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Front Pages

Athens Journal of Education

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The ***Athens Journal of Education (AJE)*** is an Open Access quarterly double-blind peer reviewed journal and considers papers from all areas of history. Many of the papers published in this journal have been presented at the various conferences sponsored by the Education Unit of the Athens Institute for Education and Research (ATINER). All papers are subject to ATINER's Publication Ethical Policy and Statement.

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Editorial and Reviewers' Board

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The current issue is the first of the tenth volume of the *Athens Journal of Education (AJE), published by the Education Unit of ATINER.*

Gregory T. Papanikos
President
ATINER

Athens Institute for Education and Research
A World Association of Academics and Researchers

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15-18 May 2023, Athens, Greece

The Education Unit of ATINER organizes its **25th Annual International Conference on Education, 15-18 May 2023, Athens, Greece** sponsored by the Athens Journal of Education. The aim of the conference is to bring together scholars and students of education and other related disciplines. You may participate as stream leader, presenter of one paper, chair a session or observer. Papers (in English) from all areas of education are welcome. Please submit a proposal using the form available (https://www.atiner.gr/2023/FORM-EDU.doc).

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- Abstract Submission: **14 February 2023**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **17 April 2023**

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- Athens Sightseeing: Old and New-An Educational Urban Walk
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Forestalling Bullying in Primary and Secondary Schools in Spain

By Elia Saneleuterio[*], Rocío López-García-Torres[±] & Teresa Fernández-Ulloa[°]

Bullying refers to degrading actions, recurring and prolonged, exerted by minors on an equal. Physical or virtual assaults and insults, rejections or intimidations that hinder the victims' school activity and cause them to feel continually threatened are examples of bullying and cyberbullying, which have serious repercussions, not only on the emotional well-being and academic performance, but also on physical and mental health. It is necessary to build a citizenship engaged to education (Global Citizenship Education) to prevent bullying, and to work in other Sustainable Development Goals (SDGs). The solutions must involve families and teachers, particularly in the context of regulated education, where participation can be promoted in a more planned and controlled way. Expert approaches insist on the relevance of the school to prevent aggression and discrimination through critical and reflective attitudes towards the violence that surrounds these situations. It is about teaching students to reject them *ab initio* as inappropriate. The aim of this paper is to identify the characteristics of the interventions aimed at the prevention and detection of physical and psychological violence among school children in various settings and populations, specifically in Spain, as well as their results and controversial aspects.

Keywords: bullying, violence, harassment, prevention, global citizen education, sustainable development goals

Introduction

Bullying is seen as degrading actions, recurrent and prolonged over time, exercised by minors on an equal. Aggressions and insults, physical or virtual, rejections or intimidation that hinder the victims' school activity and make them feel continually threatened are examples of bullying and cyberbullying, which have serious repercussions, not only on their emotional well-being and academic performance, but also on their physical and mental health. We will discuss here harassment in primary and secondary schools.

Although harassment among minors can be studied paying attention to each act or specific case, we can also consider it as a certain type of "climate" of opinion. In this sense, experts speak of violence as a psychosocial illness that is generated in the habituation to violent environments, caused by a lack of democratic

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consciousness. However, it is necessary to be aware that "whoever verbally assaults, does not have to go beyond the barrier of physical injury. Frequently, however, those who physically attack also do so verbally" (Saneleuterio & López-García-Torres, 2017, p. 268, translation). Psychological abuse, instead, presents greater subtleties precisely because they are not usually accompanied by verbal abuse or physical aggression. For this reason, psychological abuse is not usually measured as precisely as direct violence, much less in school settings, such as those discussed herein.

First, the aggressor and the victim must be clearly defined. For the study of the casuistry and prevention in childhood, we can agree that both must be minors, which would leave aside cases of aggression where the age is very unequal and shows a factor of dominance or evident power. In this regard, it must be considered that, as Prats (2015) has established, bullying by peers, especially in the school environment "leaves more consequences than abuse by adults", probably because it is more difficult to assume, since it cannot be related to an excess of authority.

