid, Sabi, İbn Abbad ve Risalelerinden Örnekler. *Doğu Araştırmaları 2,* 75-98.

Büyüköztürk, Ş., Akgün, Ö. E., Demirel, F., Karadeniz, Ş., & Çakmak, E. K. (2021). *Bilimsel Araştırma Yöntemleri*. Pegem, Ankara.

Can, Ö. G. R., & Kuru, A. Ç. (2023). Çağdaş Türk Sanatında Mitolojik Kaynaklı Hayvan Üslubu. *Üç Aylık Uluslararası Hakemli Dergi*.Üç Aylık Uluslararası Hakemli Dergi Quarterly International Refereed Journal YIL: 2 0 2 3, Nisan / SAYI: 2 Türkdam E-Dergisi/ Nisan-2023/ Sayı: 2

Coşkun, N. Ç. (2022). Doğa-İnsan İlişkisi Bağlamında Mersin Konar-Göçerlerinde Geleneksel Ekolojik Bilgi. *Türük Uluslararası Dil, Edebiyat ve Halkbilimi Araştırmaları Dergisi*, (29), 32-48.

Cunbur, M. (2021). Halı Dokuya Dokuya Şiir Okuya Okuya. *Arış Dergisi*, (3), 112-113.

Çakmakoğlu Kuru, A. (2017). Anıtkabir'deki Renkli Taş Süslemeler–İkonografik Bir Yaklaşım-. Sanat Tarihi Dergisi, XXVI/1, Nisan, ISSN 1300-5707.

Çalışkan, V., & Hasan, K. O. Ç. (2013). Türkiye'de Coğrafi İşaretlerin Dağılış Özelliklerinin ve Coğrafi İşaret Potansiyelinin Değerlendirilmesi. *Doğu Coğrafya Dergisi*, *17*(28), 193-214.

Çatalbaş, R. (2011). Türklerde Hayvan Sembolizmi ve Din İlişkisi. *Turan-Sam*, *3*(12), 49-60.

Çelik, A. (2020). Türk-İslam Kültüründe Sanat ve Din İlişkisi (İslam'da Tasvir, Resim ve Figür Konusuna Eleştirel Bir Gözle Bakış). *Atlas Journal*, *6*(25), 48-71.

Çetin, E. (2020). *Ankara Etnografya Müzesinde Bulunan Kilim Örneklerinin İncelenmesi*. PhD Thesis, Hacı Bayram Veli Üniversitesi, Ankara.

Çonoğlu, S. (2008). Türk Şiirinde Folklora Dönüste Meyve. *Electronic Turkish Studies*, *3*(5).

Çoruhlu, Y. (2002). Türk Mitolojisinin Ana Hatları, Antropoloji-Arkeoloji-Mitoloji Dizisi: 10, 1. Basım, Kabalcı Yayınevi, ISBN: 975-8240-11-0, İstanbul.

Davşancı, M. (2018). *Batı ve Türk Resim Sanatında Geleneksel Türk Kilim ve Halı Örnekleri.* Master's Thesis, Karadeniz Teknik Üniversitesi, Sosyal Bilimler Enstitüsü, Trabzon.

Deniz, B. (1994). Bir Vakıf Eser Olarak Cami, Mescid, Zaviye, Şifahane Gibi Dini ve Sosyal Yapılarda Bulunan Halı, Kilim ve Düz Dokuma Yaygılar ve Bunların Günümüzdeki Durumu. *Vakıflar Dergisi*, S.23, 283-297.

Deniz, B. (2000). *Türk Dünyasında Halı ve Düz Dokuma Yaygıları*. Atatürk Kültür Merkezi Yayınları, ISBN: 9751612829, 1. Baskı, Ankara.

Dikmen, Ü. (2022). Kazakistan ve Anadolu'da Yaygın Olarak Kullanılan Motiflerden Yıldız, Kuş, Koç Boynuzu, Göz, Baldak, Bereket, Gül, Boynuz Motiflerinin Tasarım Açısından Benzerlikleri. *Turkuaz Uluslararası Türk Dünyası Bilimsel Araştırmalar Dergisi*, *3*(2), 183-203.

Doğan, B. (2012). Bedri Rahmi Eyüboğlu'nun Şiirlerinde Halk Bilimi Unsurları. *Electronic Turkish Studies*, *7*(1).

Durul, Y. (1974). Anadolu Kilimlerinin Teşhisi ve İmler. *Birinci Uluslararası Türk Folklor Semineri Bildirileri*. Başbakanlık Basımevi, Ankara.

Erbek, M. (2002). *Çatalhöyük'ten Günümüze Anadolu Motifleri*. T.C. Kültür Bakanlığı Yayınları, Ankara.

