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IICE

28 – 30 October 2024

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Message from the Steering Committee Chair

Welcome to the Ireland International Conference on Education (IICE), October 2024. The IICE is a biannual conference (April and October) and international refereed conference dedicated to the advancement of the theory and practices in education.

The IICE-2024 received 327 papers from 91 countries of which 141 papers were accepted after the first review and 105 submissions (19 speakers' proposals, 21 abstracts, 31 extended abstracts, 22 papers, 11 posters and 1 workshop) were finally accepted. The double-blind paper evaluation method was adopted in IICE-2024 for each submission. Please note that all authors will be invited to extend their papers for journal publications and to contribute to book chapters.

Many people have worked extremely hard to make IICE-2024 possible. We would like to thank all who have helped in making IICE-2024 a success. The Steering Committee and reviewers each deserve credit for their excellent job. We would also like to acknowledge our appreciation to the following organisations for their sponsorship and support: Inclusive Education and Lifelong Learning, Mental Health Awareness, Young Researchers ThinkTank, Desing Thinkers, Music Creativity, Inclusiveness, and Infonomics Society. The long-term goal of IICE-2024 is to build a reputation and respectable conference for the international community.

On behalf of the IICE-2024 Executive members, we would like to thank all the authors and participants who have contributed to IICE-2024. Your future participation in the IICE as authors, speakers, panellists, workshop organisers and volunteers will be well-appreciated.

We wish you a pleasant stay in Dún Laoghaire, Co. Dublin, Ireland.

Professor Charles A. Shoniregun
IICE-2024 Steering Committee Chair

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Table of Contents

 ISBN: 978-1-913572-73-0

 ISBN: 978-1-913572-73-0

 ISBN: 978-1-913572-73-0

IICE-2024 Executive Committees

 ISBN: 978-1-913572-73-0

IICE-2024 Executive Committees

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Julie A. Holmes, Louisiana Tech University, USA

 ISBN: 978-1-913572-73-0

Speakers

 ISBN: 978-1-913572-73-0

Speaker 1

 ISBN: 978-1-913572-73-0

Conflicts of Interest and the Unsolicited Influence on Academic Freedoms

Brett J. Holt
Department of Education
College of Education and Social Services
University of Vermont
USA

Abstract

The Special interest groups have a long history of unsolicited involvement in academia (Holt, 2021). Such unsolicited involvement often leads to encroachments on academic freedoms. This presentation will begin by operationalizing modern academic freedoms as the freedoms to engage in teaching/learning (lehrfreiheit/lernfreiheit), inquiry, external/internal speech, and service which is how both the American Association of University Professors (AAUP) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO) contextualize academic freedoms (Dea, 2018; Euben, 2002). Next, examples of special interest groups involvement with academia will be examined. High-profile examples of well-known special interest groups (e.g., British Petroleum, Tyson, SmithKlineBeecham/GlaxoSmithKline, etc.) will be used to show the effects of their involvements in academic research (Lea, 2010). Public skepticism is one of the consequences when academia invites external special interest groups into the inquiry process (Heck, 2014). An academics' ability to remain neutral while researching for results becomes questionable (McWhorter, 2021) when external special interest groups invest in the research (outcome). The presenter will discuss some of the criticism and condemnation of academic integrity that is reflected on the freedom of inquiry process. The presenter will introduce the audience to websites such as propublica.com that monitor and keep track of external special interest groups involvement in academia. However, the presenter will also examine internal conflicts of interest. For example, an internal conflict of interest can be caused when a job candidate is also a member of the appointed search committee. The presenter will then explain how students' academic freedoms are also at risk from special interest groups. Perhaps, a student is interested in studying a particular discipline in college but is coerced into studying an entirely different discipline due to monies being provided to only pursue studies in the alternative discipline. Finally, the presenter will summarize how academics can prevent and maintain credibility and integrity when dealing with conflicts of interest. The presentation will conclude with audience questions and discussion.

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 ISBN: 978-1-913572-73-0

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Speaker 2

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Global Learning Supports Global Readiness - Projects With Purpose

Brian Bilich
Austin Community College District
Austin, TX

Abstract

By fostering project-based collaborations with local business and non-profit entities, Austin Community College global learning students use real operational practices to gain insight and inspiration for project development on global themes such as sustainability, applied Lean principles and a variety of global social conflict issues from immigration and homelessness to hunger and obesity. In this session, the presenter will introduce participants to the Global Learning institute in Continuing Education at Austin Community College District. Through visual and oral presentation, the presenter will acquaint attendees with this unique program area, its successes since its inception in 2013 in promoting global readiness through projects with purpose and special attention given to balancing learning, hospitality and travel.

This session highlights (3) 2-week global learning project-based programs constructed and coordinated for two Danish gymnasia located in the municipalities of Thisted and Herning in the Northern region of Denmark; Northwestern Jutland. Some notable corporate and non-profit partnerships include but are not limited to Mobile Loaves and Fishes' CommunityFirst! Village, Meal on Wheels Central Texas, Kompan, Inc, Goodwill Industries of Central Texas, 10,000 Villages and the Austin Baptist Chapel – Angel House Soup Kitchen. Past projects have used media like video game development for example to educate the student developer and the end user on global social conflict issues as well as the development of mock Non-Governmental Organizations to promote empathy though awareness while exercising critical solution-based thinking.

Interactive Texas-Centric Ice Breaker

A brief interactive Texas-centric ice breaker via Zoom will open or close the session depending on the session structure. Upon completion of the session, participants will:

- *Gain a familiarity with global learning practices in Continuing Education at Austin Community College as a model for replication.*
- *Have an appreciation for balancing learning, hospitality and travel in the delivery of short-term global learning programming.*
- *Be aware of purposeful global learning projects as a means to promote global readiness.*
- *Find their Inner Y'all (the art of the Texas swagger and other cultural nuances).*

 ISBN: 978-1-913572-73-0

Speaker 3

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Culture, Holism and Meaningful Context as Critical and Persistent Values for Adult Literacy Learners: Expanding Ecological and Wellbeing Theories of Adult Literacy Learning for Shaping Policy and Practice

Jane Furness
University of Waikato
New Zealand

Abstract

This paper considers the findings of a 2023 study of mainly indigenous adults' experiences of community-based literacy learning from a wellbeing perspective. Two frameworks developed in an earlier study by the author were systematically applied to the 2023 study. The first of these frameworks identified six principles and practices related to literacy and six related to people as having shaped adult literacy learners' positive experiences and contributed to learning and life outcomes important to them. The second framework set out the elements of a process of movement towards enhanced wellbeing for the learners, their families, and their communities in which literacy learning opportunities played an important role. Analysis of the 2023 study data using these two frameworks showed that key principles and practices including programme staff belief in the adults' capabilities, recognition of the complexities of people's lives, recognition of the importance to adults of content that is meaningful in their everyday lives and the use of pedagogy that is culturally appropriate, also contributed to the learners' positive experiences in the recent study. As well, key process elements including the identification of idiosyncratic yet tangible learning and life pathways, the contribution of history and context to the literacy learning experience and the 'flow-on' of programme effects to wider aspects of the adults' lives and to others in their family and wider social networks were seen. These findings confirm the necessity of a culturally shaped, holistic approach to the design of adult literacy learning opportunities and to the attribution of outcomes that go beyond traditional skills testing to focus on what matters to people in their lives, aspects of the adult literacy field that continue to be contested. The findings also confirm the value of an ecological approach to understanding the essential elements of successful adult literacy learning environments and the critical importance of individual, family, and community wellbeing as a framework for understanding what success means for adult literacy learners. Ecological and wellbeing-based theories of adult literacy learning are built upon and expanded in this presentation and will support practitioners and policymakers in their efforts to achieve outcomes that are valued by both adult learners and adult literacy programme funders.

 ISBN: 978-1-913572-73-0

Speaker 4

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Preserving Sacred Landscapes – Blood Memory as Justice: Youth Elder Relations Addressing Collective Environmental Wellness

Margaret Kress
University of New Brunswick
Canada

Abstract

The nationwide "Preserving Sacred Landscapes" is a transformative research project and a dynamic exploration of land and body reclamation among youth and elders throughout Turtle Island. A youth driven participatory action study employing Indigenous research methodologies of Storywork, Ceremony, Land Learning and Traditional Revolutionary Art employing Indigenous Research Methodologies was offered to communities of youth, leaders and elders in Canada. This Social Science and Humanities (SSHRC) Funded Research Project lead by Dr. Margaret Kress, Principal Investigator, University of New Brunswick, and supported by co-investigators Dr. David Perley, UNB; Dr. Laara Fitznor, UMANITOBA; Dr. Alex Wilson, USASK has had far reaching effects among the participants of the four projects that took place in Tobique First Nation, New Brunswick; Opaskwayak First Nation, Manitoba; Amisk Lake, (Peter Ballantyne Cree Nation) Saskatchewan/Flin Flon, (Many Faces High School), Manitoba, and Duck Lake, and Prince Albert, Saskatchewan.

The context of this research was founded from directives of Cree, Denesuline, Métis, and Inuit elders, knowledge keepers and leaders from the research of Dr. Margaret Kress:

Sisters of Sāsīpihkēyihtamowin - wise women of the Cree, Denesuline, Inuit and Métis: understandings of storywork, traditional knowledges and eco-justice among Indigenous women leaders (2014). These knowledge keepers believed a primary action required for youth to be well and balanced is the engagement of elders with youth, teaching specifically about the land and culture of place: this being on the land aids youth in learning from the languages, ceremonies, traditions and livelihoods of their relations or their ancestors.

This research examines points of reference for Indigenous youth as they learn about themselves through lands, waters, traditional knowledges and histories of their peoples from women elders and other knowledge keepers of their communities. The central query provides opportunity to examine environmental and personhood justice, through the recall of history, and the telling and listening of stories with notions of Indigenous living. Within the teaching of ancestral knowings and the application of today's contemporary expressions of ceremony and life, youth learn about protections of lands and waters, and their own agency in this effort.

Youth have engaged in collaborative, reflexive gatherings to experience teachings of land and water, ceremonies and traditional arts, to enhance their spiritual landscape and their psyches. From these gatherings, and through a vis-á-vis of teaching and learning, they created in a multitude of ways—storytelling, crafting, sculpting and photovoice were central in displays of both visual and performing arts. Beginning with the interactive nature of Indigenous research methodologies, this research underscores its pivotal role in unraveling the intricate relationship between land and identity. By incorporating the principles of storywork, the power of embodied narrative is conveyed in the diverse perspectives and experiences of Youth and their guiding Elders. By examining the narrative thread found in this research the nuanced layers of reclaiming space

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through land and water protection and the intricacies of embodied embracement become clear. The integration of land knowledges, and their significances in shaping pimatisiwin within cultural preservation and Indigenous identity, is a worthy notation—here the intertwining of age-old knowledges specific to the life itself, and the holism and contemporality of youths' emotive feelings and experiences, emerge as central to this work. This research shares the beauty of revolutionary art, as it highlights how creative expression becomes a powerful vehicle for conveying the complexities of reclamation—it shows how both youth and elders transcend conventional boundaries and reach for justice, wellness and pimatisiwin in challenging times, and bright movements.

 ISBN: 978-1-913572-73-0

PhD and Doctorate Consortium: How to Write a Research Paper and PhD Thesis

The idea of writing a research paper or developing a topic of research interest that can lead to a degree project /or dissertation and PhD proposal is always an endless thinking of where, when, why, what and who. Therefore, becoming an experienced researcher and writer in any field or discipline takes a great deal of practice. This PhD Consortium provides solutions in response to the lack of competence demonstrated by young researchers and PhD students, and the understanding of what contributes to the knowledge gap.

Organiser: Charles A. Shoniregun
Infonomics Society, United Kingdom and Republic of Ireland

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Sessions

 ISBN: 978-1-913572-73-0

Session 1: Cross-disciplinary Areas in Education

Title: What Two Popular Youth Adult Fiction Novels Tells Us about Bullying: Findings from a Qualitative Content Analysis
Author: Corene De Wet

Title: A Global Exploration of Intersectionality in Teacher Preparation: Advancing Equitable Education
Authors: Lindsey Pike, Adam Moore

Title: Sense of competence, evaluation of own computer and digital competence, effectiveness of communication with students and effectiveness of own work of academic teachers 60 plus (in relation to younger colleagues)
Authors: Grażyna Bartkowiak, Sebastian Dama

Title: Contrast Analysis of the Professional Competence of Graduates and Professionals of Education
Authors: Oswaldo Lorenzo, Lucía Herrera

 ISBN: 978-1-913572-73-0

What Two Popular Youth Adult Fiction Novels Tells Us about Bullying: Findings from a Qualitative Content Analysis

Corene De Wet
University of the Free State, South Africa

Abstract

Despite a proliferation of young adult fiction (YAF) dealing with bullying, and an awareness of the usefulness of YAF in creating an awareness of bullying, little research has been done on this subgenre. In an effort to address this hiatus in research on bullying, this paper reports on findings from a qualitative content analysis of two popular YAF novels that feature bullying, namely William Golding's Lord of the Flies *and R.J. Palacio's 2012 bestseller* Wonder. *Both novels' depiction of bullying as repetitive, aggressive and negative behaviour, characterised by an imbalance of power, is in line with research findings on the topic. This study highlights the potential of the two novels creating an awareness of bullying among their readers. The findings shed light on, for example, different types of bullying, the characteristics of bullies, victims and bystanders and the role that parental and teacher involvement or the lack thereof can play in the fight against bullying.*

1. Introduction

The portrayal of bullying in fiction stretches back to British and American public school stories such as *Tom Brown's School Days* by Thomas Hughes (1857), J.D. Salinger's *The Catchers in the Rye* (1951) and William Golding's *Lord of the Flies* (1954). The present-day popularity of fictional works on bullying is obvious from Amazon's 2024 listing of one hundred bestsellers in young adult fiction (YAF) on bullying [1] and Goodreads' listing of 97 YAF books on bullying [2]. Even though bullying is seen as one of the predictable features of school stories, alongside "sport, fights, fagging, inter-house and inter-school rivalry" [3], the pioneering research by Dan Olweus on bullying in Scandinavian schools in the 1980s found that bullying was not a rite of passage, but preventative behaviour. Fiction has the possibility to contribute much to antibullying education. Fiction can enable learners to understand more about themselves and others by "functioning as mirrors that allow [learners] to reflect on themselves and windows through which [they] can imaginatively view people and worlds beyond themselves" [4]. Literature "enable[s] readers to imagine what it is like to be another"; this is useful for developing "sympathetic imagination" [4]. Despite an increase of YAF titles dealing with bullying, and an awareness of the usefulness of YAF in creating an awareness of bullying, little research has been done on this subgenre [5]. In an effort to address the aforesaid hiatus in bullying research, this paper reports on findings from a qualitative content analysis of two popular YAF novels that feature bullying.

2. What is bullying?

Despite efforts by researchers, no universal or consistent definition of bullying exists. A literature review suggests that some researchers' definitions are grounded in Olweus's definition, which includes aggressive behaviour, power imbalance and the repetition of negative behaviour; others define bullying as specific types of behaviour, e.g. kicking, hitting and spreading malicious rumours [6]. The current study was guided by Olweus's definition and the Florida General Statute [6]. Olweus's [7] definition reads as follows: "A student is being bullied or victimized when he or she is exposed, repeatedly and over time, to negative actions on the part of one or more other students." The Florida General Statue disallows bullying in schools and defines it as follows: "Bullying includes cyberbullying and means systematically and chronically inflicting physical hurt or psychological distress on one or more students and may involve: teasing, social exclusion, threat, intimidation, stalking, physical violence, theft, sexual, religious or racial harassment, public or private humiliation, or destruction of property." [6].

3. Theoretical framework

This study is underpinned by Sidanius and Pratto's social dominance theory (SDT) [8] and Long and Pellegrini's dominance theory. These theories are closely related, but while SDT centres on group-based social hierarchies [9], the focal point of the dominance theory is individual-based social hierarchies. The central argument of SDT is that all societies consist of group-based social hierarchies that are influenced by, among other aspects,

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gender, age and group affiliation. The latter may include race, ethnicity and religion. According to Evans and Smokowski [10], these "group-based social hierarchies are formed through the mechanisms of oppression, discrimination and injustice". Individuals' power and social status are a consequence of their group membership, rather than individual characteristics. Bullying behaviour is motivated by the bully's desire for power and dominance. Bullies consequently use humiliation and intimidation to obtain power. Evans and Smokowski [10] write that both theories "indicate that youth bully one another in their attempts to gain group and individual-levels of social status … Bullying perpetration is used as a means of establishing and maintaining power".

4. Research methodology

An Internet search using the key phrase, "YA bullying books", resulted in an abundance of Internet postings, articles and lists on the topic. I therefore decided to limit this paper to two popular YAF books: *Lord of the Flies* by Golding [11] and R.J. Palacio's 2012 bestseller, *Wonder* [12]. *Lord of the Flies* tells the story of a group of British boys who are stranded on an uninhabited island after a plane crash and their efforts to govern themselves. An overweight boy wearing glasses and suffering from asthma, nicknamed "Piggy", is ignored, humiliated and bullied by his peers. Thus far, two film adaptations of Golding's book have been released. A black-and-white version directed by Peter Brook was released in 1963. Harry Hook's colour adaptation was released in 1990 [13]. *Wonder* is a life-affirming and touching story of the navigation of a facially disfigured boy named August through his first year in middle school. August's disfigurement makes him the target of bullies, especially a classmate named Julian. In 2017, a film, based on this *New York Times* bestseller book directed by Stephen Chbosky, was released. I used qualitative content analysis to work through the two novels. First, I familiarised myself with the data (novels); then I used a coding framework to generate initial codes; thereafter, I searched for themes, reviewed them and then defined and named them. In the last phase, I produced the report [14]. To enhance the trustworthiness of my study, four constructions of trustworthiness were used, namely transferability, credibility, dependability and confirmability [15].

5. Findings

5.1. Lord of the Flies

Bullying is an important continuous theme in *Lord of the Flies*. Ralph, Jack, Piggy and Simon are four dynamic characters who stand in the midst of the bullying relations. By means of qualitative content analysis, I identified the following bullying themes: different types of bullying; victims and perpetrators of bullying; and the impact of the absence of adults on the intensification of bullying and violence. Even though Piggy was not the only victim of bullying in the novel, he had to bear the brunt of allies and foes alike. It is therefore understandable that the findings focus on the cruel behaviour towards him.

5.1.1. Different types of bullying. I identified three types of bullying in the novel, namely verbal, physical and relational bullying. Piggy was *verbally abused* on numerous occasions. He received the name "Fatty". Jack told Piggy, "Shut up, Fatty," and "You shut up, you fat slug!" Piggy got interrupted and humiliated by Jack whenever he tried to speak during meetings, e.g. "You're always scared. Yah – Fatty!" and "You would, would you? Fatty!" Ralph was also guilty of verbally abusing Piggy: He not only told him to keep quiet during meetings but was also guilty of demeaning name-calling: "Sucks to your auntie!" and "Sucks to your ass-mar!" Piggy was not the only victim of verbal abuse in *Lord of the Flies*: The boy with the birthmark on his face was relentlessly mocked by the boys. Simon was called "batty" and laughed at "cruelly" by the boys throughout the novel.

The following are examples of *physical bullying*: Roger and Maurice physically bullied the Littluns. They destroyed the sandcastles the Littluns had built and purposefully kicked sand in the Littluns' eyes. Piggy was the victim of physical bullying on numerous occasions. After a confrontation between Jack, Ralph and Piggy over the fire and Piggy's glasses, Jack "took a step, and [was] able at last to hit someone. [He] stuck his fist into Piggy's stomach. Piggy sat down with a grunt. Jack stood over him". Jack's voice was "vicious with humiliation". This physical confrontation was a turning point in the relationship between the boys. By standing over Piggy, Jack exerted his power over Piggy. Jack's punch caused Piggy's glasses to fall, smashing one side. This left him half-blind, making him an easy, vulnerable target. The consequent escalation of violence led to the death of Simon and Piggy, as well as the unexplained disappearance of the boy with the birthmark on his face.

Piggy was often the victim of *relational bullying*. He was told to keep quiet during meetings ("Oh shut up!") or ignored when he had an asthmatic attack ("He lay against a log, his mouth gasping, blue shadows creeping round his lips. Nobody minded him"). Piggy was not only isolated, but also the victim of group bullying: "They bumped Piggy who was burnt, and yelled and danced. Immediately Ralph and the boys were united and relieved by a storm of laughter. Piggy once more was the centre of social derision so that everyone felt cheerful and normal."

5.1.2. The victims of bullying. The study found that the victims of bullying in *Lord of the Flies* were often those who differed physically, intellectually or mentally from

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the stranded boys' perceived norm. Piggy's asthma, obesity and poor eyesight made him an easy target for the other boys' ridicule and ostracism. Piggy is also portrayed as a bit neurotic. The other boys made fun of his weaknesses. Piggy's efforts to preserve some form of order and democracy were mocked by the boys, especially Jack. This resulted in Piggy becoming quieter and more reserved. Ralph had the following to say about Piggy: "Piggy was a bore; his fat, his ass-mar and his matter-of-fact ideas were dull."

The hunters, Maurice and Roger, bullied the Littluns, who were physically and mentally weaker than them. The Littluns felt lost and afraid on the island. The two hunters drew joy from the destruction of the sandcastles the Littluns had built on the beach. Furthermore, they scared the Littluns with stories of snakes and beasts lurking on the island.

The victims of bullying in *Lord of the Flies* were often bullied by those whom they thought were their allies or friends: The Littluns threw sand in the eyes of another Littlun, Percival. Jack bullied his fellow-hunters and members of his choir. The hunters play-acted that a fellow-hunter, Robert, was a pig. Soon the game was out of control, and they began to stab and hurt Robert. The group of boys were thus physically bullying one of their own: "The circle moved in and round. Robert squealed in mock terror, then in real pain. 'Ow! Stop it! You're hurting!'"

5.1.3. The perpetrators of bullying. Jack Merridew, the leader of the hunters, is portrayed as an overconfident boy who likes to order others around: "I ought to be chief, because I'm chapter chorister and head boy." He had a hunger for power, wanted to have control over everyone and was impolite and inconsiderate towards others. His conduct towards Piggy was especially demeaning. In Chapter 2, Jack rudely snatched Piggy's glasses off his face to start a fire, and when Piggy suggested that the boys be more careful the next time they build a fire, Jack said: "You're always scared. Yah – Fatty!" Later on, Jack broke Piggy's glasses by slapping them off his face. Jack continually interrupted Piggy when he attempted to speak during assemblies ("You shut up, you fat slug"), and towards the end of the novel, he even stole Piggy's broken glasses to start his own fire.

Even Ralph, who "has "a mildness about his mouth and eyes that proclaimed no evil" and thus appeared to be the more caring and less savage of the two boys who competed for the leadership position on the island, was often cruel towards Piggy. He continuously bullied Piggy. When Ralph and Piggy first met, Piggy told Ralph that he was called Piggy at school and that he detested the name. Ralph burst out laughing and shouted: "Piggy! Piggy!" Piggy's pleading for Ralph to stop ("Ralph – please!") was ignored. Ralph "found a little pleasure … out of pulling [Piggy's] leg, even if one did it by accident". When Piggy told Ralph about his life back in England, Ralph emphasised the power imbalance between him as the bully and Piggy as his victim: "Get my clothes … Along there." Only at the very end, after Piggy's death, did Ralph realise that Piggy was a "true, wise friend".

5.1.4. The possible impact of the absence of adults on the intensification of bullying and violence. Alone, without the guidance of adults, the boys divided into two groups, the Littluns – boys around the age of six – and the Biguns – between the ages of 10 and 12 – who had to fend for themselves on the island. In Chapter 2, Jack said, "There aren't any grown-ups. We shall have to look after ourselves." Notwithstanding this realisation, the boys slowly descended into savagery. The boys lost all respect for one another, and bullying became the norm on the island. "The world, that understandable and lawful world, was slipping away." As things were falling apart, Piggy, Ralph and Simon realised they were unable to "convey the majesty of adult life", namely a life in which order prevails. Maurice, for example, felt that he was able to do whatever he liked to do because there was no adult supervision: "In his other life Maurice received chastisement for filing a younger eye with sand. Now, though there was no parent to let all a heavy hand." The chaos and lawlessness resulted in "things … going rotten", the deaths of Simon and Piggy, "the end of innocence".