Focusing consequently on peer problems, a study by Cerezo (2009) showed that, when the distribution is seen according to sex, violent behaviour during the first years of school occurs more frequently among boys than among girls. Although the data is not particularly striking, what stands out is to find that both types of violence (boy-boy and girl-girl) are dominant with respect to those that occur between the sexes; these are rare in childhood, increasing with puberty and adolescence, and specializing in sexual or sexist violence. However, if we extend to harassing behaviours without violence, these stereotypes are nuanced. Globally, the latest UNESCO (2018) report advances that the prevalence of bullying is not significantly higher, in general, in one sex than in the other. The difference would come in its typology, and, for this reason, it is necessary to investigate it in order to adapt prevention measures that act precisely at the origins of the problems, according to their nature.

There are several terms related to bullying that are worth explaining here. People, and especially young people, tend to follow the crowds. According to Schmitt-Beck (2015), professor of political sociology at the University of Mannheim, Germany, this phenomenon is called the "bandwagon effect" or "contagion effect".

> The term […] denotes a phenomenon of public opinion impinging upon [itself] […] In their political preferences and positions people join what they perceive to be existing or expected majorities or dominant positions in society. It implies that success breeds further success, and alternatives that appear to enjoy a broad popular backing are likely to gain even stronger support.

Human beings are social beings, and to share ideas with others helps to maintain harmony. This happens often, and stronger, on social media. The dangers of this are obvious when it comes to negative content; for example, hate speech or cyberbullying. Without having a deeper knowledge of an issue, people get carried away by the comments of others, especially teenagers.

Crowd psychologist Gustave Le Bon states,

> We see, then, that the disappearance of the conscious personality, the predominance of the unconscious personality, the turning by means of suggestion and contagion of feelings and ideas in an identical direction, the tendency to immediately transform the suggested ideas into acts; these, we see, are the principal characteristics of the individual forming part of a crowd. He is no longer himself, but has become an automaton who has ceased to be guided by his will" (Leary, 2018).

In the cyberspace, there are many users keen to linguistic violence. Language abusers in the social media are known as "internet trolls", whose act is defined by Buckles, Trapnell, and Paulhus (2014), as "the practice of behaving in a deceptive, destructive, or disruptive manner in a social setting on the Internet with no apparent instrumental purpose" (p. 97). What these people want when they post is to irritate others. According to the Center for Mobile Communication Studies (2018), "Groshek and Cutino (2016) conclude that mobile or web-based content tends to show more incivility and impoliteness (p. 1). Therefore, today's Internet environment provides a broader place for the breeding of malicious speeches". These comments are contagious, mainly due to that crowd or bandwagon effect, and rational discussion is lost forever. This is shown, for example, in the Chinese director Kaige Chen's movie *Caught in the Web* (2012), where the heroine becomes embroiled in controversy after a cell phone video of her being disrespectful to an elderly person goes viral. She had a justification to do that, but she begins to face a public pressure that destroys her life.

This *trolling* attitude is common between young population, who inundates the social media, what causes more school bullying, since they have an easy access to those media through the cell phones and tablets/laptops everywhere. According to the Center for Mobile Communication Studies (2018), "The Internet allows these young people to send harassing e-mails or instant messages, post obscene, insulting, and slanderous messages to online bulletin boards, or even develop Web sites to promote and disseminate defamatory content (Patchin & Hinduja, 2006, p. 153)".

Other concepts deserving some attention are "intimacy" and "extimacy" in social networks. There is a need to discuss how ethical principles are violated due to the ignorance and confidence of users. The Web 2.0. distorts privacy, through the constant communication and feedback; users consider that is more important to share their privacy. As Tello (2013) indicates,

> […] the way we constitute and define ourselves as subjects has changed. Introspective view is deteriorated. We increasingly define ourselves as what we exhibit and what the others can see. Intimacy is so important to shape who we are that we have to show it (Pérez-Lanzac & Rincón, 2009).

This debilitation of the introspective process was already stated by Jacques Lacan (1958), who created the label "extimacy", linked to the expression of once-private information through social networks. Privacy is made public through new communication networks; it is an "exposed intimacy".