Ergen, B. (2010). *Yozgat Yöresi Kilim, Cicim, Zili Örneklerinin Renk, Motif ve Kompozisyon Özellikleri*. Master's thesis, Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara.

Gönen, B. (2008). *Van Kilimlerinde Kullanılan İpliklerin Bitkisel Boyarmaddelerle Geleneksel Boyama İşlemi ve Renk Denemeleri*. Master's thesis, Yüzüncü Yıl Üniversitesi, Sosyal Bilimler Enstitüsü, Van.

Kan, M., Gülçubuk, B., & Küçükçongar, M. (2012). Coğrafi İşaretlerin Kırsal Turizmde Kullanılma Olanakları. *Karamanoğlu Mehmetbey Üniversitesi Sosyal ve Ekonomik Araştırmalar Dergisi*, *2012*(1), 93-101.

Kar, M. (2022). Din–Sanat İlişkisi Bağlamında Eski Türklerde Kült-Sanat Etkileşimi. *KutBilim Sosyal Bilimler ve Sanat Dergisi*, *2*(1), 9-22.

Karakelle, A. (2014). *Hatayda Yetişen Bitkilerden Elde Edilen Renkler, Haslıkları ve Kilim Tasarımında Kullanımı*. PhD Thesis, Ankara Üniversitesi, Fen Bilimleri Enstitüsü, Ankara.

Kavşut Kaplanoğlu, V., Gündüz, E., & Başaran, A. (2022). Telkâri ve Kilim Dokuma Sanatının Birlikteliğinden Oluşan Telkâri-Kilim Takı Koleksiyonu. *Folklor Akademi Dergisi*, *5*(2), 231-249.

Kayabaşı, N., Bozkurt, H., & Özkoca, B. (2016). The Motifs Used in Corum's Handicrafts and Their Meanings. *Hitit University Journal of Social Sciences Institute, Year*, *9*, 39-62.

Kılıç, F. (2009). Kavram Analizi Yönteminin Kültür Kavramının Öğrenilmesine Etkisi. *Education Sciences*, *4*(4), 1381-1391.

Kökrek, M. (2014). Tarihin Sessiz Dili Damgalar/The Silent Language of History Damgas. *Sosyoloji Konferanslari*, (50), 97.

Mesara, G. (1998). *Türk Sanatında İnce Kâğıt Oymacılığı: Katı'*. Türkiye İş Bankası Kültür Yayınları, Genel Yayın No: 215, Sanat Dizisi: 35, Minpa Basımevi, Ankara.

Meydan, E. (2021). Ortaokul (5, 6, 7, 8) Türkçe Ders Kitaplarındaki Edebi Metinlerin Değerler Eğitimi Açısından Yeterliliği Üzerine Bir İnceleme. *Uluslararası Türk Dünyası Araştırmaları Dergisi*, *4*(4), 23-36.

Nuran, S. A. Y. (2002). Düz El Dokumalardan Kilimin İlk Öğretim Programlarında Kullanılması Gerekliliği. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, *22*(1), 195-201.

Okca, A. K., & Öz, N. D. (2019). Kaybolmaya Yüz Tutmuş Kültürel Miras: Karapınar Tülü Dokumaları. *Sanat ve Tasarım Dergisi*, (24), 281-299.

Oyman, N. R. (2019). Bazı Anadolu Kilim Motiflerinin Sembolik Çözümlemesi. *Arış Dergisi*, (14), 4-22.

Ögel, B. (1995). *Türk Mitolojisi*. II. Cilt, Ankara. Ölmez, N. F. ve Aydoğan, E. (2008).

Önder, M. (1968). Halılar, Kilimler ve Bir Yazılı Halı. *Türk Etnografya Dergisi*, (61), 5-12.

Özbek, Ö., & Çevik, S. (2018). Somut Olmayan Kültürel Mirasın Taşıyıcısı Olarak Geleneksel El Sanatları: Gönen. *Journal of Tourism and Gastronomy Studies*, *6*(4), 588-603.

Özdemir, T., & Çakmak, M. A. (2018). Ortaokul Öğrencilerinin Türk Kültür Tarihi Açısından Halı ve Kilim Motiflerinin Dili Hakkındaki Görüşleri-Pazırık Halısı Örneği. *International Journal of Eurasian Education and Culture*, *3*(4), 74-98.

Özkartal, Z. (2014). *İslamiyet Öncesi Türk Kültüründeki Kaya Resimlerinin Türk Halı Motifleri ile İlişkisi*. Master's thesis, Süleyman Demirel Üniversitesi, Güzel Sanatlar Enstitüsü, Isparta.

Sağ, M. (2012). Bir Sembol Olarak "Kilim". *Arış Dergisi*, (8), 116-121.