5.2. Wonder

Wonder by R.J. Palacio tells the story of the relentless verbal and relational bullying of 10-year-old August Pellman and how he, with the love and support of his family, empathic teachers and a few learners, swayed the hearts of most of his bullies and was embraced as an award-winning learner of Beecher Prep. Using qualitative content analysis, I identified the following bullying themes: different types of bullying; the victims, perpetrators and bystanders in the bullying triangle; the role of adults in the fight against or as instigators of bullying; and, lastly, the triumph of August and his loved ones over bullying.

5.2.1. Different types of bullying in *Wonder*. I identified two types of bullying in the novel, namely relational and verbal bullying.

Relational bullying: Initially, August was an isolated, lonely boy. The other children did not want to touch him ("Julian moved out of the way quickly, like he was afraid I might accidentally touch him as I passed by him") or sat next to him in class ("I could tell Henry did not want to move next to me, just by the way he dragged his backpack on the floor as he came over, like he was moving in slow motion"). The children "would take the longest way around me to avoid bumping into me in any way, like I had some germ they could catch, like my face was contagious". Ximena had a panic attack when the teacher

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tried to make her August's dance partner. There was a "game" on at August's school: "Anyone who accidently touches August has only thirty seconds to wash their hands or find hand sanitizer, before they catch the Plague." The author used humour to emphasise the absurdity of the learners' efforts not to touch August.

Verbal bullying: August was not ignorant of the hurtful names his classmates called him: "Rat boy. Freak. Monster. Freddy Krueger. E.T. Gross-out. Lizard face. Mutant. Zombie kid." The children openly talked about his disfigurement: "I knew they were whispering about me." At one stage there was a "war" against August and his friend, Jack: "Practically nobody was talking to us, and Julian had started leaving notes in our lockers. The notes to Jack were stupid, like: *You stink, big cheese*! And *Nobody likes you anymore*! I got notes like: *Freak*! And another that said: *Get out of our school, orc!*"

5.2.2. The victims, perpetrators and bystanders in the bullying triangle. A bullying triangle can be observed in *Wonder*.

Victims of bullying: August, the central character of the novel, was not the only victim of bullying in *Wonder*. His sister, Via, and his friend, Jack, were, for example, bullied because of their loyalty towards and association with him. Via was snubbed by her former best friends. As the story unfolds, the focus of the bullies shifted from August to Jack, "because [the bullies] knew that if they got caught 'bullying' me, it would be big time trouble for them. Jack they figured, was an easier target". Mention is also made in the novel of the stressful relations between the so-called cool and the nerdy girls. In a chapter titled "Out with the old", one learns of the troubled relations between the "super-popular set" and the dorky "smart girls" in the school.

Bullying has a serious, negative impact on the victims. Bullying made August sad ("I started crying. … I wanted a hole I could fall inside of: a little black hole that would eat me up"). He became withdrawn. He did not want to talk about school with his sister and often answered her well-meaning questions abruptly and sarcastically. He also became physically ill. After being bullied by Justin, August, when arriving home, "went straight to the bathroom and threw up".

Bullies: At the onset of the new school year, August knew that he was going to be bullied because of his deformity. He noted that there was often a difference in the levels of maliciousness and intentionality of bullies: "What is cool about really little kids is that they don't say stuff to try to hurt your feelings, even though sometimes they do say stuff that hurts your feeling. But they don't actually know what they're saying. Big kids, though, they know what they are saying. And that is definitely not fun for me."

Julian, the antagonist in the novel, whom the headmaster thought was a kind boy who might help August to adapt to the new school, is portrayed as a deceitful child who went out of his way, from the first day he met August, to be hurtful: He point-blank asked August: "What's the deal with your face? I mean were you in a fire or something?" Julian purposefully cut in front of August, which made him stumble. August knew that Julian's "Oops, sorry about that!" was insincere. Julian, sometimes subtly, sometimes openly, verbally humiliated August. Julian's efforts to be popular at the cost of August, initially seemed to be successful. He had quite a following, and there were boys sitting at the table neighbouring Julian's table, "like on the fringe of popularity". August's mom described Julian as follows: "he is the kind of kid who's one way in front of grown-ups and another way in front of kids." Even when most of the children's attitude towards August changed for the better, Julian's demeanour did not change.

Wonder emphasises the fact that adults can also be bullies. Julian's mother photoshopped August's face out of the class picture and then "she gave a copy to a couple of other moms". She organised a "huge holiday party" and invited nearly everybody who were not friends with August. During this party, Julian told everybody that Jack had "emotional problems". Rumours were going around that Julian's mom was "actually pushing the school to review Auggie's application to Beecher".

Bystanders or onlookers in the bullying triangle: Bystanders in the bullying triangle can either be passive onlookers or cheer on or reproach the bully. Jack is portrayed as a confused boy: he desperately wanted to be popular, but he also wanted to be friends with August. He consequently failed to defend August when the others were badmouthing him. He started making fun of August and "saying really horrible things behind [August's] back". As the plot develops, Jack gained insight into August's bravery, intellect and humour. He then used words such as "cool", "nice", "funny" and "smart" to describe August. Not all the children were mean towards August at the beginning of the school year. Summer was one of the few children who reached out to him. Her point of view was: "He's just a kid. The weirdest-looking kid I've ever seen, yes. But just a kid." Summer was shunned by the "big super group of popular kids" because of her friendship with the "Zombie kid".

5.2.3. The role of adults in the fight against bullying. Fundamental to *Wonder* is August's parents' unconditional love for him. His mother home-schooled him for the first four school years. She told her husband, "We can't keep protecting him … We can't just pretend he's going to wake up tomorrow and this isn't going to be his reality …" When August returned from his first day at school, his mother kissed him "all over [his] face. She kissed [his] eyes that come down too far. She kissed [his] cheeks that looked punched in. She kissed [his] tortoise mouth." August's dad played an important role in building his self-esteem. He told August that he was "turning out quite the strong man". Importantly, August's

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mom helped him to see his bullying in perspective: "There are more good people on this earth than bad people, and the good people watch out for each other and take care of each other. Just like Jake was there for you. And Amos. And those other kids."

The teachers at August's school also played a vital role in building his self-esteem and his fellow-learners' humanness. The importance of empathy was, for example, emphasised by the English teacher ("When given the choice between being right or being kind, choose kind"). At the year-end school function, Mr Tushman told the children, "we all carry with us, as human beings, not just the capacity to be kind, but the very choice of kindness". Caring adult leadership made Beecher Prep a safe haven for August.

5.2.4. Winning the battle against bullying. As time progressed during August's first year at Beecher Prep, it seemed as if the majority of the children at the school "weren't buying into Julian anymore" and their attitude towards August changed for the better: "I am pretty sure everyone's stopped playing the Plague game behind my back, too. No one really cringe if I bump into them anymore, and people borrow my pencils without acting like the pencil has cooties. People even joke around with me now sometimes." During August's class nature retreat, four boys from a neighbouring school made insensitive, offensive comments about August's face. His former bullies became his allies and guarding angels: "They were surrounding me as we walked through the crowd of kids. Like I had my own emperor's guard."

The novel ends in triumph for the battle against bullying. August received an award for greatness, named after the human rights activist and humanitarian Henry Ward Beecher, at the year-end award function. Palacio aptly used the following Beecher quote to emphasise the triumph of kindness and humanness over cruel bullying: "Greatness lies not in being strong, but in the right using of strength. He is the greatness strength carries up the most hearts by the attraction of his own."

6. Conclusion

The current limited study on the portrayal of bullying in YAF confirms findings from previous studies on the value of YAF in creating an awareness of bullying [5]. *Lord of the Flies* and *Wonder* tell young readers in an understandable way what bullying entails. The core characteristics of bullying, as defined by Olweus [7], namely repetitive, aggressive and negative behaviour characterised by an imbalance of power, are apparent in both novels. August was, for example, relentlessly ostracised and humiliated by the power-hunger Julian, his cronies and even Julien's mother. Fat, asthmatic and short-sighted Piggy was ceaselessly bullied physically, verbally and mentally by Jack and his hunters. Jack's abuse of power ultimately led to Piggy's death.

Both novels give insight into different types of bullying, some characteristics of bullies and victims and the impact of bullying on the victims. The pivotal difference between the two novels can be found in their conclusions. *Wonder* ends in the triumph of good over evil. *Lord of the Flies* ends in sadness "for the end of innocence". A golden thread in *Wonder* is the role adults played in uplifting August and disciplining the bullies. The absence of adults on the desolated island, on the other hand, resulted in the boys reverting to a primitive way of life, characterised by fighting, myths and even murder [16]. Therefore, this study emphasises the importance adults (should) play in the fight against bullying.

The findings from this study exemplify how YAF, such as *Lord of the Flies* and *Wonder*, can create an awareness of bullying per se, the different types of bullying, the negative impact of bullying on victims, sensitivity towards children who may be easy targets of bullying, the role of bystanders in the bullying triangle and, lastly, the chaos that may ensue owing to the absence or passivity of adults.

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A Global Exploration of Intersectionality in Teacher Preparation: Advancing Equitable Education

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Abstract

This paper proposes a study which examines the use of intersectionality theory in teacher preparation programs across global contexts to promote educational equity. Intersectionality, which addresses overlapping identities such as race, ability, gender, and class, provides a framework for understanding and challenging systemic inequities in education. Teacher educators and scholars from around the globe are invited to engage in developing this collaborative study to explore how teacher education programs leverage intersectionality theory to develop preservice teachers' knowledge, skills, and dispositions to foster equitable practices and advance social justice in diverse global contexts. Findings from the proposed study will inform best practices in teacher preparation, offering insights into the role of intersectionality in advancing equity and shaping the development of future educators for diverse classrooms worldwide.

Keywords: teacher preparation, intersectionality, equity

1. Introduction

Equity in education continues to be influenced by multiple theoretical perspectives, historical events, and prevailing opinions. Scholars and advocates working to advance equitable education for all students in the United States and globally emphasize the importance of considering the multiple identities and individual circumstances of students, families, and schools [3], [4]. Intersectional theorists and educational researchers assert that the application of intersectional theory within education will support more detailed identification of inequities related to ability, race, gender, class, language, and other identities [1], [14]. Advancing equity and social justice perspectives within education requires teacher preparation programs to support future teachers in developing knowledge, skills, and dispositions to connect beyond their own experiences and develop a deeper understanding of their students, teaching, and learning. Course approaches, content, experiences, and assessments within these programs must focus on critical consciousness and disrupting deficit perspectives that serve to reproduce societal inequities [1], [5], [8]. This proposed study seeks to build on the existing foundations and applications of intersectionality in teacher preparation and create an exchange of knowledge, implementation, and lessons learned amongst teacher educators in international contexts to enhance practice and efficacy.

2. Body of Knowledge

Multiple global examples of intersectional issues of equity in education exist. In the United States, the disproportionate representation of students from culturally and linguistically diverse backgrounds in special education is a pervasive and persistent issue [15]. Disproportionality is an equity issue related to race and disability. The United Kingdom Department for Education recently released data on student suspensions and exclusions for disciplinary infractions in England, reporting suspensions and exclusions for male students from Black Caribbean and Roma backgrounds were disproportionately higher than White students, at rates over five times greater [6]. A recent international study from Meili and colleagues [9] indicates "intersectional connections between gender and ethnicity and access to education in multiple sub-Saharan African countries and South Asian and Latin American countries" (p. 18). Dhuinn and Keene's study [7] underscores the connections between the ethnicity, language, and immigration status of students in Ireland and the teacher expectations, educational opportunities, and peer relationships they experience in school.

Samson and Cavendish [14] assert intersectionality "accounts for the complex, overlapping, and cumulative effects" of multiple identities and intersectional approaches to educational research and pedagogy and can be used for "understanding and examining the complexity of social conditions and experiences in education… for increasing equity" (p. 2). This is especially important

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as the teaching cadres in the U. S., the U. K., Australia, and other countries do not match the student body they serve. There is a lack of parity between the students served within public schools and the educators who teach them. For example, the current teaching cadre in the U. S. is approximately 79% White [12] with about 3% of teachers disclosing a disability [18], [17]. In contrast, 52% of the students the cadre serves are non-White or multiracial [12] and approximately 13% are served under IDEA for a disability [18]. Connected to this lack of parity between students and teachers, researchers in the U. S. report preservice and in-service general education teachers' lack sufficient self-efficacy, knowledge, skills, and dispositions to serve students with disabilities [16] and students from culturally and linguistically diverse backgrounds [2]. Such gaps in knowledge, skills, and self-efficacy serve to perpetuate inequities in the educational experiences and systems students engage with every day. Teacher preparation programs can leverage intersectionality theory and perspectives to facilitate the development of knowledge, skills, and dispositions of preservice teachers to advance equity through their practice [1], [5], [8].

3. Proposed Research

The proposed research will engage scholars, researchers, and practitioners from multiple countries who use intersectionality within teacher preparation settings. The purpose of this study is to explore and gain insight into how intersectionality theory, perspectives, and related practices are used to address various issues of educational equity across global contexts through teacher education programs and practices. Potential research questions to guide this study include:

- How is intersectional theory being used in international contexts to conceptualize and address educational inequity?
- How are teacher educators in international contexts leveraging the concept and theory of intersectionality to inform teacher preparation?
- Does the use of intersectionality as a framework within teacher preparation impact the knowledge, skills, and dispositions of preservice teachers?
- How does intersectionality transform/differ in international contexts and what can we learn about the concept/theory, systemic inequality, and its application to teaching and learning?
- What analytic insights are gained from intersectionality as it shows up in a variety of diverse/international contexts and how might this impact the reconceptualization of intersectionality in the U.S. context? Other contexts?

To answer these research questions, a qualitative or mixed-methods research design would be most appropriate. As with qualitative and exploratory inquiry of this kind, it would be important for those who choose to engage in this study to collaborate and co-construct the research design and methods together. Interviews, surveys, focus groups, and artifacts are potential sources of data collection and analysis. Gathering data from multiple sources across multiple contexts would provide a strong basis for capturing both similarities and nuanced differences across professionals and programs which leverage intersectionality to conceptualize and focus teacher preparation practices.

It is important to note that the proposed research plan is intended to be co-constructed by scholars and partners from across the globe. As noted in the aforementioned literature, intersectionality is shaped and positioned by sociopolitical, societal, and cultural contexts that differ at various geographic locations. Thus, we anticipate that the research proposal will evolve and benefit from multiple perspectives by participants interested in global intersectionality and equity research within education.

4. Conclusion

Global issues of educational equity can be more fully understood and analyzed through intersectionality theory. Similarly, intersectional frameworks can support the development of future educators to more deeply understand their students and the social and educational contexts they experience. Supporting new educators in developing a perspective on teaching and learning that considers the whole-child, is critically conscious, and commits to social justice is crucial. Such dispositions have the potential to support new teachers in guarding against implicit bias, identifying and addressing barriers and systemic inequities in their context, and advocating on behalf of the strengths and needs of all students. This proposed research seeks to gain insight into the use of intersectionality in teacher preparation in a variety of global contexts. The proposed study will serve to further theory and method for understanding and addressing issues of educational equity through the way the field prepares new teachers and inform contextualized, evidence-based practices in applying intersectionality to teacher preparation.

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Sense of Competence, Evaluation of Own Computer and Digital Competence, Effectiveness of Communication with Students and Effectiveness of Own Work of Academic Teachers 60 plus (in Relation to Younger Colleagues)

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1. Introduction

The subject of the article's consideration is the sense of competence, evaluation of one's computer and digital skills, effectiveness of communication with students and effectiveness of one's own work among academic teachers 60 plus in comparison with their younger colleagues.

The current state of research relating to university teachers in the context of their age [1], [2], [3], does not provide a clear answer to how much age is a factor in determining their performance.

The effects of digitization are undeniably spreading into all areas of daily life. It is changing the way people interact, communicate, learn and work [4], [5], [6], [7]. Therefore, the acquisition of digital competencies as part of the education that students receive as part of their program of study, for which university teachers are responsible, has become a key and natural need, a response to the deepening wave of digitization.

2. Theoretical Considerations

The traditional understanding of university teachers' professionalism is based on expertise and pedagogical skills, autonomy in work and a strong service ethic [8]. However, there is a need to adapt this understanding to the modern context, taking into account digital technologies [9].

Teachers' digital competencies are complex and multifaceted, and their definitions are constantly evolving [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [1]. It is important to consider personal factors, cultural values and the complexity of teaching and learning. The DigCompEdu framework is an example of a comprehensive set of digital competencies for teachers, including not only the ability to use digital tools, but also their integration into teaching, learning, assessment and the development of students' digital skills [20].

Effective communication between academics and students is crucial for effective teaching [21]. It includes both the transmission of information by the teacher and the reception of information and knowledge from the student. Praxeology emphasizes the importance of goal orientation in the communication process [22].

The evaluation of a teacher's work both in the literature is controversial. Some authors, when commenting on the effectiveness of university teachers, emphasize objective factors, i.e. the level of students' mastery of knowledge and their competence, as well as the time spent preparing for classes [10], [23], [24]. However, as a rule, studies explicitly emphasize subjectivity in establishing such criteria [25], [26], for this reason, the subjective evaluation of academic teachers' self-efficacy was taken as the subject of further consideration and research.

3. Research Method

The purpose of the study was to identify the existence of discrepancies among university teachers aged 60 plus in the area of four variables that determine the functioning of university teachers:

- Sense of competence.
- Assessment of their computer and digital skills.
- Effectiveness of communication with students.
- Self-efficacy among university teachers.

Thus, the study formulated four research problems:

- Is there a relationship between the age of university teachers and the sense of competence? Which age group has the highest sense of competence?
- Is there a relationship between the age of university teachers and the evaluation of their own

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computer and digital competence ?

- Is there a relationship between age and the evaluation of the effectiveness of communication with students among university teachers ?
- Is there a relationship between the age of academic teachers and the evaluation of self-efficacy ?

In the research proceedings, the diagnostic survey method, survey technique was used and a specially prepared and validated (during the pilot study) questionnaire consisting of 35 questions was used as the research tool.

The study involved 224 university teachers, in diverse age groups (up to 30 years, 31-40, 41-50, 51-60, over 61 years). The survey covered the area of Poland. The following statistics were used in the statistical analysis: the Kruskal-Wallis test, post -hoc test, Dunn's test with Bonferroni and Conover's correction.

4. Findings

The data obtained showed that there were statistically significant differences between age in each group of teachers and all four of these variables. The lowest sense of competence was found for the 60 plus group. Thus, age proved to be a significant factor related to the functioning of university teachers.

The study conducted has some limitations, as not all components of digital competence were taken into account, i.e. problem solving or critical thinking. Nevertheless, as a result of the research and analysis, it can be indicated that the studied group of university teachers would require, in a large measure in the aspect of operating computer programs in the form of training, mentoring, so as to create an organizational culture at the university and other educational institutions where 60 plus teachers work.

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Contrast Analysis of the Professional Competence of Graduates and Professionals of Education

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Abstract

This paper presents a research project in which is being carried out a contrasting analysis of the training and job performance of early childhood and primary education teachers and the exercise of their professional competences. This is a crucial issue in the evaluation and improvement of both the training programmes of teachers at these stages and their professional insertion, allowing the identification of the best educational practices and the pedagogical models and orientations on which these practices are based. The analysis of the quality of teacher training and their professional competence is one of the fundamental elements for ascertaining the degree of educational, social, scientific and economic development -in accordance with the current context- of educational models, and is also one of the necessary vehicles for identifying the strengths and weaknesses of these models and their pedagogical orientations. All this is highlighted in the most recent political and strategic documents in Spain and in the international context (reports of the Spanish State School Council, the OECD, the World Bank and the EURIDYCE network).

Keywords: professional competence, graduates and professionals, education.

1. Introduction

Different studies have highlighted the existing gap between the demands of the employer sector and the training and professional application of graduates' competence [1]. In this sense, we have to assume that in the Spanish context the majority of employers of graduates of early childhood and primary education teaching degrees belong to the public sector. It is a challenge - little addressed but necessary - to analyse the perceptions of those in charge of primary education centers regarding the professional quality of these in-service graduates and the professional competences they detect in them.

To achieve this purpose, it is necessary to carry out studies and analyses of the training and satisfaction of graduates of early childhood and primary education degrees and of employers' assessment of the professional competences acquired by these graduates. By doing so we will improve the qualifications and competences of teaching staff and bringing the scope of their training in higher education closer to the real context of the labour market, the demands of employers and the digital society [2, 4].

The aforementioned reports and documents clearly support the implementation of a project that analyses and deepens the training and professional development of early childhood and primary education teachers and that also includes transversally the improvement of people's lives at an early age (0 - 12 years). In particular, their learning and training processes, thus assuming the social challenges to which, from educational research, it aims to respond. In addition, this is carried out by connecting different educational establishments, universities and early childhood and primary schools, as well as researchers and research groups, mobilising Knowledge and Innovation Communities (KIC's) [3, 5].

Given that the training of early childhood and primary school teachers is a determining factor in the innovation and quality of their teaching performance and professional competence, it is very appropriate to explore the possibilities of improving this training, based on the opinion of the main protagonists (graduates in professional practice), as well as employers (educational administrations and primary school management teams), in a context of training and professional development. Thus, the timeliness and necessity of the project is justified by three key factors, supported by the above-mentioned national and international thematic priorities [6, 7]:

1. Quality education is a decisive factor in the construction of an advanced and integrated society.

2. The quality of education in the early childhood and primary education stages is linked to the qualification of teachers, their professional competence and the permanent evaluation of their work performance.

3. Assessment of the competences acquired by teachers in initial training and their application in professional development is not only the responsibility of graduates but also of employers. This

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is crucial for the identification of best educational practices and the pedagogical models and orientations on which these practices are based.

2. Objectives

i. To analyse the opinion of employers of early childhood and primary education graduates on the general training and professional competence received by in-service graduates in educational centres in the Autonomous City of Melilla, Spain.

ii. To evaluate and measure the professional competences of in-service early childhood and primary education teachers.

iii. To identify the best educational practices of early childhood and primary education teachers and their relationship with the pedagogical models and orientations on which these practices are based.

iv. To make a proposal for an innovative training programme for a degree in early childhood and primary education, which will enrich the training satisfaction and professional development of in-service teachers.

v. To compare the results of the training received by early childhood and primary education graduates and the satisfaction perceived by employers with respect to families and the social environment.

vi. To examine the characteristics of the professional insertion of early childhood and primary education graduates and to strengthen their employability.

3. Methodology

A research design with both quantitative and qualitative methodology is being used. Interactive methods of data collection and analysis using ICT tools (questionnaires and semi-structured interviews with digital recording) are combined with methods such as digital and content analysis of documents.

4. Project impact and expected outcomes

From the scientific-technical point of view, this project will have a high impact on the analysis, evaluation and improvement of the training, employability and professional development of early childhood and primary education teachers and their employers. It will also involve a methodological improvement in the data collection procedures using ICT, the qualitative and quantitative instruments created for this purpose. Furthermore, on a social level, the project is a transversal axis for the improvement of the lives of people at an early age (0-12 years) and of their learning processes and social performance.

This research will contribute to the systematisation and establishment of a conceptual and methodological framework linked to the concept of training in professional competences, employability and teacher professional development that will allow the subsequent development of research projects based on the principles and foundations that can be built.

5. Acknowledgments

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- UGR/Autonomous City of Melilla 2024 "Analysis of contrast of professional competencies of graduates and professionals of education degrees (ACOMEDU)" (MEL-24-UGR24).
- Evaluation of Teacher Training in Latin America and the Caribbean. Guarantee of the Quality of Education Degrees (ECALFOR). Cooperation for Innovation and the Exchange of Good Practices. Erasmus + Programme of the European Union. Reference: 618625-EPP-1-2020-1-ES-EPPKA-CBHE-JP-. 2021–2024

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Session 2: Curriculum, Research and Development

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An Emergent Framework for Developing Online Learner Identities in Nursing Education

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Abstract

Teaching During the COVID-19 pandemic, many teachers at all levels of the educational sector were forced to shift their teaching to online formats. Due to social distancing, many educators have rapidly upskilled in technologies that facilitate learning. Yet, there is uncertainty about whether teachers have the necessary pedagogic skills to optimised learning in these new online learning spaces [1]. While current research provides general recommendations for the design and delivery of online curricula [2, 3, 4], less is written about how educators can successfully shift their approaches to online formats (on platforms such as Zoom, Teams or Google Hangouts) where connection and collaboration are challenging to replicate and sustain. In this presentation, we discuss a framework developed from a recent study on teaching disability studies to pre-registration nursing students - The Emergent framework for implementing principles of embodied learning, which we suggest could be used to guide the development of courses and curricula to develop online learner identities. We describe the study methods and the iterative design process that underpins the framework. We also outline the unique context in New Zealand during 2020 and 2021, whereby schools and universities were thrust in and out of successive lockdowns, meaning learning moved from face-to-face to online spaces frequently during this time. This unique context allowed the authors to experiment with blended and fully online formats and compare student engagement in ways we could not do under normal circumstances.