The solution to this problem seems to be "literacy", "the first step towards freedom, towards liberation from social and economic constraints. It is the

prerequisite for development, both individual and collective", according to Azoulay (n.d.), Director-General of UNESCO. Also, becoming emotionally literate can help prevent bullying. "Students who have emotional literacy are more able to recognize the signs of bullying" (Gerds, n.d.).

There are also interesting attempts to increase "modesty" among students, for example, Comer and Schwartz (2020), discuss how they have raised their students' awareness that modesty matters, clarified for them what it is, and given them techniques to help them work towards it. This is something all schools should incorporate, apart from the advice at home. Leviner's (2018) action research study is also a proposal of implementing education on social media responsibility as a means of curtailing cyberbullying, a pressing problem in 21st century education. This study was carried out in a high school in North Carolina, where the researcher gathered information on students' knowledge and experience using the internet and social media appropriately and the dangers and effects of inappropriate use of the same. Their personal views and opinions about how this responsibility correlates with cyberbullying were also collected. As the author states,

> In embracing the internet and social media in the school environment, schools must accept the responsibility that comes with its incorporation and the larger impact it has outside of traditional education purposes. Developing education on how to use social media properly and how to be a responsible digital citizen can provide lasting effects for adolescents' entire high school careers, preparing them to be responsible citizens as adults. More broadly, it is also important for educators to continue to evaluate their schools for areas of academic and social improvement (23).

Method

This article discusses bullying in various forms, and the objective is to identify the characteristics of the interventions aimed at the prevention and detection of physical and psychological violence among primary and secondary school children and young adults in various settings and populations, as well as their results and controversial aspects.

This is a qualitative descriptive study, through the review of various articles and materials, a widely used technique in social and educational studies, which we have considered as the most appropriate way for the purpose of our work, which is to determine the current state of scientific knowledge regarding this topic (or problem). Thus, a review was carried out based on the search in different bibliographic sources, reading of the appropriate literature, synthesis of the results, and evaluation of these in relation to the objective of this work. We will focus mainly in some studies done in Spain.

Sustainable Development Goals, Global Citizenship and Bullying

As indicated in the *Guía didáctica. Conecta con los ODS*, by the Generalitat Valenciana (2019), globalization has a positive side, which allows us to connect

and interact with other people around the world. But globalization is also making exclusion more visible: hunger, poverty, inequalities, the violation of Human Rights in many parts of the planet, the depletion of natural resources, forced migrations that produce problems integration…

> The 2030 Agenda for Sustainable Development[1], adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries – developed and developing– in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests (United Nations, 2019).

Those sustainable goals are shown in Figure 1.

Figure 1. Sustainable Development Goals

Source: United Nations, 2020.

The implementation of the SDGs or #GlobalGoals is necessary to empower women and the youth to live in a world in which all people can thrive as global citizens. But, how can citizenship be formed with a sense of belonging to a world community of equals, committed to the problems caused by inequalities? Once again, education seems to be the answer, according to the *Guía didáctica*. Building this citizenship, having global awareness, and at the same time being actively engaged in transformative local action, is what has been called Global Citizenship Education, and it draws upon experience from other education processes, including human rights education, peace education, education or sustainable

[1]See https://sustainabledevelopment.un.org/post2015/transformingourworld.

development, and education for international and intercultural understanding. It does not have a formal status, since it is not a predefined subject or school subject. Global Citizenship Education evolves from the pedagogical tradition of Education for Development (promoted by specialized NGOs in international development cooperation since 1980), and expands its horizon incorporating in a comprehensive manner various content related to education for peace, education in values, education for gender equality, environmental education, education for health, education for sustainable consumption...