Sarı, H. K. (2019). Denizli İli Çal İlçesi Kabalar Köyü Düz Dokuma Örnekleri. *Motif Akademi Halkbilimi Dergisi*, *12*(27), 734-748.

Sarıçiçek, M. (2015). Kirkor Ceyhan'ın Kısa Öykülerinin Dili ve Tehcir. *Uludağ Üniversitesi Fen-Edebiyat Fakültesi Sosyal Bilimler Dergisi*, *16*(28), 43-56.

Savaşkan, V. (2016). Ortaöğretim Türk Edebiyatı Program ve Ders Kitaplarının Somut Olmayan Kültürel Miras Ögeleri Açısından İncelenmesi. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, *18*(2), 1302-1323.

Şahin, A., & Meral, Y. (2012). Türkiye'de Coğrafi İşaretleme ve Yöresel Ürünler. *Türk Bilimsel Derlemeler Dergisi*, (2), 88-92.

Şahin, C., Ölmez, F. N., & Kılıçarslan, H. (2019). Kırşehir Halk Türkülerinde Geçen Tekstiller ve Dokuma Araçları Üzerine Bir Değerlendirme. *Trakya Üniversitesi Sosyal Bilimler Dergisi*, *21*(1), 33-54.

Şahin, G., & Akova, S. B. (2019). Coğrafi İşaret Kapsamındaki Türk Halı ve Kilimleri (İnce Isparta "Hasgül" El Halısı ve Bayat Türkmen Kilimi). DOI: 10.26650/PB/PS12.2019.002.114.

Şanlı, H. S. (2011). Halı ve Kilim Yünlerinin Boyanmasında Kullanılan Renkler ve Bu Renkleri Veren Bitkiler. *Social Sciences*, *6*(4), 439-445.

Şemin, M. E. (2019). *Gördes, Milas, Eşme, Bayat Dokumacılarında Halı ve Kilimin Kültürel Yeri*. Master's thesis, Pamukkale Üniversitesi, Sosyal Bilimler Enstitüsü, Denizli.

Teker, M. S. (2011). Geleneksel Türk El Sanatları Bölümü Halı-Kilim ve Eski Kumaş Desenleri Anasanat Dallarında Eğitim Amaçlı Doğal Boya Laboratuvarı Kurmanın Gerekliliği. *Arış Dergisi*, (5), 110-119.

Türe, A. & Ozturk, O. T. (2021). The Transformation of Mythological Stories into the Art of Painting. In S. Jackowicz & O. T. Ozturk (Eds.), *Proceedings of ICSES 2021-- International Conference on Studies in Education and Social Sciences* (pp. 223-234), Antalya, TURKEY. ISTES Organization.

Yardımcıel, F., & Yılar, Ö. (2022). Aysel Gürmen'in Eserlerinde İletilen Değerler Bağlamında Bir İnceleme. *Ardahan Üniversitesi İnsani Bilimler ve Edebiyat Fakültesi Belgü Dergisi*, (7), 16-32.

Yayan, A. K. G. (2010). Adana İli Tufanbeyli İlçesi Çakırlar Köyü Avşar Kilimleri. *Gazi Türkiyat Türkoloji Araştırmaları Dergisi*, *1*(6), 183-223.

Yegen, Ü. (2022). Neşet Ertaş Türkülerinde Yer Alan Metaforların Türkçe Derslerinde Kullanılabilirliği. *Turkish Studies-Educational Sciences*, *17*(4).

Yeşilbaş, E. (2011). Diyarbakır Karacadağ Kilimlerinin Desen ve Motif Özellikleri. *Arış Dergisi*, (6), 112-117.

Yetkin, Ş. (1971). Türk Kilim Sanatında Yeni Bir Grup, Saray Kilimleri. *Belleten*, *35*(138), 217-228.

Yetkin, Ş. (1978). Divriği Ulu Camiinde Bulunan Osmanlı Saray Sanatı Üslûbundaki Kilimler. *Belleten*, *42*(165), 53-63.

Yolcu, M. A. (2021). Ayvacık Yöresi Dokumacılığı ve Geleneksel Ekolojik Bilgi. *III. Uluslararası Toplum ve Kültür Araştırmaları Sempozyumu (1-3 Ekim 2021) Tam Metin Bildiriler Kitabı*, 126.

Zırh, B. C. (2015). " Cansız Hayaller": Gayri-resmi Tarihimizin Şeyleşmiş İmajları. *Kebikec: İnsan Bilimleri İçin Kaynak Araştırmaları Dergisi*, (40).

www.istes.org

www.ijemst.net www.ijres.net www.ijtes.net

www.ijte.net www.ijonse.net www.ijonest.net www.ijonses.net

International Conference on Social and Education Sciences

istesoffice istesoffice istesoffice

www.iconses.net