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Dynamic Learning Ecosystems: A reflection on the renewal of Public Governance curriculums

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Abstract

Teaching Public Governance modules within the context of South African realities extends beyond conventional academic learning, especially considering the challenging environments in which learners in this sector find themselves. The responsibility is particularly critical for those preparing to work in the public sector, necessitating a thoughtful evaluation of the curriculum content in both the BA Programme for Governance and the Postgraduate Diploma in Governance at the University of the Free State.

The purpose of this presentation is to present the reflection on an evaluative exploration of the three-year process that led to the development of new modules for the Public Governance program. This evaluation was not guided by a rigid renewal process but rather by an instinctive approach, informed by academic considerations and multi stake-holder engagement with public governance practitioners and industry leaders. The focus is on employing Reflective Practice, utilizing Gibb's Reflective Cycle [1], and assessing adherence to the Process Model of curriculum development. This reflective analysis lays the foundation for a planned longitudinal study, investigating the impact of the teaching approach and content on learners' workplace performance.

The reflective examination draws upon insights gained through a three-year academic journey, interactions with public governance practitioners, and involvement in conferences and workshops. It incorporates the theoretical framework I am shaping which is elaborated shortly. Additionally, it highlights the need for further development of this teaching theory through research in the Scholarship for Teaching and Learning (SoTL) domain.

Teaching Public Governance should transcend conventional academic boundaries, assuming a broader responsibility in preparing learners for the intricacies of the public sector. The theoretical framework I am offering, currently named Dynamic Learning Ecosystems in Public Governance Teaching, suggests that the teaching approach should mirror the dynamic and interconnected nature of the Public Governance landscape. This approach emphasizes continuous adaptation to evolving demands, flexible learning objectives, and leveraging technology to create an agile and innovative learning environment. The argument underscores the necessity of this theory's development through ongoing reflective practices and engagement with SoTL.

In conclusion, this reflective presentation explains a journey of introspection and evolution in teaching Public Governance modules at the University of the Free State. The development of new modules, driven by a dynamic rather than a structured process, underscores the commitment to better equip learners for the challenges of the public sector considering current and future realities. I believe the exploration of Dynamic Learning Ecosystems in Public Governance Teaching presents a convincing argument for an innovative and adaptable teaching approach. The paper calls for further research within the realm of SoTL to refine and expand this theory, ensuring that the teaching process effectively facilitates the transformation of information into knowledge and, ultimately, wisdom. This is vital to the impact needed in public sector governance in South Africa. This reflective analysis therefore serves as foundation for a longitudinal study to assess

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the real-world impact of these teaching innovations on learners' workplace performance in South Africa.

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Teacher Educators' Experiences of a Curriculum of Place: Integrating Indigenous Knowledge Systems and Community Land/place-based Education

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Abstract

The purpose of our research is to investigate how educators' experiences in field studies with community partners can inform an interdisciplinary educational program (STEAM- Science, Technology Education, Arts and Mathematics) based on a curriculum of place [1]. Many contributions to education have been made through non-Indigenous perspectives of place. Place-based education [2], [3] is an approach to teaching that is grounded in the context of community and environment [4], and seeks to help students, school staff, educators, scientists and other interested community members in solving community problems [5]. However, emerging research suggests that place-based education is limited because it does not critique colonial legacies in theoretical frameworks of place [6]. Indeed, many Indigenous scholars are replacing the term place with land and argue that land-based pedagogies promote the decolonization of education [7] by recognizing the intimate relationship that Indigenous peoples have with the land. One challenge with land-based pedagogies is the role non-Indigenous peoples have in this approach to the decolonization of education. Our research, in a western Canadian context, explores this tension as we come to a deeper and shared understanding of our co-responsibility within Treaty 7 relationships. Learning from place emphasizes a relationship with the land [8], something deeply respected in Indigenous communities, and something absent from much of place-based education. Our project seeks to close this gap by considering varying perspectives of place as it informs STEAM teacher education pedagogy. Through an attention to disciplinary borders, our self-study inquiry, focused on STEAM, is to build knowledge and understanding from Indigenous, interdisciplinary, and cross-sector perspectives of a curriculum of place as it relates to educational programs.

Methodology

Our methodology has been co-designed within existing partnerships to honor and reflect Indigenous knowledge systems and designed so we can "grow into knowledge through engagement in hand-on activities learning side-by-side with masters of the crafts" [9]. Drawing on the research involving self-study as a methodology for studying professional practice settings [10], program improvement [11], and teacher education [12], and based on principles of self-study design [13], this research was self-initiated, focused on inquiry into our practice, collaborative, aimed at improvement of our practice, and using multiple and primarily qualitative means of inquiry.

Participants

The participants in this study included the two teacher educators, a Blackfoot Elder, three student research assistants and sixty-three teacher candidates. Together, we piloted integrated 7-week intensive STEAM courses in coordination with candidates' practicum experiences and field studies and inquiry projects.

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Results

The results show that our attempts to enact a curriculum of place that recognizes the intimate relationship that Indigenous people have with the land and emphasizes relational ways of knowing were impactful. However, we were disappointed that many of our students seemed to experience a place-based curriculum that was not linked explicitly to Indigenous ways of knowing. Moving forward, we will begin the STEAM semester in ceremony, learning closely with our Indigenous school partners in designing field studies that invite students to experience all dimensions of the place, as we look to shifts in identity needed to authentically experience a curriculum of place.

Conclusion

In this paper, we will present some of the benefits and challenges we encountered, how we attempted to resolve issues that emerged, and what we learned about our teacher educator transdisciplinary practices in the process. It is our hope that our research findings will prompt others to consider how teaching and learning can be enhanced [14] through a curriculum of place that considers how Indigenous knowledge systems can inform and/or challenge critical, intellectual, cultural, societal, and economic investigations intended to connect children, undergraduate students, teachers, and educators with their specific place on the earth.

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Navigating Linguistic and Educational Borders: Experiences of Sudanese Refugee Students Integrating into the Ugandan Curriculum

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Abstract

As the conflict between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) continues across Sudan, civilian displacement continues to steadily increase. To date, more than 7.2 million people have been displaced inside and outside Sudan. Uganda's progressive refugee policies have made it easy for many Sudanese refugees to seek support in the country. The linguistic and cultural transition poses unique challenges for these students, shedding light on the complexities associated with refugee education and acculturation. Therefore, this research explores the experiences of Sudanese refugee students as they integrate into the Ugandan curriculum. Understanding their experiences is crucial for designing effective support systems and interventions to facilitate a smoother integration process not only for the Sudanese refugees but also for other refugees.

Methods

Semi-structured interviews and focus group discussions were used to collect this qualitative data. Participants included Sudanese refugee students enrolled in various Ugandan educational institutions who were sampled using the snowball method. Thematic analysis was employed to identify patterns and themes in their narratives, providing a deeper understanding of the challenges and coping mechanisms associated with curriculum integration.

Results

The findings reveal a multifaceted integration experience for Sudanese Arabic-speaking refugee students. Language barriers emerged as a significant obstacle, impacting academic performance and social interactions. Cultural adaptation, however, played a vital role in the students' ability to navigate the Ugandan educational system. Support from teachers, peers, and community networks (especially the muslin and Arab-speaking Ugandan networks) as well as taking up extra English lessons were identified as positive coping strategies.

Conclusions

The study underscores the importance of recognizing and addressing the linguistic and cultural challenges faced by Sudanese Arabic-speaking refugee students in the context of the English Ugandan curriculum. Efforts to enhance language support, cultural sensitivity, and community integration are essential for creating an inclusive and supportive educational environment. The results contribute valuable insights to educators, policymakers, and organizations working towards the successful integration of refugee students into diverse educational settings.

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Session 3: Pedagogy

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A Framework for Affective Reading Instruction for Dyslexic Learners

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Abstract

In this exploratory literature review, we examine approaches to literacy instruction that include traditional approaches in dyslexia instruction, as well as posthumanist, affective theorizations around reading instruction for racially, culturally, and linguistically diverse learners with educational disabilities in the United States. In doing so, we disrupt notions of reading success that rely on students' compliance, attention, and ability and instead also focus on affective considerations in effectively supporting racially and culturally diverse dyslexic learners through tailored educational strategies. We hope to answer the question: in what ways can an effective, literacy instruction framework critique and strengthen traditional instructional approaches for dyslexic learners and diverse learners with disabilities?

1. Introduction

Researchers have explored reading interventions ranging from multisensory techniques aimed at discrete skill remediation to approaches that promote a growth mindset and highlight students' strengths. In this literature review, we review the extant research on educating dyslexic students and the emerging literature in critical disability studies on humanizing approaches to educating diverse learners with disabilities. We highlight the impact of varied methods to offer insights for teaching dyslexic learners and offer a framework for considering affective networks in reading instruction.

2. Dyslexia

Students with dyslexia often exhibit deficits in reading comprehension, phonological processing, and decoding unfamiliar words. Despite showing normal listening comprehension, dyslexic learners find it challenging to draw inferences and process texts fluently [1]. Designing personalized educational plans that focus on aligning teaching methods with students' preferred learning styles while combining multisensory approaches has been the dominant contemporary approach to literacy instruction for dyslexic learners. Approaches to teaching dyslexic learners have emphasized multisensory teaching methods that combine visual, auditory, and kinesthetic activities with assistive technology and tailored lesson plans [10] alongside individualized instruction and resilience-building strategies for equitable educational opportunities [12]. Similarly, multisensory teaching and software tools in dyslexia-friendly classrooms where teachers and parents collaborate to support each student's unique learning needs [6]. Relatedly, Nicolson and Fawcett [7] focus beyond symptomatic reading struggles to address learning challenges rooted in cognitive and neural mechanisms. They identify the procedural learning system, involving cortical and subcortical regions, as the underlying cause of dyslexia, and recommend targeted interventions.

3. Methods and Techniques that Focus on Disposition in Learning

Dweck [4] advocates for teaching a growth mindset which centers on the belief that abilities and intelligence are developed through dedication and hard work (versus a "fixed mindset" that sees talent as a finite resource). Early cultivation of a growth mindset fosters resilience which is essential for dyslexic students' willingness to take on and work through academic challenges. It is equally important to note that, dyslexic learners possess distinctive strengths, such as spatial reasoning and creativity [5]. Unfortunately, these strengths are often overlooked in conventional classroom settings, resulting in student frustration and underachievement. Eide and Eide [5] argue that educators should nurture these strengths to foster innovation and creative problem-solving.

Similarly, Waters [16] reviews 12 school-based positive psychology programs and demonstrates significant improvements in student well-being, academic performance, and relationships. Integrating these practices into daily classroom activities can enhance learning outcomes for dyslexic students.

Furthermore, case studies have shown how early diagnosis, and intervention can significantly impact students' emotional well-being and success in understanding cognitive and emotional challenges to develop actionable strategies [14].

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4. Affective Ecologies in Sociocultural Methods of Literacy Instruction

We extend traditional considerations of the linguistic and neurological components of dyslexia and reading instruction to include an approach to reading instruction and assessment that includes posthumanist considerations of affect and its role in learning to read. Sociocultural approaches to literacy focus on "good reading" as a complex social practice where readers are apprenticed into specific linguistic practices [18], [19], [20], [21], [22], as well as the ways in which student use a variety of strategies to continuously monitor their thinking about the text [20]. An affective approach to reading also considers the multidimensional implications of the use of language and the written word within an existing emotional classroom ecology.

5. (Re)Constructing "Good Readers" to include Affective interactions with print

Literacy practices require that students engage with language in and through print [24]. We expand our conceptualization of literacy and "good reading behavior" to include the affective engagement between a student and the print interactions [9], [11]. Like all interactions within affective ecologies, student's interaction with print should not be unidimensionally assessed through singular measures or observations. We challenge dominant understandings of "good readers" to go beyond compliance, attention, and word-calling to also include the many ways a student's emotions –as experienced through their identities–informs their connections to not only curricula, but to each other within classrooms and honor the ways youth constantly make meaning of their own circumstances: interpreting phenomena and navigating it[15]. For children at intersections of race, dis/ability, and language, and for whom behavior is not an immediate indicator of "goodness" and "smartness" in school [2], [8] providing room for care and support that considers their own meaning-making affords children and teachers the bidirectionality of relational interdependence within literacy practices and instruction. Through interdependent relational ecologies, emotion and behavior can be understood as agency with meaningful impact on others and shifts focus on all people in a classroom as independent and autonomous toward "already living and being in the world as both cultural participants and producers" [17]. In a classroom where children's meaning-making is considered automatically valid because of– not in spite of– race, language, and dis/ability, all members of a classroom are believed capable of "making and communicating meaning" [23] in ways averting what Taylor [13] refers to as "epistemic disempowerment" by situating emotions and behavior outside of an isolated experience and to "the full social sphere" [23].

6. Conclusion

In summary, early identification and intervention are crucial in addressing the unique needs of dyslexic learners, who often struggle with reading comprehension and phonological processing despite neurotypical listening comprehension [1]. Teaching methods like those advocated by Reid [10] and Stuart and Yates [12] emphasize the importance of multisensory instruction, assistive technology, and individualized lesson plans. Elliot, Davidson, and Lewin [6] stress early diagnosis and collaboration between educators and parents, while Nicolson and Fawcett [7] recommend targeting the procedural learning system to tackle underlying cognitive challenges. Dweck [4] promotes a growth mindset for fostering resilience, and Eide and Eide [5] encourages nurturing dyslexic strengths like creativity and spatial reasoning. Waters [16] illustrates the benefits of positive psychology programs for improving well-being and academic performance, and Thomson [14] demonstrates the significance of early diagnosis in supporting emotional health and success.

Relatedly an in consideration of the affective nature of literacy, reframing of "strong literacy skill" to include the relational components of reading has implications for both teacher and student: the student must be able to authentically engage with print, and the teacher has to ensure the affective ecology of the classroom allows for communities of care that foster authentic engagement. Though post humanist approaches to literacy are gaining more popularity in research journals focused on literacy, applying these conceptualizations to students with disabilities– including dyslexic students– is essential to reframe away from those practices that continue to marginalize students at the intersections of race, language, and dis/ability, and toward liberatory literacy instruction honoring students' identities and affect as epistemologically empowering. Collectively, these approaches underscore the value of holistic and tailored strategies to maximize learning outcomes for all students, and for dyslexia students and students with disabilities in particular.

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Enhancing International Collaboration Through Faculty Exchange: Case Study from Two Universities in the US and Hungary

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Abstract

This case study examines an ongoing faculty exchange between researchers in Hungary and the US. It explores the collaboration's development, progress, achievements, future directions, and key insights.

1. Introduction

International partnership has become a cornerstone of contemporary higher education, even in the field of law enforcement, where organizations and experts collaborate to create synergies benefiting all parties involved. This case study delves into a collaborative initiative between Metropolitan State University of Denver (MSU Denver) and Ludovika University of Public Service (LUPS) in Hungary, focusing on sustainable teaching and research practices. While the literature extensively explores institution-level collaborations, this research examines the effect of partnership from facilitated by faculty exchange.

2. Literature Review

A robust body of research underscores the significance of international partnerships in higher education. Numerous studies have investigated institution-level cooperation and its potential benefits [1]. However, a gap exists in understanding the impact of targeted faculty exchange programs on departmental collaborations. This study aims to fill this gap by examining the MSU Denver and LUPS partnership.

3. Background and Settings

MSU Denver, a comprehensive university located in Denver, Colorado, and LUPS, a public service university based in Budapest, Hungary, formalized their partnership in September 2023 through a Memorandum of Understanding (MOU). The collaboration aims to foster academic exchange between faculty, researchers, and students.

4. International Collaboration

Driven by shared academic interests, faculty from both institutions initiated a faculty exchange program. Key activities include the development of a faculty-led study abroad program (scheduled in Spring 2025), collaborative research on public and private security, and contributions to a Fulbright research project.

5. Evaluation

The faculty exchange demonstrated strong engagement through formal and informal communication channels between the two participants. The partnership yielded concrete teaching and research outcomes, including publication, workshop, and conference presentation. Although the faculty exchange was initiated from mutual interest, the outcomes clearly present an example of efficient use in limited resources in each institution.

6. Future Plans

Building on the success of the ongoing exchange, the exchange faculty members will continue their collaboration through teaching appointments at partner institutions and the development of workshops for researchers and students. Other programs and opportunities will be examined based on the evaluation when the exchange is over.

7. Conclusion

This case study highlights the potential benefits of faculty exchange programs in fostering international partnerships. While the findings may not be universally applicable, they offer valuable insights into developing successful collaborations that enhance student learning and faculty research.

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Compilation and Verification of Monothematic Shoah-Themed Set of Texts: Presentation of Partial Results of the Research Investigation

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Abstract

In the contribution, we present partial results of a quantitative research investigation, the aim of which was the verification of a monothematic set of texts with the theme of the Shoah intended for the first grade of primary schools. A total of 457 pupils of this level of education (i.e. pupils from first to fifth year) took part in the research. A total of 116 pupils from the 4th year took part in the research, and a total of 115 respondents from the fifth year. In the article, we present the result of the hypothesis, the wording of which was "fifth graders pupils show a higher level of text comprehension than fourth graders pupils". The verification of this hypothesis was possible, because students from the 4th and 5th years filled out the same questionnaire. Based on the statistical evaluation of this hypothesis, it can be stated that it can be accepted - the students from the fourth year therefore reach a lower level of understanding of examples from Shoa-prose texts and poems.

1. Introduction

In the paper, we present the results of hypothesis*: fifth graders show a higher level of text comprehension than fourth graders*. The motivation for advancing this hypothesis was several findings. Reading comprehension among 4th and 5th graders in elementary schools is influenced by various factors, including reading habits, learning strategies, and individual learning styles [24]. Learning strategies also play a vital role in improving comprehension. Summarization has been shown to significantly improve third- and fourth-grade students´ comprehension of text more than factual retrieval, which is more effective for text retention [13]. This suggests that encouraging students to summarize texts may be a valuable strategy for improving their comprehension. Tailoring reading activities to students´ learning styles can alleviate reading difficulties and improve comprehension. For example, auditory learners benefit from listening to audio recordings before reading, while visual learners benefit from engaging with illustrated and highlighted texts. These personalized approaches have been effective in improving the reading performance of students with reading difficulties [14]. Reading fluency, speed, accuracy, and prosody are associated with comprehension. While speed and accuracy are related to literal comprehension, prosody is significantly related to both literal and inferential comprehension, highlighting the importance of expressive reading for comprehension of texts [4].

Research on reading comprehension among 4th and 5th graders reveals several key differences influenced by factors such as awareness of text structure, genre, and comprehension strategies. First, awareness of text structure plays a significant role in the differences in comprehension between these grades. A study using the *Text Structure Identification Test* (TSIT) found that 5th graders demonstrated greater awareness of text structures compared to 4th graders, particularly in recognizing problem/solution and sequence versus compare/contrast and cause/effect structures [20]. This suggests that as students´ progress to higher grades, their ability to identify and use text structures improves, potentially improving their comprehension skills. Comprehension varies across genres of text. Research shows that 5th graders perform better in reading comprehension at various levels—vocabulary, literal, intertextual, and intertextual—compared to 4th graders, especially when working with narrative texts that contain unfamiliar content [8]. This improvement can be attributed to increased exposure and familiarity with different genres of texts as students' progress through the grades. The strategies used by students also differ. In year 4, students often use methods such as exploring text images, visualizations, summarizing and story mapping to aid understanding [22].

To implement this oriented research investigation, the aim of which is to verify the content composition of an anthology of texts and other artistic monuments with the theme of the Shoah, for us the relevance of the Shoah phenomenon and the warnings that result from it for contemporary society was important. For the purposes of this article, we perceive the terms Shoah and Holocaust synonymously, i.e. as terms denoting the mass killing of various ethnic, religious, sexual and other minorities by members of the Nazi Party.

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The significance of the Shoah for contemporary society

The significance of the Shoah, or Holocaust, for contemporary society is multifaceted and affects political, educational, and cultural fields worldwide. In Israel, the Shoah has become a central component of national identity and political discourse. It is deeply embedded in the educational curriculum, with visits to Holocaust sites such as Yad Vashem mandatory for political leaders and students, symbolizing a collective memory and identity marked by the *Holocaust* [16]. This centrality reflects the larger narrative of sacrifice and survival that has shaped Israeli society and its geopolitical stance, particularly in relation to the Israeli-Palestinian conflict [17]. Worldwide, education about the Holocaust serves as a vital tool for the promotion of human rights and the fight against discrimination. It is often integrated into citizenship education, especially in developing countries, to promote a general understanding of human rights and to counter bigotry and discrimination across various social divides [1]. This educational approach underscores the role of the Shoah as a historical lesson with contemporary relevance that aims to guide individual and collective behavior toward tolerance and inclusiveness. The legacy of the Shoah also includes the persistence of anti-Semitism, albeit in different forms. While the immediate aftermath of the Holocaust dampened anti-Semitic speech in many parts of the world, it remains a significant problem, particularly in regions with historical or ongoing geopolitical tensions [19]. The impact of the Shoah on contemporary anti-Semitism is complex, involving psychological and socio-political dimensions that challenge the understanding and treatment of such prejudice [17]. In short, the significance of the Shoah today lies in its profound influence on national identities, educational frameworks, and global human rights discourses. It serves both as a reminder of past atrocities and as a catalyst for ongoing efforts to prevent future ones, emphasizing the need for ongoing reflection and action against discrimination and intolerance [16].

2. Methods of introducing students to the Holocaust theme

Introducing students to the subject of the Holocaust requires a multifaceted approach that balances historical accuracy with sensitivity to the emotional impact of the subject. Various methods have been explored in educational research to effectively teach this complex topic. One approach is the integration of cross-cultural analysis, as seen in the educational systems of Russia and Germany. This method involves a discourse analysis of textbooks to ensure that the Holocaust is presented as a significant historical event, even though it is often undervalued in the curriculum. Increasing its importance in educational materials is key to promoting adequate historical memory and developing student tolerance [15]. Another strategy involves using art and literature to express the emotional and human aspects of the Holocaust. For example, poetry and children´s drawings from the Terezín concentration camp can be powerful tools for introducing students to the Holocaust. These artistic expressions help students connect with the personal stories of those involved, making historical events more relatable and impactful [6]. Holocaust education can also be enriched by examining a wide range of texts and media, from canonical works such as *Anne Frank´s Diary* to visual art and controversial pop culture. This approach encourages students to critically engage with the material, ask questions, and understand the historical and cultural contexts of these representations. Such a method provides a broad perspective and prompts a deeper investigation into the complexity of the Holocaust [2]. Holocaust education contributes to moral education by encouraging students to empathize with the victims and understand the moral dilemmas they faced during the Holocaust. This approach, developed at Yad Vashem, emphasizes personal and community narratives, encouraging character development and ethical reflection among students [5]. Teaching the Holocaust as a cautionary tale emphasizes its relevance to contemporary issues. Educators can use the Holocaust to discuss the nature of genocide, the role of propaganda, and the importance of standing up against injustice, connecting past events to current challenges and preventing future atrocities [10].

3. Research methodology

Quantitative research was carried out by means of questionnaires, which were distributed in printed form to pupils of the first grade of primary schools - of course, after prior agreement with the headmaster of the respective school.

The first phase of the research was the selection of suitable intentional texts with the theme of the Shoah. Based on a detailed analysis of these narratives with a defined phenomenon, samples were extracted from them. Closed questions were created for individual excerpts, which determined the level of understanding of the text by the respondents, and the degree of popularity[1] of the selected publications by the relevant

[1] We perceive popularity as a two-component aspect of evaluation. The primary component contributing to popularity is the understanding of the text, the second component, which depends on the first, is the process of evaluating the narrative by the recipient (if the recipient´s

pupils was also monitored. Before starting to fill in the anonymous questionnaire, work was done with selected literary examples or pictures. The methods of working with the text were chosen based on research, which was concerned with finding out the opinions of lower-secondary school teachers on the implementation of the Shoah theme in the teaching of literary education (one part of this questionnaire was focused on the methods that the tested teachers use in the framework of literary education. By applying the methods of work with the example that the teachers mentioned, we would like to achieve that we do not deviate too much from educational reality. Based on the students´ answers, the content of the anthology was verified or falsified.