The goal of global citizenship education is to empower students to participate and take active roles both locally and globally, to confront and resolve global challenges, and ultimately to be proactive in their contribution to a more just, peaceful, tolerant, inclusive, secure and sustainable world. Thus, it is about incorporating 3 dimensions of learning (UNESCO, 2016),

> The goal of global citizenship education is to empower learners to engage and assume active roles both locally and globally to face and resolve global challenges and ultimately to become proactive contributors to a more just, peaceful, tolerant, inclusive, secure and sustainable world. Global citizenship education has three conceptual dimensions. The cognitive dimension concerns the learners' acquisition of knowledge, understanding and critical thinking. The socio-emotional dimension relates to the learners' sense of belonging to a common humanity, sharing values and responsibilities, empathy, solidarity and respect for differences and diversity. The behavioural dimension expects the learners to act responsibly at local, national, and global levels for a more peaceful and sustainable world.

To address the cognitive dimension of Education for Global Citizenship, it is necessary to work in the classroom, accessing and analysing other sources of information, aimed at facilitating the understanding of the relationships that exist between life in our contexts and the lives of people from other parts of the world, to develop critical and resolutive thinking in students. However, to address the socio-emotional and behavioural dimensions, pedagogy must be complemented by a more holistic approach, so information and knowledge can be combined with practice and direct experience. This methodological approach should provide students with experiences and opportunities to develop, contrast and build their own views, values and attitudes to understand how to take actions responsibly. Participating in community activities, taking advantage of cultural diversity in the classroom and in the close community, confronting different points of view… are some of the key pedagogical components for progress towards critical citizenship, according to this guide.

According to UNESCO (2019, foreword), "Addressing school violence and bullying is essential in order to achieve the Sustainable Development Goals (SDGs), in particular SDG 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, and SDG 16, which aims to promote peaceful and inclusive societies". And it continues,

> To ensure safe and inclusive learning environments, UNESCO advocates a comprehensive school health approach that encompasses policy and systems, skills-

> based health education, safe learning environments and links to health services. National education sectors must adopt and implement measures to prevent and address violence and discrimination, both because of their impact on education, health and well-being, and because they stop children and young people from achieving their potential (UNESCO, n.d.).

UNESCO's work in school violence and bullying is divided into four main areas (UNESCO, n.d.):

- To provide the most up-to-date and comprehensive global evidence on school violence and bullying.
- To support the development of effective policies to prevent and address school violence and bullying, including school-related gender-based violence.
- To improve the measurement of violence and bullying within the framework of the 2030 Agenda for Sustainable Development.
- To strengthen national responses to school violence and bullying, particularly education sector responses.

The actions are diverse, and include, among others, the declaration of the first Thursday of November of every year as the International Day against Violence and Bullying at School, Including Cyberbullying[2], recognizing that school-related violence in all its forms is an infringement of children and adolescents' rights to education and to health and well-being. It has also published, during the World Education Forum in 2019, *Behind the Numbers: Ending School Violence and Bullying*. This publication contains the most recent and complete data on issues related to violence and bullying, and it presents the most up to date and comprehensive evidence on the school violence and bullying, analysing global and regional prevalence and trends, the nature and impact, and successful national responses[3].

Bullying: Evolution of the Concept

The concept of "bullying" has to do with the recurring, and prolonged in time, degrading actions that a boy, a girl or a group exert on an equal in a school. According to Olweus (1978) –the first author who called the aggressor "bully"—, apart from physical assaults and insults, rejections or intimidations that hinder the victims' school activity and cause them to feel continually threatened are also included. As we have already shown in López-García-Torres and Saneleuterio (2015), bullying is determined by the compulsory relationship between schoolchildren, or at least their difficult evasion, by sharing a classroom or patio daily:

> Thus, it is in the school where the subject has the least ability to choose, since the possibilities are limited –and forced– to those enrolled in each grade. In other words,

[2]See https://es.unesco.org/commemorations/dayagainstschoolviolenceandbullying.
[3]See https://unesdoc.unesco.org/ark:/48223/pf0000366486.

> there are fewer friends to choose from and, if there are undesirables, there is a greater probability of finding them, given that they share the same square meters for many hours a week (p. 419, own translation).

Indeed, people will feel more harassed by others in a relationship inversely proportional to the possibilities that they have to avoid interacting, as it happens in the school or at work. Apart from these two areas linked to limited contexts, the most widespread aspect of harassment would be sexual, which can occur within or outside of these contexts.

For the Anglo-Saxon concept of stalking or harassment, the patrimonial equivalent *acoso* has been taken in Spanish. The term *acoso* comes from the old Spanish *cosso* ("career"); *acosar* ("to harass") means "to make somebody run" and, in other meaning of the Dictionary of the Spanish Language, "to persecute, without giving truce or rest" or "insistently urge someone with discomfort or requirements" (RAE, 2014). These actions constitute a crime according to the penal code. Thus, according to the glossary of De la Encarnación (2015),

> […] there is harassment when watching, persecuting, or seeking physical closeness; establishing or attempting to establish contact with a person through any means of communication, or through third parties; misusing their personal data, purchasing products or merchandise, or contract services, or having third parties contacting that person; infringing their freedom or their assets, or against the freedom or assets of another person close to them (p. 448, translation).

According to the *Ley Orgánica* (*Organic Law) 1/2015, of March 30, which modifies Organic Law 10/1995, of November 23, of the Penal Code*, in Spain harassment is classified as a crime punishable by penalties ranging from three months to two years in prison, among others.

Bullying is among the most common typologies of harassment, so much so that it even has its own international name: *bullying*, similar to *mobbing*, which is used for harassing in the work domain; although the latter term was first used to describe certain behaviours of the animal world. The fact that these anglicisms are widespread in the studies and literature of the Hispanic tradition shows their extensive social incidence.

The student who begins to have relations of arrogance and excessive dominance, especially if this is accompanied by someone who accepts the submission, is activating an indicator that problems of violence or school abuse will surely appear. The rigid dominance-submission scheme is characterized by one person dominating and another being dominated; one is controlling while another is controlled; one exercises abusive power and the other must submit. It is a relationship of arrogance that ends up turning the abuser into a bully or intimidator who can present overt violent behaviours –physical or verbal–, but also violent relational behaviours such as spreading rumours or excluding the victim from a group (Povedano et al., 2015).

UNESCO (2018) released updated data about the world panorama regarding bullying and school violence; in this report, there are generalized improvements related to the anti-bullying proposals and plans that have been implemented during

the recent years in different countries (Álvarez, 2016; Félix, Soriano, Godoy, & Martínez, 2008; Hidalgo, 2015; Kärnä et al., 2013; López-García-Torres & Saneleuterio, 2016; Muñoz & Fragueiro, 2013; Sánchez et al., 2001; Teijeira Bautista, 2017; Zaitegi, 2017).

All in all, UNESCO (2018) maintains the warning that these situations have serious repercussions, not only on the well-being and academic performance of those who suffer them, but also on their physical and mental health. Indeed, these types of victims are more susceptible to future mental health problems, especially anxiety, but also depression, a tendency to self-harm or to have suicidal thoughts. Rosario Ortega, vice-president of the International Observatory on School Violence, explains that suffering bullying "supposes an imbalance and wear on the subject's personality in a very strong way" (Prats, 2015, translation). Its consequences are exponentially aggravated if it is prolonged in time, since it ends up destroying in the victim "extremely relevant factors of the subject's personality" (Prats, 2015, translation), insofar as it involves physical, psychological or both types of damage, which causes the humiliation of being considered a *stupid* person, *weak* and *social outcast*. The self-esteem is devalued, and the self-image deteriorates, which increasingly isolates the victim and ends up affecting very seriously their academic performance, although the latter is especially evident among men.

The differences between abused men and women are shown in numerous empirical studies, and in the abovementioned UNESCO (2018) report. According to Romito and Grassi (2007), male victims would be more likely to fall into alcohol, while women would suffer more frequent panic attacks. The profile of the bully is more frequently identified among boys, therefore pointing to the sex variable (UNESCO, 2018). Other variables of risk include the fact that there are few academically brilliant students (Gage, Overpeck, Nansel, & Kogan, 2005), whereas other statistics from some countries indicate that a large majority, 80%, of gifted boys and girls have been attacked or bullied at school.