The selection of schools was made by random stratified selection. We focused on data from the *Annual Report on the State and Development of the Education System in the Olomouc Region* [18]. As it follows from the data, the research was carried out for practical reasons in this area of the Czech Republic. In Table 1, we list the required number of pupils who, according to the established criteria, should have participated in the research investigation. Based on Katriak [7] we determined the total number of tested pupils to be 1.5% (with a base sample size of up to 100,000).

A total of 457 pupils of the first grade of primary school were tested (of which 91 are from the first class of this level of institutional education).

Table 1. Number of pupils and classes in primary school by year - regular classes in the 2021/2022 school year

district	1st year/sample size	2nd year/sample size	3rd year/sample size	4th year/sample size	5th year/sample size	total/sample size
Jeseník	306/5	317/6	313/6	313/6	343/5	1592/28
Olomouc	2401/36	2483/37	2433/36	2336/35	2594/39	12147/183
Prostějov	1071/16	1026/15	1019/15	1028/15	1088/16	5232/77
Přerov	1112/17	1134/17	1076/16	1135/17	1165/17	5622/84
Šumperk	1104/17	1072/16	1143/17	1036/16	1096/16	5451/82
Total/sample	5994/91	6032/91	5984/90	5848/89	6286/96	30144/457

Source: Annual report on the state and development of the educational system in the Olomouc region, [18, p. 17] (edited).

3.1. Research sample

A total of 457 primary school pupils participated in the research. According to the stratified dimensional selection, 89 of this number should have been from the fourth year and 96 from the fifth year. Since all pupils from the given classes who were in school at the time of the research took part in the research (respectively filling in the questionnaires), the number of pupils was finally set at 116 from the fourth year and 115 from the fifth year. These balanced numbers are also an adequate starting point for testing the presented hypothesis.

4. Research results

In this part of the contribution, we present the results of the presented research investigation in connection with testing the hypothesis that *fifth graders pupils show a higher level of text comprehension than fourth graders pupils*.

Both groups of respondents filled out the same questionnaire, which consisted of three texts with the theme of the Shoah - two prose and one poem. Closed questions were postulated for these - respondents chose one option from the offered ones. We present the results that were used to verify the postulated hypothesis.

attitude towards the text in the first stage is negative, the second stage does not even begin).

4.1. The first sample with tasks

The first sample was from the book *Diary of Rivka Lipszycová: found in 1945 by the Red Army in Auschwitz, first published in 2014 in San Francisco* [25].

"Do you have everything?" *her mother asked. Rivka checked her supplies. In her rucksack she had a woolen scarf, a loaf of bread, two apples and a piece of cheese wrapped in a handkerchief. She wanted to pack a winter coat as well, but because it was too bulky and didn´t fit in her backpack, she put it on herself. She was already sweating.* "Yes, Mom," *she replied. The mother was standing in the hall holding the baby in her arms. Rivka´s younger brothers, Saul and Isak, should have been asleep long ago, but instead stood by the door, staring at their sister with wide eyes. Everyone in the apartment was wearing pajamas. Everyone except her. Because she was going away. Tears welled up in her eyes.* "Mom, please don´t make me leave..." "Stop it," *her mother cut her off in a choked voice.* "We have already discussed it." *There was a knock on the door. Mother opened them and behind them stood Rivka´s cousin Nathan.* "Come on," *she said softly.* "Rivka is already waiting for you."
(…)

It was warm that August morning, and Rivka´s coat weighed perhaps a ton. The sweaty blouse clung to her body. Despite the heat, however, she was shivering. "Why would the landlords want to kill us? We didn´t do anything to them." *Nathan shot her with a look of disdain.* "We are Jews. And that´s enough for some people." *An uncomfortable feeling dug into her stomach. She knew Nathan was right.* "But how would they know we are Jews? If we don´t tell anyone, we´re safe."

The first question related to this sample was the question of *Why Rivka was taking a coat?* We present the results in Figure 1.

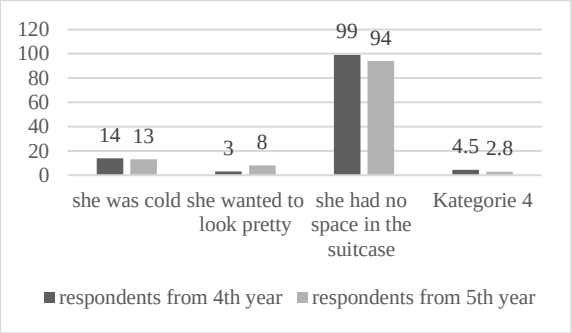

Figure 1. Why did Rivka take her coat?

The second question was - *How could people know that they were Jews?* We present the results in Figure 2.

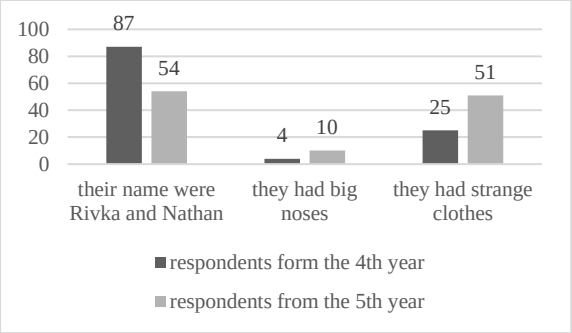

Figure 2. How could people know they were Jews?

As can be seen from the graphic representation, most respondents from both tested groups (a total of 85.34% from the fourth grade and 81.74% from the fifth grade) chose the option *she had no space in the suitcase*. The other two options offered received a negligible number of votes in the context of the number of respondents. Based on the statistical evaluation, it can be concluded that no statistically significant differences ($p>0.05$) were found between the answers to this question between the respondents from the two tested groups.

Figure 2 shows there were differences between the answers of respondents from both tested groups, especially quantitative ones. Based on the evaluation, it can be stated that statistically significant differences were found between fourth- and fifth-year students ($p<0.001$). This fact was caused by a considerable nominative number of choices for the option *their name were Rivka and Nathan* (87 choices x 54 choices) and *they had strange clothes* (25 choices x 51 choices). The level of understanding of the text in this area differs between fourth and fifth graders.

4.2. The second sample with tasks

The second example was taken from the publication *Hana* [11]:

It tightens so that you can hear how the tree trunks crack in the winter on the mountain. In the Jasenovský stream, the ice cracks on the shallows around the stones. Dry leaves attacked on the ground are broken. Some were blown into the stream by the wind and frozen in ice; there they will wait for the spring water to carry them down the stream. When such frosts hit, the Oravans don´t go outside unnecessarily. They quickly run to work, from there maybe to the office when something needs to be done or to buy groceries. Then back to the cottage to do housework, which there was no time for in the summer, or just dozing, sitting, reading, listening to the radio. When there is no end to the snowfall, large clumps fall from the sky, the yard must be cleared, and even several times a day at least the sidewalk to be able to walk on the street. Silence. It comes along with the frost because the ice in the creek doesn´t talk. The tree branches don´t move, the breeze doesn´t stir the grass and leaves. The chirping of the birds falls silent. And, the human commotion, because no one is standing around unnecessarily. Hana woke up on a broken wooden bench in the synagogue. It reminded her of camp, and she wondered why she had fallen asleep so soundly. She must have been very tired. The jet-black hair wrapped in the sleeping bag first trembled slightly, and then the heavy lids revealed clear and bright pupils. Hana was shaking like an aspen.

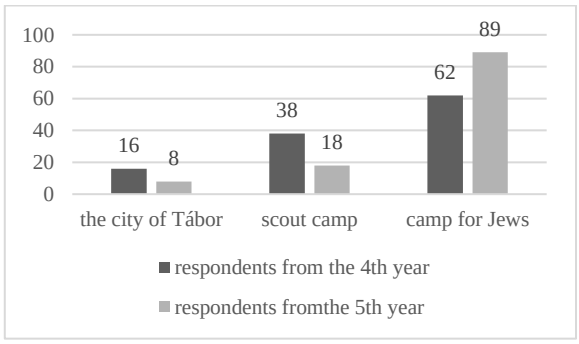

Figure 3. How could people know they were Jews?

We monitored the understanding of the text as part of the question *What kind of camp did the bench remind Hana of?* We present the results in Figure 3.

As the graph shows, most respondents from the fifth year (77.39%) chose the option *camp for Jews*, while from the fourth year this option was chosen by roughly half of the respondents (53.45%). The differences are also visible in the number of choices of the second option, *scout camp*: 32.76% x 15.65%. It was these answers that made it possible to state that there are statistical differences ($p<0.001$) in adequate understanding of this text between respondents from the fourth and fifth grades.

4.3. Poem

The last sample in the questionnaires for the mentioned tested years was a poem called *Memory of Prague*, written in the Terezín concentration camp by Petr Ginz, who was interned there until he was fourteen years old before he was murdered in Auschwitz.

How long has it been
what did I see last
the sun setting behind Petřín.
That Prague was kissed by a tearful gaze,
When she covered herself with the evening shadow.

I´ve been squatting in an ugly hole for almost a year now
instead of your beauties, I only have a few streets.
Like a caged wild animal.
Prague, stone fairy tale, I remember!

As part of determining the level of understanding of this poem, the question *What does Prague remind the poet of?* The responses of the respondents are shown in Figure 4.

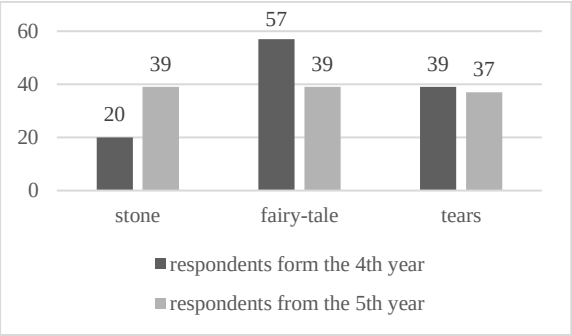

Figure 4. What does Prague remind the poet of?

Figure 4 shows that the respondents´ answers are relatively even, especially in the answer *tears*. A more significant differences can be observed in the answer *stone* (17.24% x 33.91%) and *fairy-tale* (49.14% x 33.91%). It was for this reason that it was found that there are statistically significant differences in the understanding of this poem among students from the fourth and fifth grades ($p<0.05$).

Based on the presented results documented by their statistical evaluation, we accept the hypothesis that *fifth graders pupils show a higher level of text comprehension than fourth graders pupils*. Respondents from the fifth year thus achieve a higher level of understanding of the samples from Shoah-prose and authentic poems given in the questionnaire.

5. Discussion

The presented results confirm the data presented in the theoretical background to motivate the postulation of this hypothesis. It can be stated that pupils attending a year higher in primary education achieve a higher level of understanding of prose text and poems. These claims can be substantiated, for example, by the conclusions of the study by Nohachevska and Komarnitska [12], where they identify four levels of text comprehension, emphasizing that each level builds on the previous one, which indicates developmental progress in understanding literary texts. It follows that as students´ progress in their education, they are likely to reach a higher level of understanding and move from basic content understanding to more complex interpretive and methodological levels. Research by Ureta-Mendoza and Mantilla-Vivas [23] on the teaching of language and literature in upper primary education emphasizes the importance of understanding language as an abstract system as well as a communication tool. This dual approach is essential for developing a deeper understanding of both prose and poetry, suggesting that students at higher educational levels who are more exposed to these concepts may achieve better understanding. A study by Blohm et al. [3] examines genre-specific reading strategies, suggesting that prose and poetry require different cognitive approaches. Sugiarti et al. [21] demonstrate that active reading strategies can significantly improve students´ comprehension and understanding of prose by integrating mind, emotion, and motivation. These findings suggest that as students´ progress, they may develop more sophisticated strategies for reading and understanding different literary genres, thereby improving their overall comprehension.

6. Conclusion

In the contribution, the core of which was the presentation of partial results of a quantitative research investigation, the goal of which was the content verification of a monothematic set of texts with the theme of the Shoah, we verified the hypothesis *fifth graders pupils show a higher level of text comprehension than fourth graders pupils*. The

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adoption of the hypothesis took place through the evaluation of four closed questions aimed at determining the level of understanding of examples from publications with the theme of the Shoah and one authentic poem that was created behind the walls of the Terezín concentration camp.

Thus, the results of other research were confirmed, the authors of which prove that students from higher grades achieve a higher level of understanding of various texts for various reasons.

For the very compilation of anthology of texts with the theme of the Shoah, these findings are of key importance, not only in its content composition itself, but also in the realization that every year of education advances the level of understanding of various texts on the part of (not only) pupils of the first level of primary education. We will emphasize these facts during the finalization of the *Anthology of Shoah-Themed Texts for the First Grade of Primary Schools*, whose publication is planned for the end of 2024.

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Evaluating the Impact of Metaverse Integration on Academic Performance and Engagement in Primary Education: A Case Study of Medersat.com Bouskoura

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Abstract

This work-in-progress study investigates the impact of metaverse integration on the academic performance and engagement of primary school pupils at Medersat.com Bouskoura. Conducted with 46 6th-grade students (aged 11 years old), the research compares an experimental group using VR headsets for immersive learning with a control group following traditional teaching methods. The study focuses on three key dimensions: learner engagement, knowledge retention, and the development of practical skills. Pre-tests and post-tests were administered to both groups to assess knowledge of the human body's organs and electronics before and after the learning sessions. Preliminary analyses using statistical methods, including paired t-tests, independent t-tests, and effect size calculations in SPSS, indicate significant improvements in both groups, with the experimental group showing a more substantial gain. While early findings suggest that metaverse-based learning enhances academic performance and engagement more effectively than traditional methods, the full analysis is ongoing. The study aims to offer valuable insights into the integration of advanced technologies like the metaverse in primary education and provide a foundation for future research in this area.

1. Introduction

The rapid advancement of technology has introduced innovative methods for enhancing educational experiences, among which the metaverse a collective virtual shared space created by the convergence of virtually enhanced physical reality and physically persistent virtual space has emerged as a promising tool for immersive learning. The potential of the metaverse to revolutionize education lies in its ability to provide interactive and engaging experiences that traditional classroom settings may lack.This study explores the effectiveness of metaverse-based learning environments in comparison to conventional classroom-based learning methods, specifically focusing on their impact on the academic performance and engagement of primary school pupils at Medersat.com Bouskoura. By leveraging virtual reality (VR) technology, the metaverse offers students an opportunity to engage with educational content in a highly interactive manner, potentially leading to greater learner engagement, improved knowledge retention, and enhanced development of practical skills.

2. Body of knowledge

The rapid advancement of technology has introduced innovative methods for enhancing education, with the metaverse emerging as a promising tool for immersive learning. This study investigates the potential of metaverse-based environments, leveraging virtual reality (VR), to improve educational outcomes compared to traditional classroom settings.

Purpose of study

The study aims to evaluate the effectiveness of immersive learning in the metaverse against traditional methods across three dimensions: learner engagement, knowledge retention, and practical skills development. The goal is to provide insights into the potential advantages and limitations of using metaverse technology in primary education.

Sample

The study sample consists of 46 6th-grade students (11 years old) from Foundation BMCE - Medersat.com Bouskoura, randomly divided into two groups: an experimental group that engages in learning through immersive VR environments and a control group that follows traditional teaching methods. The random selection process was designed to ensure the representativeness of the sample and to minimize bias. Data collection is ongoing, with pre-tests and post-tests already administered. The study is currently in the data analysis phase, with preliminary results showing promising trends favoring the metaverse group.

 ISBN: 978-1-913572-73-0

3. Measuring instrument

The study employs a range of measurement instruments to assess the effectiveness of metaverse-based learning compared to traditional methods. These include pre-tests and post-tests designed to measure students' knowledge of the human body's organs. The pre-test established a baseline for students' knowledge, while the post-test aimed to capture the learning progress. Additionally, qualitative observations are being gathered to assess student engagement and participation during the learning sessions. These observations will be crucial in understanding the broader impact of metaverse integration beyond just academic performance.

Figure 1. Primary School Students Engaging in Immersive Learning with VR Headsets at Medersat.com Bouskoura

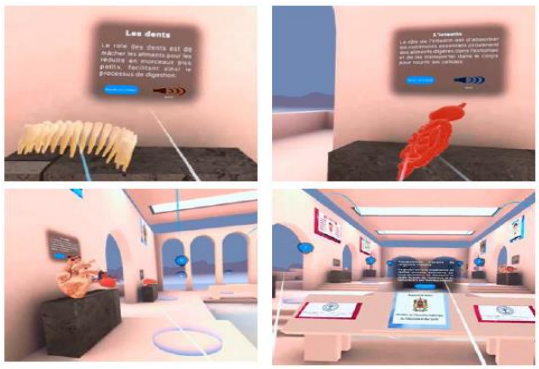

Figure 2. Virtual Reality Educational Environment Showcasing Human Anatomy Lessons

Figure 3. Virtual Reality Laboratory Environment for Hands-On Science Education

4. Statistical analysis methods

To evaluate the effectiveness of immersive learning experiences within the metaverse compared to traditional classroom-based learning methods, we conducted a series of tests in a 6th-grade primary school class at Fondation BMCE - Medersat.com Bouskoura. The class consisted of 46 students, with an equal distribution of boys and girls (50% girls and 50% boys). The students were randomly divided into two groups: the experimental group, which engaged in immersive learning using VR headsets to explore human body organs, and the control group, which followed traditional teaching methods using textbooks and classroom lectures.

We administered pre-tests to both groups to assess their baseline knowledge of the human body's organs. After the learning sessions, we administered post-tests to evaluate the knowledge gained. The pre-test and post-test scores were recorded for each student.

Statistical analysis of the data collected is currently underway using SPSS software. Paired t-tests and independent t-tests are being utilized to analyze the improvements within and between groups, respectively. The calculation of effect sizes (Cohen's d) is also in progress to determine the magnitude of the observed differences. While initial results are encouraging, further analysis is required to draw definitive conclusions. The research team is also exploring potential confounding variables that could influence the outcomes, ensuring a robust and comprehensive evaluation.

5. Preliminary Findings

Preliminary findings suggest that the experimental group engaged in metaverse-based learning is showing greater improvements in both knowledge retention and engagement compared to the control

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group. Early data indicates a significant increase in post-test scores for the experimental group, with a particularly strong effect size observed. However, these results are not yet conclusive, and further data analysis is necessary to confirm these trends. The study will continue to monitor these groups over an extended period to assess the long-term impact of metaverse-based learning on academic performance.

Sample Data: Pre-test and Post-test Scores

Experimental Group (Metaverse)

Pre-test Scores: {48, 52, 45, 40, 46, 50, 44, 42, 49, 47, 43, 45, 41, 48, 44, 42, 50, 46, 45, 47, 43, 41, 44}
Post-test Scores: {80, 85, 75, 78, 76, 80, 79, 77, 82, 81, 76, 78, 75, 80, 78, 76, 85, 81, 79, 83, 77, 75, 78}

Control Group (Traditional)

Pre-test Scores: {44, 46, 43, 42, 45, 47, 44, 41, 42, 45, 46, 43, 44, 41, 42, 47, 45, 46, 43, 44, 42, 41, 43}

Post-test Scores: {70, 72, 68, 69, 71, 73, 70, 67, 69, 72, 74, 69, 70, 67, 68, 73, 71, 74, 68, 70, 69, 67, 68}

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
pre_test	23	40	52	45.30	3.211
post_test	23	75	85	78.87	2.974
Valid N (listwise)	23				

6. Conclusion and Future Directions

The work in progress shows that this study is beginning to highlight the potential benefits of integrating the metaverse into primary school education. While preliminary results are promising, the full implications of metaverse-based learning will only be understood after the complete data set has been analyzed. Future work will involve a deeper exploration of the qualitative aspects of student engagement and the practical challenges of implementing VR technologies in educational settings. Additionally, the research will consider the scalability of these technologies and their accessibility for schools in various regions.

As the study progresses, it aims to provide valuable insights into how the metaverse can be used to enhance educational outcomes and to identify the conditions under which it can be most effectively implemented. The final phase of the research will also include recommendations for educators and policymakers on how to integrate advanced technologies like the metaverse into existing curricula.

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Session 4: Science Education

Title: Analytical Treatment for the Family of Damped Nonplanar KdV-Burgers Equation
Author: Hanan Abdulrahman Alqarni

Title: Novel Analytical Approximations for the Damped Burgers Equation and the Nonplanar Burgers Equation
Author: Maryam Hajij Alolowi

Title: Best Practices in Science Teacher use of Simulations for POE Inquiry-Based Learning
Author: Umesh Ramnarain

Title: Geometry and Astronomy in Primary School: Observations, Measurements, Models and Geometric Entities
Authors: Giancarlo Artiano, Emilio Balzano, Francesca Mazzeo

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Analytical Treatment for the Family of Damped Nonplanar KdV-Burgers Equation

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Abstract

In this investigation, the damped KdV-Burgers equation and the forced damped nonplanar (cylindrical and spherical) KdV-Burgers equation are solved using the ansatz method. Based on this approach, generic formulas for semi-analytical approximations are derived. Utilizing the obtained approximations, we obtain dissipative shock wave (ShW) solutions for both the damped KdVB equation and the forced damped nonplanar KdVB equation. All the obtained approximations can assist numerous researchers interested in investigating intricate nonlinear phenomena in the realms of plasma physics and fluid mechanics.

keyword:*Damped KdVB equation, Forced damped nonplanar KdVB equation, Ansatz method, Semi-analytical solutions, Shock wave.*

1. Introduction

The planar Korteweg–de Vries (KdV) equation ($\partial_t\Psi + A\Psi\partial_x\Psi + C\partial_x^3\Psi = 0$) is considered one of the most important PDEs that has greatly succeeded in modeling many nonlinear phenomena in various scientific fields, particularly in fluid mechanics [1–4]. This equation combines nonlinearity and dispersion effects. Nevertheless, there are many phenomena encompass not only dispersion but also dissipation, and these phenomena are not governed by the KdV equation [5–8]. When a medium exhibits both dispersive and dissipative characteristics, then the propagation of small-amplitude waves can be effectively modeled by a differential equation known as the KdV-Burgers (KdVB) equation [9–13]

$$\partial_t\Psi + A\Psi\partial_x\Psi - B\partial_x^2\Psi + C\partial_x^3\Psi = 0 \qquad (1)$$

where $\Psi \equiv \Psi(x,t)$ and the coefficients (A, B, C) depend on the physical model being considered. The dissipative Burger term ($\partial_x^2\Psi$) originates from dissipative mechanisms, including viscosity, Landau damping, dust charge fluctuations in a dusty plasma, and wave-particle interactions. Eq. (1) supports shock waves, which arise from the balance between dissipation and nonlinearity [14–16]. If the dissipative effect is negligible, the KdVB equation (1) simplifies to the KdV equation, which allows for a soliton solution. In a broad range of physical media and diverse applications, the frictional interactions among system components can not be neglected and must be taken into account during studying the phenomena under consideration. Therefore, for realistic applications, Eq. (1) requires modification to include the damping term, resulting in the damped KdV-Burgers equation

$$\partial_t\Psi + A\Psi\partial_x\Psi - B\partial_x^2\Psi + C\partial_x^3\Psi + R\Psi = 0 \qquad (2)$$

Here, R denotes the coefficient of the damping term, which is a function of the collisional frequency of the colliding particles. Eq. (2) can be used to study a series of important physical problems for planar geometry. However, when the physical medium is three-dimensional with cylindrical and spherical symmetries [17–23], in addition to the presence of an external periodic force, the evolution equation (2) becomes

$$\partial_t\Psi + A\Psi\partial_x\Psi - B\partial_x^2\Psi + C\partial_x^3\Psi + (R + f(t))\Psi = F(t) \qquad (3)$$

This equation is called the forced damped nonplanar (spherical and cylindrical) KdV-Burgers equation, where $F(t) = f_0\cos(\omega t)$ in which f_0 indicates the strength of the external periodic perturbation and ω represents its frequency, whereas $f(t) = \frac{m}{2t}$ represents the nonplanar geometrical term [24, 25]. In planar geometry, $m = 0$ is used, while $m = 1$ and $m = 2$ are used for cylindrical and spherical geometries, respectively. It should be noted that in the absence of both the nonplanar geometrical and forced terms, Eq. (3) can be reduced to Eq. (2). The forced damped nKdVB equation (3) can describe a wide range of nonplanar nonlinear phenomena (e.g. nonplanar ShWs), which occur in numerous physical systems including waves in water tanks, fluid mechanics, and both space and laboratory plasmas. Eq. (3) does not support analytic solutions, influenced by both the collisional and geometrical terms. Similarly, Eq. (2) does not have an analytic solution due to the presence of the damping term ($R\Psi$). However, to study the properties of dissipative structures, such as shock waves in any plasma model, it is necessary to find some semi-analytical (approximate analytical) solutions to these equations. These approximations enable researchers to interpret their practical results. The main objectives of the current study can be summarized in the following points:

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• Using the ansatz method to derive some analytical approximations to the damped KdVB equation (2) and forced damped nKdVB equation (3).
• By applying the obtained results, we can examine all traveling waves described by Eqs. (2) and (3), such as shock waves (ShWs), which can propagate in various fields of science, including plasma physics, oceanography, and nonlinear optics.