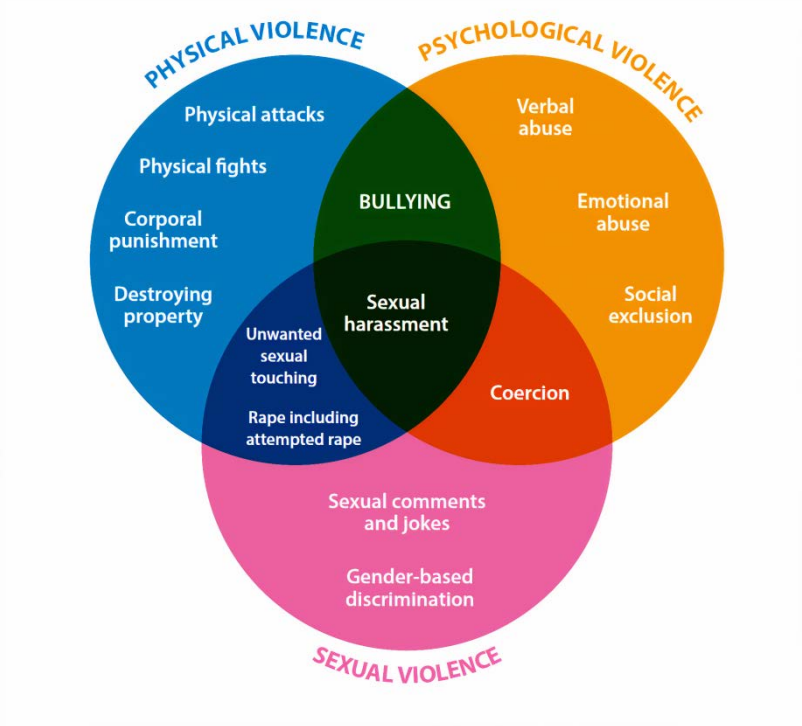
Now, as Ortega (1998) explained and we mentioned in Saneleuterio and López-García-Torres (2017), to some extent, people who are cruel and unjustifiably aggressive should also be considered victims of the process, in addition to those who are the object of their cruelty and violence. And, thirdly, victims are also those who, without having become involved as agents, unintentionally fall into the observer role without deciding to intervene and end up living in social spaces soaked in violence. This last group, mostly neglected by the least evidence of their suffering, harbours potential abusive people who have become accustomed to this type of environment; by living in continuous fear and normalizing these behaviours, they may even develop, conversely, a weak profile as future victims.

In the first sense, although with much less weight, many television series undermine sensitivity, especially the more realistic and closer they are to the viewer. Real or fictitious, the indirect effect of getting used to certain attitudes leads to perceiving a subsequent normalization of abusive practices –first in the mind– and then in the elevation of the threshold of what aggression is and what is not, what is admissible and what is not, etc.

Identification and Forestalling

UNESCO (2019) addresses bullying and its different types –physical, psychological and sexual– as the most common form of school violence (Figure 2).

Figure 2. Conceptual Framework of School Violence and Bullying



Source: UNESCO, 2019, p. 11.

Starting from other classifications of school violence (Grado & Uruñuela, 2017), this paper proposes a double characterization. On one side, according to the effect, that is, whether psychological, verbal, physical or a combination of these abuses occurs. And, on the other side, according to the motivation, that it may be due to personal (physical, psychological, sexual orientation or identity) or collective factors (ethnicity, religion, belonging to a social group, etc.).

Among the behaviours, it is possible to find several that must have the characteristics of intent, recurrence, and persistence over time to be considered "bullying": social exclusion and marginalization, verbal aggression, humiliation and vexation, indirect or direct physical aggression, intimidation, threats or blackmail, among others. In other words, a specific attack due to a disagreement or offense that may have occurred would not be a harassing behaviour. The victim could be anyone, but in cases of harassment the identity of the victim is decisive, and, in addition, it presents an additional characteristic: defencelessness, since the victim shows less power, whether on a physical, psychological or social level.

In effect, the person subject to harassment is usually a single student; this decreases individual's chances to defend himself or herself, or to achieve synergy with another victim. In bullying there is usually a collective or group component;

there are many passive observers who, as silent witnesses, know the situation, but do not contribute sufficiently to the end of the attack. As a result, and a symptom of the perpetuation of the problem, the entire process is invisible to external (adult) agents who would be the ones who could act.

It is worth highlighting, within the different types of bullying and its manifestations, what experts have called *cyberbullying*, where the aggressor uses electronic means that transcend the school context. This conduct is defined as harassment between equals in the environment of information and communication technologies (ICT), and includes acts of blackmail, harassment and insults, with or without sexual content, towards a student. Being virtual, aggressors usually protect themselves with anonymity, and cases have been reported where an adult person was behind the screen. Sexual content recurrently sent to minors through digital media by paedophiles who hide their identity in order to gain their trust, is called *grooming*. This is a phenomenon with very different procedures and effects, not at all comparable to the psychological effects of bullying or cyberbullying.

Cyberbullying also involves dissemination of harmful or defamatory information about the victim in a technological format. Sometimes, these practices are combined with direct physical or verbal ones. School cyberbullying is a phenomenon of great relevance –and concern– due to its prevalence, the severity of its consequences and the difficulties it presents for its prevention and approach. Cyberbullying can consist of "sending emails to someone who does not want to receive more, threatening, sending malware, humiliating others, distributing tricked photos, creating defamatory websites or impersonating their identity", as described by Luengo (2014).

Bearing in mind the general characteristics of bullying, the following nuances are added to cyberbullying: first, and most striking, is that the intention to cause harm does not always occur in the early stages of the process; second, that the repetition also occurs in virtual messages or actions, which are frequent and lasting over time; third, the fact that there is usually previous contact or relationship between those involved in the physical world; fourth, that it is not always linked to situations of harassment in the physical environment and, if they are, they usually precede virtual attacks; finally, and as a defining condition, the attacks materialize through ICT media: SMS, WhatsApp, email, mobile phones, social networks, blogs, forums, chat rooms, among other virtual realities.

According to the Information Society Area of the European Commission, this practice among adolescents, together with the *grooming* phenomenon, is "the greatest problem currently evident among the set of detestable or risky behaviors" (Luengo, 2014, p. 115). It is particularly interesting that, although bullying in general seems to be declining, cases of cyberbullying are increasing (UNESCO, 2018), which forces to rethink prevention strategies and reinforce media education.

For this reason, educational centres that design and apply prevention and action protocols are seeing an increase in cases of bullying and cyberbullying, as well as for those behaviours that alter coexistence in a serious and repeated way: insults, threats, assaults, fights, vandalism, child abuse and gender violence, whether these situations occur within the school or outside the school domain, provided they are motivated or directly related to school life.

These practices are consistent with research on bullying, as more and more studies are trying to discover the different influences of educators. Podestá (2019), for example, conceptualizes the roles of teachers in five metaphors: the spectator, the gardener, the judge, the bridge and the ally. Those descriptions help to show the limitations and strengths of each way of acting and, above all, the perverse effects that they can cause in the behaviours that are intended to be reduced. Along the same line of thought, Ruiz-Hernández et al. (2019) have also recently studied parental styles and their relationship with violent manifestations in adolescents. These researchers found that what is not advisable is the authoritarian style, coercive practices, physical punishment or the imposing character. In addition, they showed that the dimensions of affection, communication and promotion of autonomy guarantee positive behaviours, as De Vicente Abad (2017) had already partially showed.

Thus, the triangulation of the solution must involve families and teachers, this particularly in the context of regulated education where other more cautious solutions may be recommended. Indeed, all expert approaches insist on the relevance of the school in the prevention and detection of violence and discrimination, for example, through "serious and effective programs framed in a preventive pedagogy" (Aroca, Ros & Varela, 2016, p. 27). For this reason, nowadays, educational centres are supporting the explicit promotion of the so-called "culture of peace" (*cultura de la paz*) (Sánchez Fernández, 2017) or the "good treatment" (*buen trato*) (Pastor Fasquelle & Cruz Velasco, 2017; Sanz Ramón, 2017). Among these initiatives, we can mention the TEI program "Tutoría Entre Iguales" (peer tutoring). It is a coexistence program for the prevention of bullying and violence (physical, emotional or psychological). This is an institutional plan that involves the entire educational community, and whose objective is to work for an inclusive and non-violent school, promoting and improving the centre or school culture regarding coexistence without conflict (González Bellido, 2015).