The paper is structured as follows: In Section 2, the ansatz method is utilized to find an approximation to the damped KdVB (2). In this section, a general formula for the analytical approximate solution is derived. In Section 3, the ansatz method is implemented again to find some approximations to the forced damped nonplanar KdVB (3), resulting in two general formulas for the analytical approximate solutions. In Section 4, the obtained formulas for analytical approximations are applied to derive dissipative shock wave solutions for both the damped KdVB equation (2) and the forced damped nonplanar KdVB equation (3). The most important results obtained are summarized in Section 5.

2. Analytical Approximation to the Damped KdV-Burgers Equation

As stated above, the damped KdVB equation (2) does not have an exact analytic solution. In this case, the ansatz/hypothesis method can be employed to find an analytical approximation for this equation with the help of the exact solution of the integrable KdVB equation (1). According to our ansatz method, we following the below steps:

Step (I) We assume the approximate solution to Eq. (2) is given by

$$\Psi(x,t) = f_1(t)\Phi(xf_2(t), f_3(t)) \tag{4}$$

Here, $\Phi \equiv \Phi(xf_2(t), f_3(t))$ represents any exact solution (e.g., SWs and ShWs) to Eq. (1), while the functions $f_1(t)$, $f_2(t)$, and $f_3(t)$ respectively represent the wave amplitude, wave inverted width, and wave velocity.

Step (II) By inserting (4) with the following value of $\partial_x^3\Psi$

$$\partial_x^3\Psi\big|_{\Psi(x,t)\mapsto\Phi} = \frac{1}{C}\left(-\partial_t\Psi - A\Psi\partial_x\Psi + B\partial_x^2\Psi\right) \tag{5}$$

into Eq. (2), we get

$$L_1\partial_x\Phi + L_2\partial_x^2\Phi + L_3\Phi + L_4\partial_t\Phi = 0, \tag{6}$$

with

$$\begin{cases} L_1 &= Af_1(t)f_2(t)(f_1(t) - f_2(t)^2)\Phi \\ &\quad +xf_1(t)f_2'(t), \\ L_2 &= Bf_1(t)(f_2(t)^3 - f_2(t)^2), \\ L_3 &= f_1'(t) + Rf_1(t), \\ L_4 &= f_1(t)(f_3'(t) - f_2(t)^3), \end{cases} \tag{7}$$

where $\Phi \equiv \Phi(xf_2(t), f_3(t))$ and $f_i'(t) \equiv \partial_t f_i(t)$ for (i=1,2,3).

Step (III) Now, for $L_{1,3,4} = 0$, we obtain the following system of ODEs

$$f_1(t) - f_2(t)^2 = 0 \tag{8}$$

$$f_1'(t) + Rf_1(t) = 0 \tag{9}$$

$$f_3'(t) - f_2(t)^3 = 0 \tag{10}$$

Step (IV) By using the initial condition (IC) $f_1(t_0) = 1$. Eq. (9) can be solved to give us

$$f_1(t) = e^{-RT} \tag{11}$$

where $T = (t - t_0)$.

Step (V) Substituting the value of $f_1(t)$ given in Eq. (11) into Eq. (8), we get

$$f_2(t) = e^{-\frac{R}{2}T} \tag{12}$$

Step (VI) By substituting Eq. (12) into Eq. (10), we get the following ODE

$$f_3'(t) - e^{-\frac{3}{2}RT} = 0 \tag{13}$$

Step (VII) For solving Eq.(13), we use the below Mathematica command with the initial condition $f_3(t_0) = 0$

$$DSolve\left[f_3'[t] - e^{-\frac{3}{2}R(t-t_0)} == 0 \&\& f_3[t_0] == 0, f_3[t], t\right]$$

hence, we get $f_3(t)$

$$f_3(t) = \frac{2(1 - e^{-\frac{3}{2}RT})}{3R} \tag{14}$$

Step (VIII) Now, inserting the values of $f_1(t)$, $f_2(t)$, and $f_3(t)$ given in Eqs. (11), (12), and (14) into Eq. (4), the following approximate analytical solution to the damped KdVB equation (2) is obtained

$$\Psi(x,t) = e^{-RT}\Phi\left[xe^{-\frac{R}{2}T}, \frac{2}{3R}\left(1 - e^{-\frac{3}{2}RT}\right)\right] \tag{15}$$

The solution (15) represents a generic solution to the damped KdVB Eq. (2), meaning that it can be used to investigate the characteristics of all dissipative nonlinear structures described by Eq. (2) with the aid of exact solutions of the undamped KdVB (1), including solitons, shock waves, etc.

3. Analytical Approximations to the Forced Damped Nonplanar KdV-Burgers Equation

Since the forced damped nKdVB equation (3) is non-integrable due to the existence of the damping terms that arise due to the collisions between charged and neutral particles, as well as the effects of nonplanar geometry, we try to derive some analytical approximate (semi-analytical) solutions to this equation by applying the same techniques used in the previous section, as detailed in the steps below:

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Step (I) In the beginning, and according to the hypothesis method, we assume that the approximate solution to Eq. (3) is defined by the following formula

$$\Psi(x,t) = S_1(t)\Phi\big(xS_2(t), S_3(t)\big) + S_4(t) \tag{16}$$

where $S_1(t)$, $S_2(t)$, and $S_3(t)$ respectively represent the wave amplitude, inverted width, and velocity of the non-planar structures, while $S_4(t)$ denotes the external periodic force and $\Phi(x,t)$ indicates an exact solution to the planar KdVB Eq. (1).

Step (II) Substituting Eq. (16) with the following value of $\partial_t\Psi$

$$\partial_t\Psi\big|_{\Psi(x,t)\mapsto\Phi} = -A\Psi\partial_x\Psi + B\partial_x^2\Psi - C\partial_x^3\Psi \tag{17}$$

into Eq. (3), we get

$$Q_1\Phi + Q_2\partial_x\Phi + Q_3\Phi\partial_x\Phi + Q_4\partial_x^2\Phi + Q_5\partial_x^3\Phi + Q_6 = 0, \tag{18}$$

with

$$\begin{cases} Q_1 = 2tRS_1(t) + mS_1(t) + 2tS_1'(t), \\ Q_2 = 2tS_1(t)\big(xS_2'(t) + AS_4(t)S_2(t)\big), \\ Q_3 = 2AtS_1(t)\big(S_1(t)S_2(t) - S_3'(t)\big), \\ Q_4 = -2BtS_1(t)\big(S_2(t)^2 - S_3'(t)\big), \\ Q_5 = 2CtS_1(t)\big(S_2(t)^3 - S_3'(t)\big), \\ Q_6 = -2tF(t) + 2tS_4'(t) + 2tRS_4(t) + mS_4(t) \end{cases} \tag{19}$$

Step (III) From Eq. (19), the following relations are obtained

$$2tRS_1(t) + mS_1(t) + 2tS_1'(t) = 0 \tag{20}$$

$$S_1(t)S_2(t) - S_3'(t) = 0 \tag{21}$$

$$S_2(t)^2 - S_3'(t) = 0 \tag{22}$$

$$S_2(t)^3 - S_3'(t) = 0 \tag{23}$$

$$-2tF(t) + 2tS_4'(t) + 2tRS_4(t) + mS_4(t) = 0 \tag{24}$$

Step (IV) By solving Eq. (20) with the help of the initial condition $S_1(t_0) = 1$, we obtain

$$S_1(t) = \left(\frac{t_0}{t}\right)^{\frac{m}{2}} e^{-R(t-t_0)} = \hat{T}^{\frac{m}{2}} e^{-RT}, \tag{25}$$

where $T = t - t_0$ and $\hat{T} \equiv t_0/t$.

Step (V) It is evident from Eqs. (22) and (23) that $(S_2(t), S_3(t))$ has two different values, indicating that two various formulas for analytical approximations can be obtained. By substituting the value of $S_1(t)$ given in Eq. (25) and the value of $S_3'(t) = S_2(t)^2$ given in Eq. (22) into Eq. (21), we obtain the following

$$S_2(t) = \hat{T}^{\frac{m}{2}} e^{-RT} \tag{26}$$

Also, following the same procedure in above but using the value of $S_3'(t) = S_2(t)^3$ as given in Eq. (23), we obtain

$$S_2(t) = \hat{T}^{\frac{m}{4}} e^{-\frac{R}{2}T} \tag{27}$$

Step (VI) By inserting the values of S_2 from Eqs. (26) and (27) into Eqs. (22) and (23) respectively, and solving the resulting equations with the initial condition $S_3(t_0) = 0$, using the following Mathematica commands

$$\text{DSolve}\big[\big(\frac{t_0}{t}\big)^m e^{-2R(t-t_0)} - S_3'[t] == 0 \&\& S_3[t_0] == 0, S_3[t], t\big]$$

$$\text{DSolve}\big[\big(\frac{t_0}{t}\big)^{\frac{3m}{4}} e^{-\frac{3R}{2}(t-t_0)} - S_3'[t] == 0 \&\& S_3[t_0] == 0, S_3[t], t\big]$$

we get:

$$S_3(t) = e^{2Rt_0}\hat{T}^m\big(\frac{t_0}{\hat{T}^m}E_m\big(2Rt_0\big) - tE_m\big(2Rt\big)\big) \tag{28}$$

$$S_3(t) = e^{\frac{3Rt_0}{2}}\hat{T}^{\frac{3m}{4}}\big(\frac{t_0}{\hat{T}^{\frac{3m}{4}}}E_{\frac{3m}{4}}(\frac{3Rt_0}{2}) - tE_{\frac{3m}{4}}(\frac{3Rt}{2})\big) \tag{29}$$

where $E_n(Z)$ indicates the exponential integral function.

Step (VII) For $F(t) = f_0\cos(\omega t)$, we can solve Eq. (24) to find the value of $S_4(t)$ with $S_4(t_0) = 0$. By using the following Mathematica command

$$\text{DSolve}\big[-2tf_0\cos[\omega t] + 2tS_4'[t] + 2RtS_4[t] + mS_4[t] == 0 \&\& S_4[t_0] == 0, S_4[t], t\big]$$

we get

$$\begin{aligned} S_4(t) =& e^{-Rt}f_0\cos(\omega t)\big(\big(\frac{t_0^{1+\frac{m}{2}}}{t^{\frac{m}{2}}}\big)E_{-\frac{m}{2}}\big(-Rt_0\big) \\ & - tE_{-\frac{m}{2}}\big(-Rt\big)\big) \end{aligned} \tag{30}$$

Step (VIII) Putting all obtained values of (S_1, S_2, S_3, S_4) into (16), we finally obtain two formulas for the approximations to the forced damped nonplanar KdV-Burgers equation (3) as follows

$$\begin{aligned} \Psi_1(x,t) =& \hat{T}^{\frac{m}{2}}e^{-RT}\Phi\big[x\hat{T}^{\frac{m}{2}}e^{-RT}, e^{2Rt_0}\hat{T}^m\big(\frac{t_0}{\hat{T}^m} \\ & E_m\big(2Rt_0\big) - tE_m\big(2Rt\big)\big)\big] + e^{-Rt}f_0 \\ & \cos(\omega t)\big(\big(\frac{t_0^{1+\frac{m}{2}}}{t^{\frac{m}{2}}}\big)E_{-\frac{m}{2}}\big(-Rt_0\big) - t \\ & E_{-\frac{m}{2}}\big(-Rt\big)\big) \end{aligned} \tag{31}$$

and

$$\begin{aligned} \Psi_2(x,t) =& \hat{T}^{\frac{m}{2}}e^{-RT}\Phi\big[x\hat{T}^{\frac{m}{4}}e^{-\frac{R}{2}T}, e^{\frac{3Rt_0}{2}}\hat{T}^{\frac{3m}{4}}\big(\frac{t_0}{\hat{T}^{\frac{3m}{4}}} \\ & E_{\frac{3m}{4}}\big(\frac{3Rt_0}{2}\big) - tE_{\frac{3m}{4}}\big(\frac{3Rt}{2}\big)\big)\big] + e^{-Rt}f_0 \\ & \cos(\omega t)\big(\big(\frac{t_0^{1+\frac{m}{2}}}{t^{\frac{m}{2}}}\big)E_{-\frac{m}{2}}\big(-Rt_0\big) - tE_{-\frac{m}{2}} \\ & \big(-Rt\big)\big) \end{aligned} \tag{32}$$

The two general approximations (31) and (32) are applicable in several scientific fields for the study of nonplanar

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structures. For instance, both approximations (31) and (32) can be employed for studying the nonplanar shock waves in complex plasma. Note that these approximations can be applied to any physical model that can be described by the forced damped nonplanar KdVB equation (3), not just one model or to study nonlinear structures in a specific model of plasma. In the following section, we will use the obtained approximations (31) and (32), along with the approximation obtained in Section 2, to analyze and study the shock wave, which is considered one of the most important nonlinear waves that arise in various plasma models.

4. Dissipative Shock Wave Solutions to the Damped KdVB Equation and the Forced Damped Nonplanar KdVB Equation

For investigating the dissipative ShWs that can propagate in any physical medium such as plasma, seas, oceans, etc., we should first determine the exact ShWs of the planar KdVB equation (1). Many exact solutions to the planar KdVB (1) have been derived by many researchers. One of the exact ShW solutions of the planar KdVB equation (1) reads [26]

$$\Phi(x,t) = \frac{3B^2}{25AC}\big[4 - \big(1 + tanh\big(k(x - \lambda t)\big)\big)^2\big], \quad (33)$$

where $k = \frac{B}{10C}$ and $\lambda = \frac{6B^2}{25C}$ represent, respectively, the width and the velocity of the planar ShWs.
Now, inserting the exact ShW solution (33) into the general approximation (15), the following planar ShW solution to the planar damped KdVB (2) is obtained

$$\Psi_{sol}(x,t) = \frac{3B^2}{25AC}e^{-RT}\big[4 - \big(1 + tanh\big(k(xe^{-\frac{R}{2}T} - \lambda\frac{2}{3R}(1 - e^{-\frac{3}{2}RT}))\big)\big)^2\big], \quad (34)$$

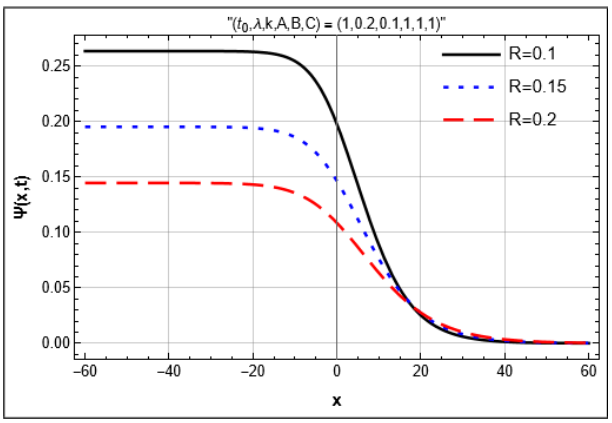

Figure 1: The profile of the dissipative shock wave solution (34) is plotted against different values of R.

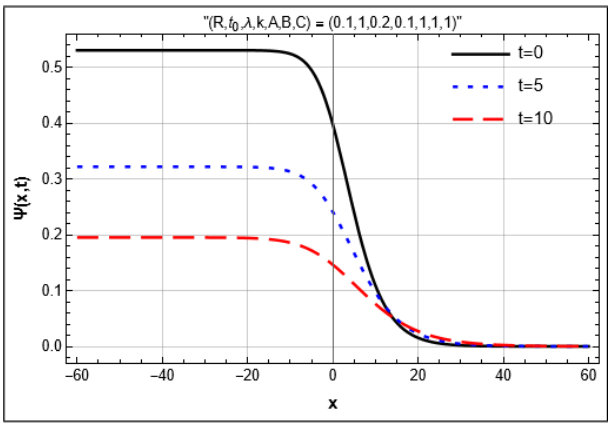

Figure 2: The profile of the dissipative shock wave solution (34) is plotted against different values of the time propagation t.

Furthermore, by inserting the planar ShW solution (33) into the approximations (31) and (32), we obtain two damped nonplanar ShW solutions with the effect of an external periodic force to Eq. (3) as follows

$$\Psi_1(x,t) = \frac{3B^2}{25AC}\hat{T}^{\frac{m}{2}}e^{-RT}\big[4 - \big(1 + tanh\big(kx\hat{T}^{\frac{m}{2}}e^{-RT} - k\lambda\hat{T}^m e^{2Rt_0}\big(\frac{t_0}{\hat{T}^m}E_m\big(2Rt_0\big) - tE_m\big(2Rt\big)\big)\big)\big)^2\big] + e^{-Rt}f_0\cos(\omega t)\big(\big(\frac{t_0^{1+\frac{m}{2}}}{t^{\frac{m}{2}}}\big)E_{-\frac{m}{2}}\big(-Rt_0\big) - tE_{-\frac{m}{2}}\big(-Rt\big)\big), \quad (35)$$

and

$$\Psi_2(x,t) = \frac{3B^2}{25AC}\hat{T}^{\frac{m}{2}}e^{-RT}\big[4 - \big(1 + tanh\big(kx\hat{T}^{\frac{m}{4}}e^{-\frac{R}{2}T} - k\lambda e^{\frac{3Rt_0}{2}}\hat{T}^{\frac{3m}{4}}\big(\frac{t_0}{\hat{T}^{\frac{3m}{4}}}E_{\frac{3m}{4}}\big(\frac{3Rt_0}{2}\big) - tE_{\frac{3m}{4}}\big(\frac{3Rt}{2}\big)\big)\big)\big)^2\big] + e^{-Rt}f_0\cos(\omega t)\big(\big(\frac{t_0^{1+\frac{m}{2}}}{t^{\frac{m}{2}}}\big)E_{-\frac{m}{2}}\big(-Rt_0\big) - tE_{-\frac{m}{2}}\big(-Rt\big)\big). \quad (36)$$

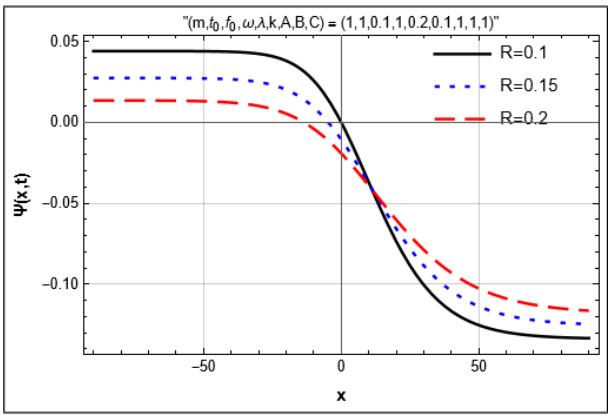

Figure 3: The profile of the nonplanar (cylindrical) dissipative shock wave solution (35) is plotted against different values of R.

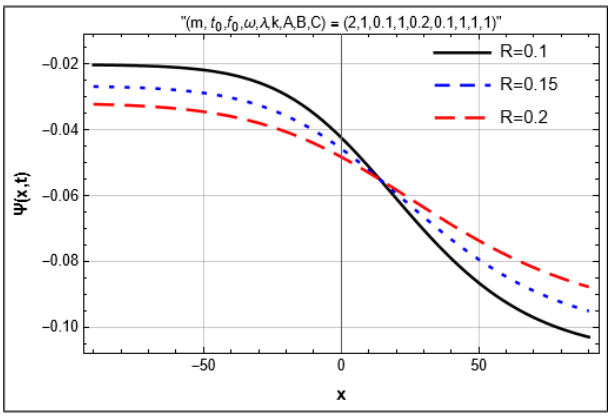

Figure 4: The profile of the nonplanar (spherical) dissipative shock wave solution (35) is plotted against different values of R.

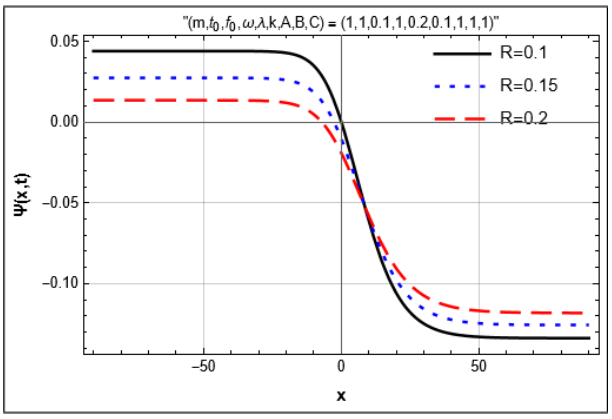

Figure 5: The profile of the nonplanar (cylindrical) dissipative shock wave solution (36) is plotted against different values of R.

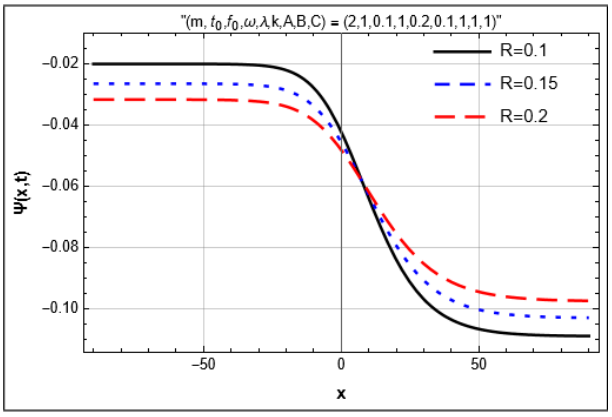

Figure 6: The profile of the nonplanar (spherical) dissipative shock wave solution (36) is plotted against different values of R.

The profile of the dissipative ShW, as illustrated in Figures 1 and 2, is investigated according to the solution (34) versus the damping term coefficient R and the propagation time t, respectively. It is clear that the shock wave's amplitude decays with increasing values of both R and t. Figures 3-6 demonstrate the profile of the nonplanar damped ShW with the effect of external periodic force for the solution (35) and solution (36). It is evident that the amplitude of cylindrical dissipative ShWs $(m = 1)$ is larger than that of the spherical ones $(m = 2)$, i.e., cylindrical ShWs propagate faster than spherical ones. Furthermore, it is shown from Figures 3-6 that the nonplanar dissipative ShWs exhibit a decrease in amplitude as the damping term increases.

5. Conclusion

Some analytical approximations to both the damped KdV-Burgers equation and the forced damped nonplanar (cylindrical and spherical) KdV-Burgers equation have been derived for the first time using a suitable ansatz. After applying the suggested method, general formulas for the analytical approximations have been obtained. All obtained approximations can be used for studying all traveling waves described by these equations. For instance, the obtained approximations were employed for investigating the characteristic of the dissipative shock waves (ShWs) that can be arise in plasma, sea, ocean,etc. It was found that an increase in the coefficient value of the damping term causes the energy of the shock waves propagating in the system under investigation to dissipate, which in turn causes the shock waves' amplitude to decrease. Moreover, the cylindrical ShW amplitude is larger than the spherical ones, i.e.,the cylindrical ShWs are faster than the spherical ShWs. At last, the obtained solutions can serve many researchers interested in studying the nonlinear structures that arise and propagate in several branches of science, especially in plasma physics, oceans, seas, mechanical fluids, and optical fibers.

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Novel Analytical Approximations for the Damped Burgers Equation and the Nonplanar Burgers Equation

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Abstract

In this investigation, we examine the damped Burgers equation and the nonplanar (cylin-drical and spherical) Burgers equation. We employ a successful semi-analytical ap-proach to achieve the study's objectives. To derive the approximate analytical solutions for these equations, we apply the ansatz method. All the derived approximations can be used to study all traveling waves, in-cluding solitary waves (SWs), shock waves (ShWs), and others described by the men-tioned equations. Additionally, we use the tanh method to find an exact shock wave so-lution for the Burgers equation, allowing us to investigate the properties of the dissipa-tive Burgers ShW and the nonplanar ShW us-ing the obtained solutions. These derived approximations are valuable for researchers in plasma physics, enabling them to analyze many different structures and interpret the re-sults of their observations and experiments.

1. Introduction

Ordinary and partial differential equations are highly effective tools for modeling the nonlinear phenom-ena across a wide range of scientific fields, includ-ing nonlinear optics, plasma physics, fluid mechan-ics, oceanography, and biology. These equations have proven successful in explaining and analyzing the complexities of various systems, prompting re-searchers to develop different analytical and numer-ical methods to solve them [1]–[7]. Recent advance-ments have improved these methods to get diverse solutions for both integrable and nonintegrable equa-tions [8]–[11]. Notably, partial differential equations (PDEs) are useful for representing nonlinear struc-tures like solitary waves, shock waves, and cnoidal waves in different plasma models and other fields [12]–[14]. Burgers Equation (BE), for instance, is a basic partial differential equation with a wide range of applications in distinct fields, such as traffic flow, nonlinear harmonics, and plasma physics [15], [16]. The standard one-dimensional BE has the following form

$$\frac{\partial \Phi}{\partial t} + A\Phi\frac{\partial \Phi}{\partial x} - B\frac{\partial^2 \Phi}{\partial x^2} = 0, \qquad (1)$$

where, $\Phi = \Phi(x,t)$. The coefficients A and B are functions associated with particular physical parameters of the system denoting the coefficients for the nonlinear and dissipation terms, respectively. Due to its crucial role in modeling various physical phenomena, the Burgers equation (BE) (1) has been extensively studied by many researchers (see, for example, [17]–[19]). Recent research has produced numerous exact solutions for Eq. (1) using various methods such as the homogeneous balancing approach [20], the Bäcklund transformation [21], and the hyperbolic function method [22]. Many studies have focused on finding analytical or numerical solutions to the integrable Burgers equation (1) without considering some physical effects such as friction, curvature, external forces, viscosity, or collisions [23]–[27]. However, natural and physical phenomena are often complex and influenced by multiple factors. Including these effects makes the differential equations more intricate but also more accurate in representing reality [28]. For example, incorporating particle collisions in plasma into the Burgers equation results in the damped Burgers equation (dBE)

$$\frac{\partial \Psi}{\partial t} + A\Psi\frac{\partial \Psi}{\partial x} - B\frac{\partial^2 \Psi}{\partial x^2} + R\Psi = 0, \qquad (2)$$

where R represents the damping effect and $\Psi = \Psi(x,t)$. This equation is used to study the dissipative nonlinear structures in plasma physics, fluid dynamics, and others. Additionally, the planar (one-

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dimensional) Burgers equation is insufficient for describing certain phenomena in various areas, such as some plasma models and space environments. To address this limitation, the nonplanar Burgers equation (nBE) is used

$$\frac{\partial \Psi}{\partial t} + A\Psi\frac{\partial \Psi}{\partial x} - B\frac{\partial^2 \Psi}{\partial x^2} + \alpha(t)\Psi = 0, \quad (3)$$

where, $\alpha(t) = \frac{m_s}{2t}$. It is important to note that the planar geometry corresponds to $m_s = 0$, while the cylindrical and spherical geometries are represented by $m_s = 1$ and $m_s = 2$, respectively. Because of the inclusion of the damping term $(R\Psi)$ and the nonplanar term $(\alpha(t)\Psi)$, both Eqs. (2) and (3) do not yield exact analytical solutions. Therefore, the primary goal of this study is to analyze these equations and obtain some approximate analytical (semi-analytical) solutions using a semi-analytical approach. To our knowledge, based on a thorough review, this is the first semi-analytical investigation of these equations. This paper is organized as follows: Section 2 applies the ansatz approach to analyze the dBE (2), and the nBE (3), and to derive the approximate analytical solutions. In section 3, the tanh method is used to obtain an exact shock wave solution to the BE (1). The results and discussion are presented in section 4, and section 5 concludes the investigation. The future work is considered in Section 6.

2. The Ansatz method

In the following subsections, we use the ansatz approach to find approximate analytical solutions for the dBE (2) and the nBE (3). This method proves effective for these types of equations. We begin by assuming that the general approximate analytical solutions to Eqs. (2) and (3) are given by

$$\Psi(x,t) = f(t)\Phi(xg(t), h(t)), \quad (4)$$

where $\tilde{\Phi} \equiv \Phi(xg(t), h(t))$ represents any exact solution to the BE (1), and $(f(t), g(t), h(t))$ are time-dependent functions that denote, respectively, the amplitude, inverted width, and velocity of the structures being studied (damped, nonplanar).

2.1 Approximate analytical solution to the dBE

The main steps of this approach for solving the dBE (2) can be summarized as follows:

- Using Eq. (1), the value of $\frac{\partial \Phi}{\partial t}$ can be determined as follows:

$$\frac{\partial \Phi}{\partial t}\Big|_{\Phi(x,t)\mapsto\tilde{\Phi}} = -A\Phi\frac{\partial \Phi}{\partial x} + B\frac{\partial^2 \Phi}{\partial x^2}. \quad (5)$$

- Substituting the ansatz (4) and Eq. (5) into the dBE (2), we obtain

$$V_1\frac{\partial \tilde{\Phi}}{\partial x} + V_2\tilde{\Phi}\frac{\partial \tilde{\Phi}}{\partial x} + V_3\frac{\partial^2 \tilde{\Phi}}{\partial x^2} + V_4\tilde{\Phi} = 0, \quad (6)$$

with

$$\begin{cases} V_1 = xf(t)g'(t), \\ V_2 = Af(t)\Big(f(t)g(t) - h'(t)\Big), \\ V_3 = Bf(t)\Big(h'(t) - g(t)^2\Big), \\ V_4 = f'(t) + Rf(t). \end{cases} \quad (7)$$

It should be noted that $(f(t), g(t), h(t))$ correspond to the amplitude, inverted width, and velocity of the damped structures, respectively.

- For $V_i = 0 \ \ (i = 2, 3, 4)$, we obtain the following equations

$$f(t)g(t) - h'(t) = 0, \quad (8)$$

$$h'(t) - g(t)^2 = 0, \quad (9)$$

$$f'(t) + Rf(t) = 0. \quad (10)$$

- Solving Eq. (10) by using the initial condition $f(t_0) = 1$, we get

$$f(t) = e^{R(t_0 - t)}. \quad (11)$$

- In order to determine the value of $g(t)$, we first substitute the value of $h'(t)$ from Eq. (9) into Eq. (8), we obtain

$$f(t)g(t) - g(t)^2 = 0, \quad (12)$$

then, we solve the last equation to get

$$g(t) = e^{R(t_0 - t)}. \quad (13)$$

- Solving Eq. (9) with the initial condition $h(t_0) = 0$, we get

$$h(t) = \frac{1}{2R}\Big(1 - e^{2R(t_0 - t)}\Big). \quad (14)$$

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- The approximate analytical solution to the dBE (2) is obtained by inserting the obtained values of $(f(t), g(t), h(t))$ into solution (4)

$$\Psi(x,t) = e^{R(t_0-t)}\Phi\Big[xe^{R(t_0-t)}, \frac{1}{2R}\Big(1-e^{2R(t_0-t)}\Big)\Big]. \quad (15)$$

  The dissipative nonlinear structures described by the dBE (2) like the dissipative shock wave can be studied using this solution.

2.2 Approximate analytical solution to the nBE

The following few points provide a summary of this technique for analyzing the nBE (3):

- Substituting both solution (4) and Eq. (5) into Eq. (3), we get

$$V_1\frac{\partial\tilde{\Phi}}{\partial x} + V_2\tilde{\Phi}\frac{\partial\tilde{\Phi}}{\partial x} + V_3\frac{\partial^2\tilde{\Phi}}{\partial x^2} + V_4\tilde{\Phi} = 0, \quad (16)$$

  with

$$\begin{cases} V_1 = 2txf(t)g'(t), \\ V_2 = 2Atf(t)\Big(f(t)g(t) - h'(t)\Big), \\ V_3 = 2Btf(t)\Big(h'(t) - g(t)^2\Big), \\ V_4 = 2tf'(t) + m_sf(t). \end{cases} \quad (17)$$

  It should be noted that $(f(t), g(t), h(t))$ here indicate the amplitude, inverted width, and velocity of the nonplanar structures, respectively.

- For $V_i = 0 \ \ (i = 2, 3, 4)$, we obtain the following equations

$$f(t)g(t) - h'(t) = 0, \quad (18)$$

$$h'(t) - g(t)^2 = 0, \quad (19)$$

$$2tf'(t) + m_sf(t) = 0. \quad (20)$$

- Solving Eq. (20) using the initial condition $f(t_0) = 1$, we obtain

$$f(t) = T^{\frac{m_s}{2}}, \quad (21)$$

  with $T = t_0/t$.

- substituting the value of $h'(t)$ from Eq. (19) into Eq. (18), and after that solving the obtained equation to get

$$g(t) = T^{\frac{m_s}{2}}. \quad (22)$$

- Utilizing the initial condition $h(t_0) = 0$ to solve Eq. (19), we get

$$h(t) = \frac{t_0}{m_s - 1}\Big(1 - T^{m_s-1}\Big). \quad (23)$$

- Lastly, we obtain the general approximate analytical solution to the nBE (3) by substituting the obtained values of $(f(t), g(t), h(t))$ into solution (4) as follows:

$$\Psi(x,t) = T^{\frac{m_s}{2}}\Phi\Big[xT^{\frac{m_s}{2}}, \frac{t_0}{m_s - 1}\Big(1 - T^{m_s-1}\Big)\Big]. \quad (24)$$

  It should be noticed that the cylindrical case $(m_s = 1)$ cannot be recovered by the derived approximation (24), which only recovers the spherical $(m_s = 2)$ and planar $(m_s = 0)$ cases.

3. Exact shock wave solution to the BE

To investigate the properties of the dissipative waves and the nonplanar waves represented by the dBE (2), and the nBE (3) respectively, it is essential to find the exact solutions for the BE (1). Equation (1) can be solved using the tanh method by following the same procedure used in Ref. [3]. Through this method, a new independent variable is introduced as follows:

$$\begin{cases} \Phi(x,t) = v(\xi), \\ \xi = kx - \lambda t, \end{cases} \quad (25)$$

and let

$$Y = tanh(\xi), \quad (26)$$

where λ denotes the wave velocity and k denotes the wavelength. By substituting Eq. (25) into Eq. (1) and after once integrating, we get

$$-\lambda v + \frac{1}{2}Akv^2 - Bk^2v' = 0. \quad (27)$$

Following the tanh method, the solution to Eq. (1) can be represented in the following form:

$$v(\xi) = \sum_{r=0}^{N} a_rY^r. \quad (28)$$

By equating the nonlinear term v^2 with the highest-order derivative v' in Eq. (27), we find that $N = 1$. Consequently, the solution (28) has the following form

$$v(\xi) = a_0 + a_1Y. \quad (29)$$

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By inserting solution (29) into Eq. (27) and equating the coefficients of Y and Y^0 to zero and by solving these equations, we get

$$a_0 = \frac{\lambda}{Ak}, a_1 = \frac{-2Bk}{A}. \tag{30}$$

Substituting the values of a_0 and a_1 into solution (29), we obtain the shock wave solution to the BE (1)

$$\Phi(x,t) = \frac{\lambda}{Ak} - \frac{2Bk}{A} tanh(kx - \lambda t). \tag{31}$$

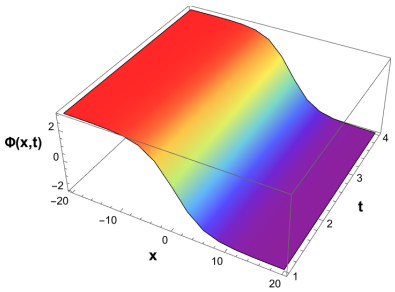

Figure 1: The profile of the exact shock wave solution (31).

4. Results and Discussion

By substituting the shock wave solution (31) into the approximation (15), we obtain the following dissipative shock wave solution to Eq. (2)

$$\Psi(x,t) = e^{R(t_0-t)}\Big[\frac{\lambda}{Ak} - \frac{2Bk}{A} tanh\Big(kxe^{R(t_0-t)} - \lambda \frac{1}{2R}\Big(1 - e^{2R(t_0-t)}\Big)\Big)\Big]. \tag{32}$$

In various scientific fields, this solution can be utilized to investigate the characteristics of the dissipative shock wave described by Eq. (2). Figure 2 shows the profile of the dissipative shock wave approximation (32) for different values of the parameter R. It is observed that as R increases, the amplitude of the dissipative shock wave decreases. A similar trend is observed over time, as demonstrated in Figure 3, where the amplitude of the dissipative shock wave approximation (32) decreases with time.

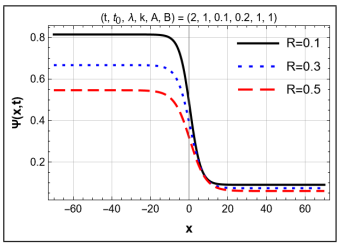

Figure 2: The dissipative shock wave solution (32) profile is presented against various values of R.

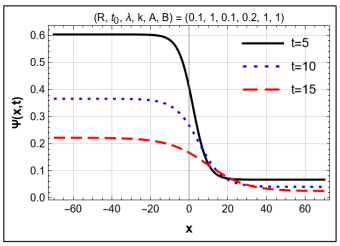

Figure 3: The dissipative shock wave solution (32) profile is presented against various values of time propagation t.

Additionally, the nonplanar (spherical) shock wave solution for the nBE (3) is obtained by substituting the solution (31) into the approximation (24)

$$\Psi(x,t) = T^{\frac{m_s}{2}}\Big[\frac{\lambda}{Ak} - \frac{2Bk}{A} tanh\Big(kxT^{\frac{m_s}{2}} - \lambda \frac{t_0}{m_s - 1}\Big(1 - T^{m_s - 1}\Big)\Big)\Big]. \tag{33}$$

Fig. 4 displays the profile of both the planar and nonplanar (spherical) ShW approximation (33) to the nBE (3). As can be seen, the planar ShW solution $\Psi_{m_s=0}$ has a smaller amplitude than the spherical ShW solution $\Psi_{m_s=2}$, indicating a faster propagation of the spherical ShW compared to the planar one. Additionally, Fig. 5 shows that when $\mid t \mid$ increases, the spherical ShW's amplitude decreases. In the same figure, it's observable that the nonplanar effect has a greater influence at smaller values of $\mid t \mid$, while it becomes less prominent and trends toward the planar case at larger values of $\mid t \mid$. This happens as a result of the additional term $(m_s/2t)$ becoming less significant as $\mid t \mid$ increases.

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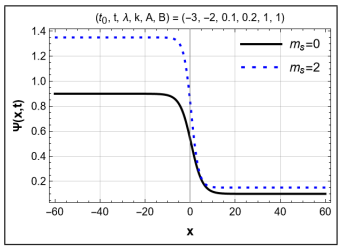

Figure 4: The planar and nonplanar (spherica) shock wave solution (33) profile is presented.

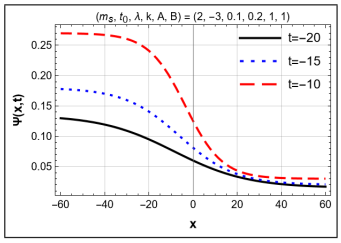

Figure 5: The nonplanar (spherica) shock wave solution (33) profile is presented against various values of time propagation t.

5. Conclusion

In this study, we have analyzed the damped Burgers equation (dBE) (2) and the nonplanar Burgers equation (nBE) (3) to find approximate analytical solutions based on a suitable hypothesis. The traveling wave solutions for the dBE (2) and the nBE (3) were explored using the derived solutions. Additionally, the exact shock wave (ShW) solution to the BE (1) was obtained using the tanh method. This solution was then used to investigate the dissipative ShW and the nonplanar ShW, represented by Eq. (2) and Eq. (3), respectively. It was found that the amplitudes of the dissipative ShW decrease as R increases. Furthermore, as $\mid t \mid$ increases, the amplitude of the spherical ShW also diminishes. Also, the amplitude of the planar ShW solution is smaller than that of the spherical ShW solution. These solutions could be useful for researchers studying a range of complex nonlinear phenomena in various scientific disciplines, including fluid mechanics, ocean waves, and plasma physics.

6. Future Work

This technique can be applied to various nonintegrable differential equations to provide useful approximations. By introducing a periodic external force to the damped Burgers equation, one can derive the forced damped Burgers equation. This equation is valuable for describing a wide range of complex natural phenomena across different scientific fields. Since the forced damped Burgers equation cannot be solved exactly, various numerical or approximation methods must be used. The same technique employed here, along with the details in Ref. [28], can be used to study the effect of this force and obtain some approximations.

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Best Practices in Science Teacher use of Simulations for POE Inquiry-Based Learning

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Abstract

This paper reports on South African Natural Sciences teachers' use of interactive computer simulations when applying the predict-observe-explain approach for inquiry-based learning. Classroom observation data were collected from 10 teachers when teaching electricity. An analysis of lesson transcripts generated the following themes: Learners engaged collaboratively; Division of labour; Teacher scaffolding; Whole class discussion. These themes are elaborated upon. The implication of the results is that simulations do offer a viable option for inquiry-based learning, especially at schools where physical resources are not readily available. A further finding is that while the POE simulated inquiries did shift autonomy to learners, teachers still played a pivotal role in scaffolding learners during all three stages.

Keywords: simulations; inquiry-based learning; Natural Sciences

1. Introduction

Despite widespread use of computers and network technologies in many areas of our lives, and the use of technology by scientists across many disciplines, such technology has often been under-utilised and poorly integrated in science education [1]. In South Africa, the imperative for the integration of information and communication technology (ICT) in learning is expressed through the South African White paper on e-Learning. The White paper underscore the South African governments intention to adopt a multi-pronged strategy for the gradual integration of ICTs at all levels of the education and training system [2].

Inquiry-based learning is a key curriculum goal in the South African school science curriculum [3]. Although the value of inquiry-based teaching and learning is recognized, the implementation of such a pedagogical approach is constrained due to a lack of physical resources at schools. Due to the legacy of the Apartheid education system there is still unequal distribution of resources with the great majority of schools not having apparatus and chemicals for students to pursue inquiry-based learning. The advent of simulations presents a means by which learners even at disadvantaged schools can acquire inquiry experiences in learning science, and also give expression to the country's White paper on e-Learning. The effectiveness of simulations is informed by the pedagogical approach that is applied [4]. In trying to understand this interaction between pedagogy and technology within a simulated inquiry environment, this research was guided by the following question:

What are the best practices of teachers in using simulations for predict-observe-explain (POE) inquiry learning?

2. Literature review

Computer simulations are computer-generated dynamic models that present theoretical or simplified models of real-world components, phenomena, or processes [5]. Computer simulations (e.g., the PhET sims at http://phet.colorado.edu), have become an integral part of science teaching. These simulations are useful in that they allow learners to visualise aspects of science and to manipulate variables in multiple ways and, in so doing, observe changes as a result of these interactions [6]. The reported benefits of using simulations in science teaching include that it the saves time; experimental variables can be easily manipulated, allowing for stating and testing hypotheses; and it provides ways to support understanding with varying representations, such as diagrams and graphs [7], [8]. Computer simulation can allow learners to observe and comprehend abstract and complex concepts by aiding their visualization [9] [10].

One of the pedagogical approaches to inquiry that have been exploited is predict-observe-explain (POE) [11]. POE is a constructivist learning strategy, where students construct their knowledge by reasoning between what they have learned before and the new information they have acquired later [12]. During the predict stage, students are asked to independently write their prediction of what will happen. In the observe stage, they carry out the demonstration, focus

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on the observation and write down what they observed. In explain, they amend or add to their explanation to take account of the observation, after students have committed their explanations to paper, discuss their ideas together. Previous research has found that the POE strategy is effective in science teaching and learning and supports students in forming concepts, improving motivation, attitude and interest in science [13], [14].

3. Method

In this research 10 Natural Sciences (grade 8-9) teachers were observed teaching a lesson where a PhET simulation was employed in teaching POE inquiry. The inquiry was on electrical circuits. The lessons were video-recorded and later the audio was transcribed for analysis. The lesson transcripts coded thematically in order to generate themes on the best practices of teachers in the use of simulations. Pseudonyms were used in transcribing the exchanges between students and teachers. The goal of a thematic analysis is to identify patterns in the data that are important, and use these patterns to formulate themes addressing the research [15].

4. Results

In addressing the research, the following themes were generated:

Theme 1: Learners engaged collaboratively

Learners were randomly places in groups of 3-4 to conduct the simulated inquiry. This allowed for engagement on the phenomenon. Learners compared their predictions and challenged each other on the reasoning behind the prediction. For example, this is evident in the following exchange that took place between two learners who were engaged in a POE activity on the effect of adding light bulbs in a circuit on the brightness of the bulbs:

Somzi: When you put more light bulbs alongside they must stay the same brightness.

Tulane: No, it cannot happen like that because it will become dimmer with more of the lights.

Somzi: No, you do not understand how they are connected.

Tulane: But each is using energy and the energy is being shared.

Eventually the above dispute was resolved when the simulated experiment was done conducted.

Theme 2: Division of labour

During the simulated inquiry, each learner in the group was assigned a particular role. One learner manipulated the controls, two learners took readings, and made notes on the observations, while the fourth learner facilitated a discussion on the results at the end of the inquiry.

For example, in the inquiry Tulane was responsible for manipulating variables using the simulations. He changed the circuit by adding more light bulbs in parallel. Sfiso and Somzi took ammeter readings and also made notes on their observations of the brightness of the light bulbs. After the results had been recorded, Patricia facilitated a discussion so the results could be explained.

Theme 3: Teacher scaffolding

The teachers played a key role in scaffolding the groups of learners throughout the inquiry. They asked probing questions to ensure that learners were engaging not just procedurally but also conceptually with the phenomenon. The following exchange between a teacher (Mr Ndlovu) and his learners shows how he supported them in making the connection between the phenomenon they observed and their conceptualization thereof. Again, the example on the simulation using the light bulb is used for this purpose, but with another group that comprised of Neo, Susan, John and Mia. This was done when he engaged with groups:

Mr Ndlovu: I see you are making good progress. Now let's see if you know what you are seeing in the simulation. How are the bulbs connected?

Neo: Next to each other

Mr Ndlovu: How can we describe it more scientifically? Yes, Mia

Mia: I think we say parallel.

Mr Ndlovu: Good, remember to use correct scientific terms. Now, let's go back to the simulation. What is happening to the ammeter readings as you add more bulbs in parallel?

Tulane: It goes higher.

Mr Ndlovu: Why?

Susan: Sir, I am not sure, but maybe more pathways for current.

Mr Ndlovu: You are on the right track, now think in terms of resistance in the circuit.

The above interaction continued until the learners were able to arrive at an explanation that the total resistance in the circuit decreased and this caused the current strength to increase.

Theme 4: Whole class discussion

After the groups had concluded the inquiry, the

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teacher facilitated a class discussion in which the groups shared their results. Here the teacher asked learners to clarify their explanation of the observations. An example of this is an inquiry activity where learners investigated the electrical conductivity of different materials. After the groups had engaged with the simulation, the teacher facilitated a whole class discussion where he asked learners to explain the difference in conductivity of materials. With the prompting of the teacher, the learners were able to formulate scientific explanations of the phenomenon they had observed.

5. Conclusion

This research demonstrated the potential of simulations as a cognitive tool for inquiry-based science learning. There was evidence to suggest simulations effectively supported the POE pedagogical approach to doing inquiry, with all three stages being addressed. While the POE simulation inquiries did shift autonomy to learners, the teachers still played a pivotal role in scaffolding learners during all three stages. Previous research points to learner struggling to make the connection between the 'domain of observables' and the 'domain of ideas' and so the teacher needs to scaffold then in this regard [16]. The research uncovered good practices in this regard where teachers asked learners to clarify their thinking, probed them on their reasoning and offered suggestions where necessary. It became clear that despite the interactivity that is afforded by simulations, learners still needed support in conceptualising phenomena.

While the simulation cannot fully replicate the inherent 'messiness' of laboratory inquiry—such as the unpredictability of real-world experiments, the hands-on manipulation of materials, and the immediate problem-solving that arises from such activities, the results do suggest that when used effectively, simulations can still serve as a valuable complement to traditional laboratory work. This is particularly relevant in contexts like South Africa, where a large portion of schools lack access to the necessary resources and infrastructure for conducting practical experiments. In such environments, simulations present an opportunity to bridge the gap in science education. When teachers are well-prepared and provide appropriate scaffolding such as guiding students through the setup of virtual experiments, interpreting results, and encouraging critical thinking, simulations can foster inquiry-based learning. This method allows students to explore scientific concepts in an interactive, engaging manner, without the constraints of limited resources. Given the widespread challenges faced by schools in accessing traditional laboratory materials, simulations represent a viable alternative that can help ensure all students have access to high-quality science education and the opportunity to develop essential scientific inquiry skills. Ultimately, simulations can enrich the learning experience, making it more accessible, equitable, and aligned with modern pedagogical approaches to inquiry-based learning.

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Geometry and Astronomy in Primary School: Observations, Measurements, Models and Geometric Entities

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Abstract

The structured approach to astronomical observations holds significant potential for enriching our comprehension of Earth's position in the Universe and fostering the development of spatial thinking and geometry. Spatial thinking, a central focus of our research endeavour, is intricately connected to inherent cognitive abilities that manifest early in human development. Young children exhibit an early capacity to process and relate spatial information pertaining to objects, shapes, distances, and positions. Our educational program, tailored for 9-year-old students, integrates astronomical observations conducted through unaided visual inspection and purpose-designed instruments employing readily available materials. The activities are centred on luminous phenomena, the optics of vision, the genesis and geometric principles of shadows, the computation and measurement of remote objects, and the examination of the celestial sphere. These activities immerse the students in a pedagogical experience that empowers them to adeptly delve into concepts of plane geometry, commencing with a foundational comprehension of space.

Keywords: Spatial Skills, Astronomy, Geometry

1. Introduction

The initial encounter a child has with space is through their own body. After becoming familiar with it, they assess motor skills concerning their surroundings. As a result, they utilise their body to explore the space around them. Subsequently, the child starts to establish a system of internal representations essential for orientation, enabling them to employ an egocentric system to manage their position in space and an allocentric system as reference points. This intricate set of skills forms the basis of learning and is called visual-spatial skills [1]. Understanding the functions of one's body is crucial for experiencing, attributing meaning to reality, and learning [2]. Initially, the child explores one's body as the primary space they are acquainted with. With motor skills development, they also explore the surrounding space, fostering an understanding of one's body within the environment.

Apprehending space through movement and processing spatial information is crucial for developing the capacity to form internal representations of space required for orientation. These skills encompass visual-spatial exploration, spatial perception, spatial thinking, visual-spatial working memory, and visual index-based construction skills. Spatial perception involves the three-dimensional mental representation of the environment arising from the perception of depth and movement. This process necessitates mentally manipulating representations of objects and spaces, such as rotations, translations, and perspective changes [3]. These cognitive processes are linked to visuospatial working memory, allowing the retention and processing of visual and spatial information to memorise spatial relationships between landmarks accurately. Visual-spatial skills are the foundational elements for developing mental representations essential for comprehending and navigating the world around us .

Visual-constructive and praxis-constructive skills, which are involved in developing internal representations of objects and spaces, require motor coordination, praxis organisation, and graphic skills [5]. These visuospatial skills are not just theoretical concepts but are fundamental for our effective interaction with the world around us. They aid in developing mental representations and spatial coding strategies during movement [6-7]. Mental representations are subsequently formed in the child based on spatial coordinates [8]. Recent research has demonstrated that contrary to Piaget's view, children can encode spatial information about objects, shapes, distances, positions, and spatial relationships very early. Spatial thinking, akin to numerical thinking, thus seems grounded in innate capacities that emerge early in life [9 - 14]. While visual-spatial abilities are not exclusive to humans, these abilities are augmented in humans through symbolic systems. Even in the preschool age, we have a graphical language that

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assists in developing diverse representations of space, such as maps and diagrams, and in mentally moving and transforming objects in space. Therefore, adults must understand how to teach geometry to enable children to master those fundamental concepts often perceived as challenging progressively, thereby fostering the development of specific and more sophisticated skills based on those already present.

2. Teaching and learning of geometry

The ideas espoused by Piaget and Inhelder (1960), as delineated in their work "Child's Conception Of Geometry" [15], have significantly shaped geometry teaching. They clearly distinguished between "perceptual" space, the space perceived by the child through sensorimotor activity, and "representative" space, referring to the space a child can represent using language. Building upon this, the van Hiele couple 1986 proposed an evolutionary theory in learning-teaching that differentiated between geometry as the conceptualisation of space and as a formal theory [16]. Their teaching model has undergone several refinements and is now foundational to numerous curricular proposals, particularly in the United States.

Emma Castelnuovo [17-18] also contributed significantly to geometry teaching by developing experiences and teaching aids that facilitate the development of the geometric intuition necessary for gradually understanding the formal geometry system. Her project allows students to define geometric entities based on corresponding natural objects and compare particular cases with borderline cases, thereby familiarising themselves with the search for the invariant elements that underpin construction in different geometries, such as that on a spherical surface.

The experimentation described in the following section was conceived within the scope of these influential references. Our research group has engaged with them from a phenomenological perspective for years, focusing on geometric modeling and constructing mathematical concepts and skills [19-20].

3. Experimentation

The research encompassed a cohort of 22 elementary school students, 10 male and 12 female students from the fourth-grade level. The primary school teacher conducted the investigation as part of her specialised pedagogical thesis over approximately 30 hours. Preceding the activities outlined in this research, conducted during the final four months of the academic year, the educator had previously implemented the prescribed curriculum, which involved introducing the concept of angles and addressing problems related to the perimeters of plane figures. The students encountered considerable challenges in comprehending the abstract geometric concepts. The experimental study, deeply practical in nature, commenced with an emphasis on the visual process, highlighting the significance of primary and secondary sources of light and light detectors, particularly the human eye (see Figure 1).

Figure 1. The mechanism of vision, the rectilinear propagation of light, observing near and far

The students were instructed about the emission of primary radiation from light sources such as the Sun and torches and the subsequent emission of secondary radiation by objects, creating a visual perception through chains of sources.

Figure 2. Shadows, Parallel and Divergent Rays "The gnomon" and the motion of the Sun

The activities were designed to provide real-world applications of the concepts. They were conducted outdoors under direct sunlight, diffused light, and within the classroom using torches (see Figure 2).

A key aspect of the study involved observing shadows in sunlight and demonstrating the parallelism between rays and their divergence by working with point sources in the classroom. Through measurements and estimations involving triangulation methods, the relationship between the dimensions of "obscuring" and "obscured" objects was verified. Additionally, the study identified visual angles by reconstructing angles with arms and hinged rods (see Figure 3). angles by reconstructing angles with arms and hinged rods (see Figure 3).

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Figure 3. Look and Observe how we estimate the distances and sizes of near and far objects

Reconstruction of the angle of view with a protractor made with two rods.

Figure 4. The children participated in constructing the parallel world map

The sphere was oriented so that the observer's position was the highest, and the sphere's axis was tilted by about 40°. The final activity involved working with a parallel world map in the schoolyard, which was oriented similarly to the Earth in space (see Figure 4). This activity allowed for real-time observations of phenomena such as day and night, the position of the Sun, and shadow direction, employing a compass and a structure to represent the terrestrial sphere. A diagram was created to represent the correlations between the topics covered and the development of practical skills, aiming to facilitate a comprehensive understanding of the educational path.

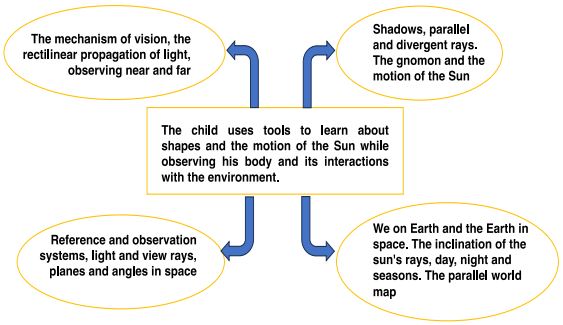

Figure 5. A map of the activities carried out in the 30 hours of experimentation

The activities are strongly interconnected with integrations between astronomy and geometry. The last activity on the parallel world map made it possible to revisit and consolidate what was done before. These practical skills were intended to facilitate the acquisition of concepts and methods of observation and measurement, fostering confidence in students' ability to apply their knowledge effectively.

A map has been created to help grasp the correlations between the topics covered and the attention to developing experimental skills that allow the acquisition of concepts and methods of observation and measurement (see Figure 5).

4. Evaluation and Results

The class teacher conducted the evaluation process, which was informed by specific criteria shared within the research group. The process encompassed quantitative and qualitative aspects, focusing on analysing quantitative data for each student's final assessment in mathematics and science. The evaluation materials utilised in this study were comprehensive, including photos, videos, audio recordings captured by the teacher and a collaborator, and technical and iconic drawings, graphs, and tables created by the students for each activity. This comprehensive approach ensured that all aspects of student performance were considered.

The evaluation grid was developed considering various skills, including collaborating and coordinating within groups, verbally articulating thoughts, communicating observation methods, and grasping astronomy and geometry concepts. The assessment of learning outcomes in mathematics and science was presented at the end-of-year teachers' conference, where colleagues from diverse disciplines acknowledged the interdisciplinary nature of the approach, highlighting its impact on language and vocabulary enrichment among students.

The children's overall performance was noteworthy, with the majority surpassing the minimum competency level of 22 children, 10 met the minimum requirements, while 12 were rated excellent. This outcome is particularly encouraging, especially considering the introduction of non-standard topics in the curriculum. Additionally, the qualitative research conducted and documented for each activity in case studies and the thesis work constitutes a valuable contribution to the field. The documentation is in the research group site www.les.unina.it.

5. Discussion

The geometry study in our country's schools typically begins with identifying plane figures such as triangles, squares, rectangles, and circles, then examining their properties and related problems [21].

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However, due to solid geometry's perceived complexity, it is sometimes overlooked. This perpetuates a standard error in the teaching of mathematics and physics. This error lies in failing to engage students in modeling abstract entities such as points, lines, planes, geometric figures, material points, and rigid bodies in physics. If we do not clearly explain these models, they do not facilitate understanding the relationship between real objects and abstract entities. This oversight has significant consequences, leading to a lack of appreciation for the cultural value of mathematical and physical theories, which are dogmatically present. It is crucial to recognise that everything in a child's environment has three dimensions, from their games to the furnishings in their classroom and the pen in their hand. Objects such as sticks, sheets of paper, edges, vertices of furniture, and the tip of a pencil inhabit the three-dimensional space of the classroom, either static or in motion.

We possess a rich vocabulary to describe positions, trajectories, and speed in space, and we must pay careful attention to the projections required for drawing—various experiences and research support starting with spatial concepts when teaching geometry in schools.

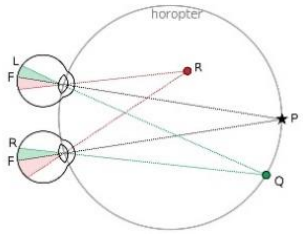

Figure 6. Binocular vision. The triangles we solve are based on the distance between the two eyes

The process of intersecting space with planes, working with projections, and transitioning to Euclidean plane geometry is akin to the mechanism of vision. Binocular vision (see Figure 6), which relies on the slightly different images each eye receives, forms the basis of depth perception through binocular disparity. Our perception of similarity involving angles and triangles is intrinsically tied to our brain and physiology, leading to the natural imposition of Euclidean geometry on our understanding. Our binocular vision dictates the notion of a triangle, with the short side representing the distance between the two eyes. At the same time, the brain processes the other two sides based on the distance of the observed object. From this innate understanding, we developed geometry by dividing the terrain and learned to estimate distances to distant stars using the parallax method.

Literature suggests that one of the challenges primary school children encounter in geometry is understanding the concept of angles [22-23]. This concept is inherently complex and can be interpreted in multiple ways. The first meaning, originating from Euclid and later expounded by Proclus, defines an angle as the mutual inclination between two lines intersecting at a common point [24]. Another meaning, introduced in the eighteenth century, views an angle as part of a plane between two half-lines with the same origin. The dynamic interpretation conceives an angle as a rotation, while another perspective sees it as a change of direction. It is important to note that focusing on a single interpretation is insufficient for meaningful learning, as each interpretation offers its insights. While the static meaning emphasises the concept of boundlessness and the existence of two complementary angles in a plane, it alone does not capture all aspects of an angle, which can be better understood from a dynamic perspective.

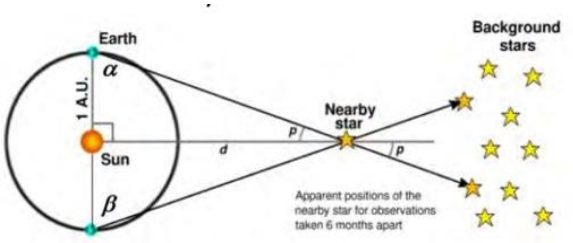

Figure 7. The parallax method is an "extension" of binocular vision

One common challenge is the linguistic aspect of mathematical concepts [25]. The everyday meaning of the word "angle" (tip, edge) can lead to confusion. Consequently, it is essential to incorporate dynamic interpretations of angles and their relationship with astronomy into the teaching curriculum. The historical link between geometry and astronomy, particularly the critical notion of the visual angle, as elucidated in Euclid's optics, can provide valuable insights and enhance the teaching of these concepts [26]. Euclid's work is founded on the concept of visual angle, demonstrating that the apparent dimensions of an object in retreat vary according to the visual angle. This historical context can provide a solid foundation for teachers and educators to explore the relationship between geometry and astronomy with greater depth and purpose.

The study presented above sheds light on the innate nature of geometric reasoning, particularly in individuals lacking formal exposure to mathematical concepts. Pica and Dehaene's research among the Mundurucu tribe unveiled remarkable geometric abilities without explicit mathematical instruction [27]. Our study, involving adults and children from the tribe, utilised dialogues and tasks to ascertain geometric comprehension (see Figure 8). Notably,

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Figure 8. Adults and children of the Munduruc grappling with the concept of angle

despite the absence of specific geometric terminology in their language, the Mundurucu individuals demonstrated proficiency in recognising geometric figures. Moreover, their aptitude extended to activities on a spherical surface, surpassing the performance of individuals from the Western world. This underscores the limitations of conventional pedagogical approaches to Euclidean geometry and emphasises the value of embodied cognition in learning (see Figure 9).

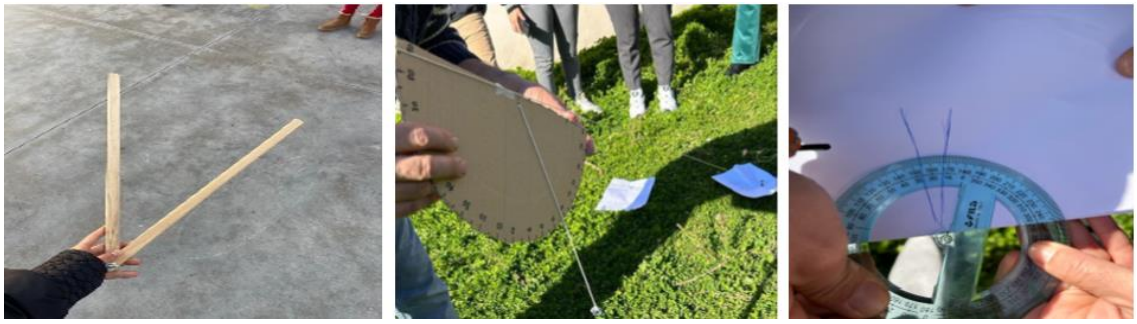

Figure 9. Starting from the visual angle and using tools for a dynamic definition of the angle, we then get to work with the protractor in the study of plane geometry

Finally, we think that by centring the learning process on bodily experiences and sensorimotor activities, it is possible to advance comprehension and overcome challenges in geometry teaching, laying the groundwork for understanding fundamental astronomical concepts.

6. Conclusion

Children need to acquire a unified vision of scientific phenomena by learning to use their body, artifacts and measuring instruments, with targeted strategies to share methods of investigation and interpretative models.

The experience we have described was based on a strong integration between topics covered in geography, astronomy and physics with the possibility of building crucial concepts of mathematics and in particular geometry. The development of visual-motor coordination based on visual information from the environment shaped geometric entities. It proved to be of fundamental importance to build and share meanings related to abstract concepts whose usefulness was manifested in the activity of prediction and measurement. Among these, the angle that with the "rays of view" and the support of wires and long sticks allowed us to estimate and evaluate distances of objects even very far away.

The educational path developed continuously up to the construction and work with the parallel globe indicating that by specifically strengthening the skills related to spatial orientation it is possible to deal with even complex phenomena thanks to the gradual control and development of geometry concepts. The outdoor activity for direct observation also involved children who are usually less motivated in studying and who then showed greater interest also in study activities in class. The authors are happy to interact with educators, researchers and teachers to provide insights and share similar experiences.

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Session 5: Learning and Teaching Methodologies

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Reflections on a Hybrid Instructional Design Model for Legal Education in a Blended and Flipped Learning Environment

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Abstract

The Covid-19 underscored the importance of teaching academics across the globe to reevaluate their courses' instructional design as well as their own teaching and learning pedagogy so that they remain responsive to meet the current demands of their students and the university where they teach. In the University of the Free State's (UFS) context, this meant that the instructional redesign of the courses I teach must fit within the institution's broader strategy which prescribes a blended learning approach. It therefore required careful planning and the investigation of several instructional design models to identify which is best suited for the task. This paper examines my experience in redesigning a foundational module within the extended LLB programme at the UFS, particularly focusing on addressing the unique characteristics and preferences of post-Covid South African law students. While instructional design methods can function in isolation, integrating them can lead to more robust and effective courses that better meet the needs of learners. The key is to select and combine methods purposefully based on the specific context and goals of the course. Accordingly, this paper aims to reflect on the hybrid instructional design model employed to create a flipped learning approach within a blended learning framework.

This paper intends to illustrate how I integrated two main instructional design models, namely ADDIE and Fink's integrated course design (ICD) model, to enhance the instructional design process and address the specific needs of South African law students. The findings, which are mainly based on student participation in the Learner Management System (LMS) activities and the module's pass rate, will showcase that this hybrid approach fostered an integrated and sequential learning experience that assisted students in succeeding in the module. Reference will be made to the development of crucial graduate attributes necessary for a 21st century law student. This, however, forms part of an ongoing Scholarship of Teaching and Learning (SoTL) project that warrants further research and will only be alluded to in this paper.

I will use Driscoll's 'what?' cycle of reflection to guide you through my course redesign process by explaining my analysis of the strengths and weaknesses of the ADDIE model and the necessity for integrating it with Fink's ICD model. It is important to explain this process since both instructional design models are not without criticism. For example, the ADDIE model is hailed to be too linear and not as iterative as other models and is not always responsive enough to the changing needs and expectations of the students and stakeholders. While I do not argue that instructional design methods cannot function in isolation, I do opine that integrating them can lead to more robust and effective courses that better meet the student's needs. The key is to select and combine elements of the methods thoughtfully based on the specific context and goals of the overall redesign of the course. I therefore leveraged the components of Fink's ICD model to adapt the implementation of the ADDIE model, thereby enriching the instructional design process. Using Driscoll's 'what?' cycle of reflection, I aim to explain how I established a new and what I perceive as an innovative approach to making a flipped learning environment 'SASSI', which is characterised by scaffolded, active, sequenced, supportive, and integrated learning experiences. Given the UFS's unique context, I assert that a 'flipped' blended approach, such as the one

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presented in this paper, fosters a dynamic and equal transformative learning experience for all foundational module students and creates a flexible learning environment that prioritises learning-centered teaching, surpassing mere student-centeredness.

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Re-Imagining Climate Change Education: A Latourian Approach to Engaging Students in the Anthropocene

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Abstract

We draw on the work of Bruno Latour in his book "Down to Earth: Politics in the New Climatic Regime" [1] to re-imagine climate change education in K-12 science teaching and learning. Our goal here is to rethink how it is that we are engaging our students with the goal of making climate change education more nuanced, local, situated, and entangled so that they may come to collective responsibility from where they are. We engage in our Latourian inquiry of, "How do students' descriptions of their dwelling place up close and at the local level create geographies that foster their understanding of the shared, inhabitable Earth and imagine an alternative way of belonging to the Earth?".

1. Introduction

Latour describes the political and philosophical challenges in the new Anthropocene proper to a time defined by environmental and socio-economic crisis. Latour argues that discourse surrounding climate change is organized around an axis that goes from investment in local values and knowledge to a hope in globalization. Shifting from a local to a global perspective ought to be inclusive of multiplying viewpoints of different beings, cultures, phenomena, organisms, and people. However, globalization today seems to be represented by a single vision, proposed by a few elite individuals, and dismantling the ideology of Earth shared by all. Consequently, the ideals of modernity are turning back to the protection of national and ethnic borders, raising issues of gender, race, class, religion, etc.

2. Frameworks

Latour emphasizes the necessity of defining a dwelling place on which terrestrials depend for their survival as well as asking the difficult question of what other terrestrials also depend on it. A dwelling place from the orientation of engendering would encompass all the agents and actors that compose it all with their own trajectories, interests, and agencies. To this end, we re-imagine K-12 climate change education by applying Latour's simple suggestion of generating alternative descriptions of where we would like to land and with whom we agree to share such dwelling place. Rather than the traditional debate or structured controversy or crisis-based approach in climate change education [2], redescription and "re-turning" [3] of a dwelling place can become a vehicle to foster students' critical inquiry to climate change.

3. Data sources

Materials and artifacts were produced through the encounters, entanglements and embodied relationalities with other actors. We applied ethnographically informed methods of field notes to describe and document in detail the interactions that resonated with us in the classroom. In our field notes, we generated glowing data [4] that included direct quotes, descriptions of the interactions, theoretical musings to guide our thinking, interpretations, and sense-making, as we were writing-analyzing the encounters.

4. Methods for Analysis

In the conventional logic of doing research as we know it, we are given an insurmountable task of representing our data. We trouble this representational and methodological orthodoxy [5] such that we can think creatively about who we are becoming [3] through intra-action and entanglement with other entities in this more-than-human world [6]. Once we engaged in our inquiries and employed writing-analyzing-reading with theories, we were then tasked with representing these encounters.

One way to enact this endeavor is to take up the practice of poetic juxtaposition detailed by Rhianna [7]. Poetic juxtapositions are made by layering pieces of qualitative data, in this case exuberant words of students, and memories, and analytic memos [8] of the teacher, with excerpts from theory texts, and sometimes everyday popular culture texts, in an analytical process that results in a poetic form with the goal of highlighting both theory and data to enrich appreciation and reveal how they relate to one another [9].

 ISBN: 978-1-913572-73-0

5. Re-Imagining Climate Change Education: A Latourian Approach to Engaging Students in the Anthropocene

We share our poetic juxtapositions of our students' descriptions of their dwelling place and thus their geographies as a way to empirically demonstrate how we brought the politics of climate change down to where these issues mattered to the students at the local level. In doing so, we are able to foster a shared understanding of what it means to co-inhabit the Earth more responsibly and ethically and to take action to advocate for the Earth that is shared by all.

6. Significance

Issues of climate change and its politics are either seen everywhere or ignored entirely. What we aim to accomplish by applying Latour's redescription of a dwelling place is to re-imagine a new frame of reference for our youth and science teachers of today to engage in dialogues about climate change in different way thereby, bringing the politics of climate change education back down to Earth. In this session we will elaborate on the following learnings as we re-think climate change education as a tool to help students develop a shared understanding of the Earth for all: First, climate change is an issue that impacts everything on the Earth and has real implications for human rights, public health, and socioeconomic equity. Second, climate change education goals should not merely increase students' scientific literacy but be ethically entangled to foster a sense of belonging and co-inhabiting the Earth more ethically and responsibly. Third, situating generations within the Anthropocene is important in distinguishing and entangling today's youths and children and the adults or the people who have destroyed the Earth. Lastly, material entanglements in mapping students' geographies bring the politics of climate change down to Earth.

7. Conclusions

Our hope is that we were able to respond to Latour's call of bringing politics of climate change back down to Earth and illustrate where these issues matter in the lives of the students. By re-framing our survival that is dependent on each other, we hope to foster an understanding that we are terrestrials that are all entangled and in a web of relations that cannot privilege one being over the other. Thus, we end this paper with a question, where would you like to land and what geo-histories would you be willing to leave as inheritance to the next generation of all beings who have the right to live well?

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Evaluation of University Training by Undergraduate Students of Education Degrees

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Abstract

The evaluation of the university experience of students is an increasingly frequent field of analysis among the academic community, as students represent one of the most important groups in universities and it is essential to know their opinion and satisfaction. In this sense, the aim of this study is to analyze the opinion of undergraduate students regarding their education according to three comparison groups: graduates, students and drop-outs. For it, a study was carried out at the University of Granada (Spain). A total of 292 students participated (82 female and 210 male), of whom 123 were graduates, 98 were still students and 71 were drop-outs. After the application of three questionnaires, it was found that the three groups of participants coincided in valuing especially characteristic dimensions of the formal teaching-learning scenario in the university experience. Different implications in the university context are highlighted as well as future lines of research.

1. Introduction

The concept of quality in higher education in Europe can be conceived from a multi-paradigmatic and multidimensional perspective [1]. In this direction, different dimensions linked to the quality of education are identified, such as resources, achievement of objectives and user satisfaction [2, 3]. In this sense, in relation to the assessment and satisfaction of students and graduates with the quality of their university studies, a great deal of research has been carried out, identifying the aspects that favor or hinder the achievement of their objectives at a professional and personal level [4]. The results obtained in these studies show that the formative experience of students in their interaction with the university can be explained through various factors, such as academic integration, the progress of the feeling of belonging to the university institution, and vocation [5, 6].

Although it is important to know the satisfaction of university students in general, it is even more important for future teachers who are being trained, since they will be in charge of training future generations in schools. In the field of future teacher training, research has focused on questions about the assessment of teaching practices throughout their training, the type of learning strategies of students, or their satisfaction with tutorial attention [7, 8]. Furthermore, studies have been carried out on graduates who carry out their teaching activity [9], but focused on determining the assessment of their activity according to the type of work center, and not in relation to the quality of their university and training experience.

Moreover, the drop-out rate in higher education in Spain is higher than in the European Union [10]. Therefore, it is important to analyze satisfaction with the training received in students who drop out of their studies.

According to research on the university experience, in addition to the social and academic integration that students experience, both peers and teachers are essential variables to consider in order to achieve an adequate adaptation of students, both when entering and remaining at university [11, 12]. Thus, the main objective of this study is to analyze the assessment that undergraduate students (graduates, students, and dropouts) of degrees in Education make about the academic training received.

2. Method

2.1. Participants

A total of 292 students from a Spanish university (the University of Granada, Faculty of Education and Sport Sciences in Melilla) participated in the study, of whom, 123 were graduates, 98 were studying for a degree and 71 had dropped out without completing their studies. Table 1 shows their main characteristics in terms of gender, age and Bachelor Degree.

2.2. Instruments

Three questionnaires were designed for students - graduates, undergraduates and dropouts [4]. The questionnaires were structured in the following sections: socio-demographic data (gender, age

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Table 1. Description of the undergraduate students

Variables		Graduates	Students	Dropouts
Gender	Male	33 (26.83%)	19 (19.39%)	30 (42.25%)
	Female	90 (73.17%)	79 (80.61%)	41 (57.75%)
Age	Minimum-Maximum	24-29	19-59	20-50
	Mean (SD)	26.50 (1.36)	25.11 (5.92)	26.13 (4.79)
Bachelor's degree	Early Childhood Education	30 (24.39%)	22 (22.45%)	19 (26.76%)
	Primary Education	57 (46.34%)	42 (42.86%)	35 (49.30%)
	Social Education	36 (29.27%)	34 (34.69%)	17 (23.94%)

cultural group, etc.) and academic data (route of access to undergraduate studies, undergraduate degree, etc.); Block I, undergraduate university experience; Block II, postgraduate university experience; Block III, work experience; Block IV, suitability of work for the studies undertaken; and Block V, probability of studying the same degree. The types of responses offered were 4-point Likert-type responses, dichotomous responses (Yes or No), multiple-choice responses, as well as some open-ended responses.

The content was validated using the expert judgment technique [13]. Seven university researchers participated, and inter-judge concordance was established. Reliability, calculated using Cronbach's alpha internal consistency index, was 0.78, 0.75 and 0.72 for each of the three questionnaires. Given that the recommended reliability is at least 0.70 [14], it is considered adequate. The present study is based on the first content block of the questionnaire, i.e. the undergraduate university experience according to the student group (graduates, students, drop-outs).

2.3. Procedure

2.3.1. For data collection. A request was made to the General Secretary's Office of the participating university for the database of students in the last 8 years of the Bachelor's Degrees in Early Childhood Education, Primary Education and Social Education, in order to have this information available. Likewise, two procedures were used to collect information (one on-line and the other face-to-face). On the one hand, three Google Docs templates were created, one for each student questionnaire, and links were sent by e-mail to the list of all students. On the other hand, the questionnaires were administered in person, with two collaborators who administered the corresponding questionnaires in each case, both in the classroom and in the students' homes.

2.3.2. For data analysis. Data were analyzed with the statistical software IBM SPSS Statistics version 25. Firstly, the normality of the data was determined in the case of the questionnaires for students using the Kolmogorov-Smirnov test. Significance values of $p < 0.05$ were obtained, so non-parametric tests were considered for the statistical analysis [15].

Secondly, the Kruskal-Wallis H test for K independent samples was used for data analysis when analyzing responses according to student group (graduate, student and dropout).

3. Results

Participants in all three sectors were asked to rate the academic training received during their undergraduate studies from 1 to 4 points, with 1 = Inadequate and 4 = Adequate (see Table 2). Significant differences by student group are also evident.

Table 2. Evaluation of the academic training received during undergraduate studies

Aspects of the degree	Graduates		Students		Dropouts		Chi^2	p
	M	DT	M	DT	M	DT		
Academic counselling and guidance, in general	2.78	0.67	2.73	0.84	2.58	0.80	4.171	0.124
Syllabus	2.82	0.70	2.63	0.76	2.51	0.67	10.781**	0.005
Theoretical training	2.87	0.68	2.77	0.78	2.65	0.66	5.604	0.061
Practical training	2.81	0.78	2.54	0.95	2.46	0.79	11.371**	0.003
Mastery of the contents taught by the teaching staff	2.94	0.80	2.87	0.78	2.86	0.68	1.003	0.605
Development of skills and competences	2.98	0.80	2.92	0.73	2.69	0.73	7.325*	0.026
Teaching methodologies and activities developed	2.96	0.81	2.73	0.79	2.53	0.71	15.742***	0.000
Periodic evaluation of student work	2.98	0.84	2.75	0.93	2.61	0.76	8.860*	0.012

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Evaluation criteria and instruments	2.94	0.83	2.78	0.84	2.63	0.74	8.078*	0.018
Teaching quality, in general	2.88	0.81	2.79	0.73	2.87	0.65	0.983	0.612
Spaces (classrooms, seminars, laboratories, etc.) for the development of the classes	2.90	0.83	2.39	0.81	2.74	0.79	18.580***	0.000
Technological resources for teaching (audio-visual, multimedia, etc.)	2.90	0.83	2.33	0.88	2.41	0.87	26.197***	0.000
Offer of courses and areas of specialization	2.61	0.78	2.57	0.84	2.47	0.82	1.198	0.383
Communication with teaching staff in the classroom	2.76	0.76	3.06	0.73	2.93	0.62	10.320**	0.006
Academic standards	2.84	0.73	2.79	0.71	2.87	0.67	0.557	0.757
Teacher attention outside the classroom (e.g. in tutorships)	2.86	0.70	3.06	0.81	2.89	0.73	5.870	0.053
The climate generated with classmates	2.83	0.87	2.96	0.92	3.10	0.70	3.940	0.139
Internships outside the university classroom (in educational centers or other types of educational and social institutions, for example)	2.90	0.78	3.00	0.96	2.36	0.98	19.286***	0.000
Preparation for future professional insertion	2.81	0.83	2.45	0.97	2.54	0.80	9.978**	0.007

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ Note: M = Mean, SD = Standard deviation.

4. Discussion

The present work provides useful data for the evaluation of the university experience of undergraduate education students, incorporating a specific direction of analysis different from the more general studies carried out with all types of university students. With regard to the results derived from the aim of the study, which was to analyze the undergraduate university experience of the different groups of students, it was found that the undergraduate university experience shown by the three groups of participants with regard to the academic training received indicates statistically significant differences, especially in three aspects: Teaching methodologies and activities developed by the teaching staff; Spaces for conducting classes; and Technological resources for teaching. These results are related to the three main dimensions that have traditionally characterized the formal teaching-learning scenario: the teaching activity of the teaching staff, the content of the subjects, the place where teaching takes place and the use of technological resources. Thus, it is not surprising that the participants highlighted these aspects as relevant, as they are highly coincidental with those shown by other similar studies carried out in Spain with university students [16, 17]. However, this allows us to observe a tendency of Spanish higher education students to identify aspects of satisfaction with the university experience that have already been overcome in other countries and which should have changed with the incorporation of Spanish universities into the European Higher Education Area (EHEA).

In view of the above, the participants' perception of learning would be related to a scenario typical of the last century and far removed from the necessary recognition of the aims of the education received in the light of the competence training demanded by the EHEA. This training, on the part of the student and the university system, should underline the function of competences as a resource that activates different knowledge to make decisions and solve problems in a contextual manner [18].

5. Conclusions

One aspect evaluated positively by both graduates and students, and significantly worse by dropouts, is the possibility of developing professional internships outside the university classroom, that is, in other educational or social institutions. This fact may be due to the fact that such practices do not usually take place in the first courses, but rather in the last ones. Therefore, one way of guaranteeing the permanence of students so that they do not drop out of their studies may be to

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have a closer approach to professional practice from the first academic years.

The foregoing makes it possible to continue research on improving the employability of education graduates, their access to the labor market and the reduction of dropout rates. While it is important to pay attention to the quality of university training, in general, teachers are agents of social change and, therefore, the higher education institutions responsible for their training must place special emphasis on this quality. However, not all the dimensions or criteria that increase student satisfaction depend on the interaction among faculty - curriculum – students [8]. There are many other relevant factors such as, for example, university policies at national and regional level, the model that supports each educational law, the connection with the work context, the strategies and actions developed to guarantee the well-being of the university community, etc. [19].

Among the limitations of the present study, it is worth mentioning that the generalization of the data should be made with caution, given that it involves only one university in the Spanish context. Also, only the questionnaire has been used as an instrument for collecting information, so that in future research it would be interesting to complement it with other types of instruments (e.g., interviews or discussion groups).

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Session 6: Inclusive Education

Title: Reframing Disability through Posthumanism: Exploring New Paradigms for Inclusive Education
Authors: Elena H. Silverman, Sophia Jeong, M. Nickie Coomer

Title: Battling Loneliness for Remote Graduate Faculty
Author: Kevin L. Splichal

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Reframing Disability through Posthumanism: Exploring New Paradigms for Inclusive Education

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Abstract

The framing of disability as lacking in terms of the normative ideas of what constitutes a good, productive life juxtaposes against the more affirmative possibilities of the posthuman [1]. The purpose of this theoretical paper is to reframe disability and reimagine inclusive teaching practices. Recent developments in posthumanism and new materialism have raised questions regarding disability and the potential for rearticulation of disability. Drawing on Braidotti's work on posthuman critical theory, we aim to rupture a priori conceptualizations of disability and find new grounds to rearticulate disability and reimagine inclusive teaching practices.

The application of new materialism, posthumanism, DisCrit can work to reframe disability. In doing so, we consider the following assumptions of posthumanism: 1) bodies are always relational, 2) we reimagine the notion of human agency with a concept of becoming that refers to a change in the capacities of an entity (both humans and more-than-humans), 3) we leverage posthuman possibilities to acknowledge that disability matters through complex assemblages of social, cultural, material and discursive aspects of our lives. Furthermore, we draw on the tenets of DisCrit [2] to interrogate framings of disability at the intersection of race and class. We will examine and inquire how the posthuman possibilities can help us reframe disability by juxtaposing critical disability assertions that disability is a political identity that is "socially constructed in tandem with race and class" [2]. To that end, we ask: 1) how posthumanism and critical disability can engage one another; 2) how, why and when posthumanism can and should be deployed; and 3) how posthumanism functions when we rearticulate disability and reimagine inclusive science teaching and learning practices.

The authors of this theoretical paper draw from experiences as teacher-educators with scholarship focusing on science education, critical disabilities studies, and educational policy and law. We engage in dialogic reflexivity [3] with one another to identify areas of tensions and promises in our individual and collective practices. Broadly speaking, teacher preparation programs, informed by critical disability studies [4], focus on inclusion and critique school systems that sort learners based on ableism [5], [6]. This particular framing presumes that preservice teachers possess the agentive capability to shift school cultures yet pays little attention to their agency as entangled with other material and discursive entities. There needs a new framing – a posthuman thought – that directs us towards processes that are not solely centered within the individual teacher in order to reimagine inclusion to be more inclusive.

Goodley et al. [7] posits that "to contemplate disability is to scrutinize inequality". Disability matters. In this vein, the consequences for not engaging in discussions of how disability is positioned in science teacher preparation courses, and broadly teacher education, have material impact on efforts to define and understand multiple truths as well as access to equity.

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Battling Loneliness for Remote Graduate Faculty

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Abstract

Instruction in a 100% online environment is lonely work. Couple the online environment with remote instruction and the result, while not blatantly obvious to the outside observer, contributes to faculty attrition, burnout, and sub-par performance. Even prior to the pandemic, which exacerbated these concerns, faculty burnout and isolation has increased [1]. Additionally, student - faculty relationships in an online course are brutally difficult to establish, compared to those in a face-to-face setting, compounding the effect on faculty performance and mental fortitude. Finally, the administration fails to recognize or address the impact this is having on the culture of the department, which contributes to faculty attrition, burnout, loneliness, and reduced effort [2]. This paper presents the author's perspective on the root causes of loneliness in a 100% online graduate program in a midwestern rural state university and offers insight into combating loneliness.

1. Introduction

What did we learn from the pandemic? Human beings are resilient. Challenges, trials, and tribulations can be conquered, and conquered triumphantly! Yes. All of this is true. There are numerous examples throughout history which bolster this fact. But we also learned that human beings need other human beings, creating a robust dynamic that promotes mental resilience. Alternatively, isolation caused panic, fear, anxiety, depression, and loneliness during the pandemic. The levels to which these symptoms impact certain individuals can be connected to numerous factors such as a person's education level, support systems, spousal relations, children, and more [3]. Regardless of your position, title, status, salary, or work environment, the effect continues to linger. McMurtrie [4] emphasized, "Burnout is a problem in academe even in the best of times. Shrinking budgets, growing workloads, and job insecurity in a profession where self-sufficiency is both expected and prized put many faculty members at risk before Covid-19 placed higher education on even shakier footing". Coupling these examples with an individual's self-efficacy, personal and social factors such as divorce, chaos, or a simple lack of communication and interaction, can result in significant psychological loneliness [5].

2. Loneliness

There has been little traction with research connected to higher education faculty loneliness. Burnout and attrition seem to lead the field of research in this regard, McCann and Holt [6]; Singh, et al., [7]; Stickney, et al., [8]; McMurtrie, [9]; Velez-Cruz and Holstun, [10]; Watts and Robertson, [11]. It is worth clarifying the fact that loneliness has many psychological and physical interpretations. When analyzing what it means to be lonely, I can only describe what it means to me, in my situation, in my environment and in my mind. Pinar, et al., [12] stated that the course of one's life should encompass a shift from biographical text to autobiographical text. This means that we must avoid the simple act of reflection on one's life through biographical text and explore the deeper meaning of one's life through a reflexive approach in autobiographical processes, an excavation of self.

As a graduate faculty member in a department of over 20 members, and twice that many adjuncts, loneliness seems far from an area of concern, yet I am lonely. I am not referring to my life outside of work. I am a father to three adult children who absolutely define the meaning of my life. Two are married which means I also have a wonderful son-in-law and daughter-in-law. There is nothing that brings more joy to my life than sharing in their lives. I also own a 160-acre farm where I revel in total solitude. It offers a profound, meaningful connection with nature. Yet work has become lonely. Work, like with many, is a large part of my life but it contradicts and battles against the joy I find in all other parts of my life.

Aristotle said if you would understand anything, observe its beginning and its development [13]. I hope to describe the factors that lead to my loneliness, why it developed, and where to go from here. I am reminded of Schon's [14] reflective practitioner where he described the murky waters. At times we may be engulfed in the murky waters with little light at the end. Emergence is not only necessary but required for proper growth in our lives.

3. 100% Online Instruction

Developing a rigorous and meaningful online

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course tied to objectives, outcomes, standards, and licensure is not easy. Kranzow [15] offers guiding questions for assessing the quality and effectiveness of an online course: Is there an avenue for open communication and discourse? Do online activities offer opportunities for reflection, interaction, and problem solving? Are there mechanisms for frequent peer interactions? Has consideration been given for evaluation of technical skills? Are adaptations offered for students with various learning needs? Do directions offer guidelines and examples of student work? Whether it is synchronous or asynchronous, self-paced or structured, philosophical or more objective, the course design contributes to both student and faculty satisfaction. Xavier and Meneses [16] stated, "It seems that the ideal balance is between structure and flexibility". Stickney, et al., [17] investigated faculty satisfaction with online instruction and analyzed two key components as contributing factors: flexibility with the online medium and support for online instruction. Instructional support in my department is not an issue. I have the support of the department, college, and university for online instruction with technology, course design, open education resources, and research. Alternatively, the flexibility component is both a blessing and a curse [18]. Yes, flexibility with the job is a benefit. I enjoy setting my own office hours. I appreciate being able to dedicate more time to my adult children. I love not being tied to a 9:30 Monday, Wednesday, Friday course, and so do my colleagues. But this also contributes to the deconstruction of the collegial environment when a faculty member may not engage and interact with his or her colleagues in the same room except for three or four times throughout the year. For much of my time, in my office and on campus, I may encounter two or three colleagues two or three times per week. The hallways are quiet. I can't run next door for advice with my research. I can't enjoy a coffee break with a colleague. No one is asking me about my day or weekend. I see undergraduate students passing by with the occasional smile or hello but that is the extent of my interaction with others outside of this computer screen. Communication, interaction, discourse, and the energy those things provide rests solely on my relations with students.

4. Student Relationships

Yes! It is this computer screen that houses my world of instructor - student relations. My students are names on a spreadsheet, not faces in a brick-and-mortar classroom. I hate to provide the impression that I have dehumanized my students. I work very hard to create meaningful relationships in my courses between course content and student experiences. Velez-Cruz and Holstun [19] stated, "In typical situations, faculty members of all disciplines and status seek meaning through their work activities, such as teaching, research, outreach programs, and other duties assigned. However, many of these demands may expose faculty to burnout, lack of compassion satisfaction and secondary traumatic stress". I find great value in my job and a tremendous amount of satisfaction with the interactions I have with students. This takes pointed and diligent work, however. Through no fault of theirs, students have been trained to complete tasks for grades. Sadly, this means going over and above the specified task is rare. After every learning module I send "follow-up" emails to my students in every course. Young [20] clarifies my actions, "Participants in an online course have a responsibility to each other to communicate in a timely and professional manner. Effective instructors model good communication skills and, following their example, students learn to do the same". I attempt to provide real-life context to course content. I encourage the sharing of student experiences and how their experiences connect to the content. Relevancy is key. Their candid, "not for a grade" sharing of experiences have contributed to my satisfaction with instruction. As a result, however, because these communication attempts are just that, "not for a grade" I may only receive a 20% response rate in the email replies. I have adapted my plan at times, making the emails for a grade, but I found their responses to be less meaningful and tied to course content rather than life experiences. "An effective instructor can provide corrective feedback and encouragement, motivating the students to stay on task and to achieve the learning goals. Online learning should not be an isolated, independent activity but rather one in which students and instructors are partners in learning" [21]. This partnership is tough work for those of us who administer meaningful and rigorous courses in the online classroom. Aristotle [22] commented, "A good result is even better when it is harder".

5. Destructive Leadership

Out of sight, out of mind! This is the way I feel that many leaders handle remote faculty. One could identify these leadership styles as destructive, narcissistic, abusive, toxic, laissez-faire or other [23]. Faculty in my department are only required to be "on campus" three times per year: two graduations and the campus-wide meetings at the start of the academic year. But let's not place blame where it does not belong. As a faculty member, with a physical office on campus, I am free to be here every single day if I choose. The same is true for my colleagues. So, what is the problem and why does the leadership contribute to the loneliness and isolation felt by so many? A narcissistic leader is socially awkward and prefers life from behind the computer, away from social interaction [24]. Toxic or Abusive leaders are difficult

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to be around and thus avoided [25]. With these two examples, specifically, a cancerous environment grows. Super talented, highly intelligent, and high-functioning faculty begin performing far below their potential and avoiding the workplace environment. Why? I've asked this question numerous times and the answer is usually, "my leader doesn't recognize or appreciate my talents and/or hard work." As a result, many of my colleagues attempt to "lessen" their exposure to these destructive leadership behaviors by staying off campus, thus remaining isolated [26].

6. Leading and Self-Care

I am fortunate to teach a leadership course where the following principles can be applied and practiced. As stated previously, I have had small successes with email communications and reciprocation from students. I have flexibility with course design which allows me to change and adapt my leadership course to meet personal needs and the needs of my students.

One of the most important is critical reflection [27]. While students are regularly asked to "reflect" on certain aspects of their educational journey, this reflection is a little different. Students are asked to explain a "murky waters" experience in their lives and then elaborate on how they emerged from those waters [28]. Some of our life lessons and experiences have resulted from failures, hurts, broken trust, broken relationships, jobs that ended prematurely, etc. These are the murky waters. Did we learn and grow as a result? I should note that students are not asked to divulge any personal information that they are not willing to share. Some past experiences come with deep emotional wounds. Students can share as much or as little as they are able in a confidential manner. The results were tremendous for myself as well as my students. Occasionally, writing about previous experiences brings renewed growth and healing. By deconstructing the way we internalize past events, we sometimes painfully open wounds in an attempt to cleanse and purify so that strength and endurance can emerge [29]. This process opens the student-instructor dialogue and models a key leadership trait of successful leaders, namely, self-reflection. Students continually remark as to how hard the process was for them. We shared something more than course content. They didn't realize they were practicing a leadership trait, and a relationship was established between student and instructor.

Secondly, as a follow up to this assignment, students are asked to describe how they take care of "self". Life, as we know, provides challenges. In what ways are we giving back to ourselves and staying grounded? This is what Heidegger [30] refers to as "discovering self". How do we move from being overwhelmed to being energized? Again, the discourse between student and instructor becomes much more meaningful and relevant. Students are asked to share their experiences of how they look after themselves and how they nurture their own physical and emotional health [31]. Once again, my students find this process of self-assessment very difficult and uncomfortable, but it is a trait that great leaders possess and regularly practice [32].

7. Growth

Kouzes and Posner [33] state that leadership is everyone's business. If that is true. If leadership is my business, especially, and maybe more importantly, when my leadership fails, I have a responsibility to lead. I have a responsibility to resist the loneliness, and the effects poor leadership has had on my attitude and outlook for teaching online. Loneliness in online and remote instruction is real and should be addressed. What are the consequences for faculty working in this environment, especially when the leadership is sub-par? Further research can identify the extent to which loneliness is affecting the performance of higher education faculty. Coles [34] stated, "How to encompass in our minds the complexity of some lived moments of life? You don't do that with theories. You don't do that with a system of ideas. You do it with a story". A qualitative study of faculty who share the same concerns can bring forward new methods that will help all of us improve instruction, mental resilience, and grit.

I have found renewed energy, enthusiasm, and passion for teaching and my work environment. Both parts of the "murky waters" assignment have helped me to overcome the isolation felt from behind the computer screen and strengthened my relations with students. Additionally, modeling these leadership traits provides real-world applications for future leaders.

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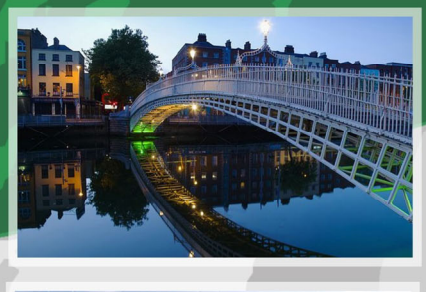

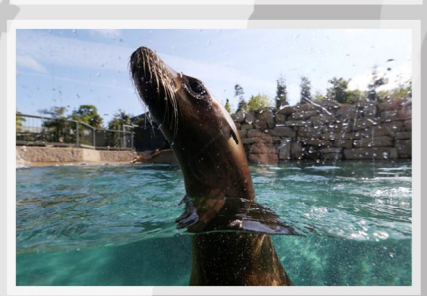

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