The promotion of "good treatment" in classrooms must consider that the main reasons for bullying among children and adolescents fall into two areas. On the one hand, that of the physical appearance: being overweight focuses on the distance from beauty standards, lack of hygiene or general neglect, especially if they are accompanied by a weak or easily dominated character; these attitudes merit vigilance. On the other hand, and as long as leadership skills do not converge, bullying is directed to people who question the sex-gender system with their clothing, hairstyle or gestures (De Stéfano, Puche, & Pichardo, 2015). The prevention of violent behaviour must, therefore, see them as inescapable strategic points in teacher training (De Botton, Puigdellívol, & De Vicente, 2012; Santos, Bas, & Iranzo, 2012).

The democratic decision-making, the pre-eminence of peaceful forms in conflict resolution, and facing social tensions using dialogue and negotiation are essential measures for the prevention of school violence. It is necessary to educate in respect and harmonious coexistence, which is aimed at avoiding the generation of personalities who foster a profile of aggressors and victims. Furthermore, in the specific case of sexual abuse and discrimination based on sex, in order to build a

future society free of machismo, it is necessary to believe in co-education (López-García-Torres & Saneleuterio, 2016).

The pandemic situation is no reason to postpone the preventive and proactive response that schools should give to bullying. The AVE© Program for the Prevention of School Harassment and Violence (Oñate & Piñuel, 2005), which pays attention to physical and psychological violence in the school environment, places the emphasis on proactive and preventive psychological evaluation to early identify the behaviors of abuse that may be having their start in the classroom. In other words, it is about "measuring early to prevent harassment from occurring from its first manifestations" (Oñate & Piñuel, 2005). This program was designed and created to help schools to contain or eradicate bullying dynamics, proactively and early, before they become fatal. For this, the AVE© Program involves the entire educational community (parents, students, playground and dining room staff, buses...) in a dynamic and participatory way, offering the schools some psychological tools and early responses to the behaviors that generate cases of violence or bullying, and favoring a culture of zero tolerance. On the other hand, the prestigious Finnish KiVa program is also applied in Spain, as demonstrated by the recent doctoral thesis by Martínez Jiménez (2021). See also Martínez Jiménez and Alcantud Díaz (2018).

Conclusion

Within the SDGs related to equality and quality education, in the context of the Global Citizenship Education goals, schools have a duty regarding the children who go to school and suffer fear and the psychological damage caused by recurrent harassment behaviors. There are many programs and interventions that fail to achieve an effective reduction in the rates of bullying in schools. The right approach here seems to deal with school abuse and psychological harassment before it happened, as the AVE© and TEI programs do. This means, for those responsible of education, to be attentive to its first manifestations and to stop it at its roots.

Teaching must be oriented to show behaviours that promote lack of solidarity and exclusion among students, emphasizing that these are detestable actions. Instructors must highlight through real examples the consequences that these dynamics entail for aggressors, victims and spectators of violence. In general, it must become clear that aggression is never an effective action to manoeuvre any situation or achieve goals.

To favour the suppression of this trend in schools, it is important to promote a critical and reflective attitude towards the violence that surrounds students, teaching them to reject it in any of its manifestations. The intervention that is programmed to prevent or address the problems of violence between equals in the educational centres should not be directed exclusively to the victims, but also to the aggressors and the spectators; since it has negative consequences for everyone involved.

All institutions, but especially schools, must implement an educational policy of zero tolerance towards any type of violence. To guarantee this, the educational project of the centre has the obligation to include the values, objectives and priorities for action into the curriculum. Effective actions promote involvement by engaging the educational community in the elaboration, control of compliance, and evaluation of the rules of coexistence of the centre, being equally important the participation of both teachers and students in the specific rules for each classroom.

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Pandemic Induced E-Learning and the Impact on the Stakeholders: Mediating Role of Satisfaction and Moderating Role of Choice

By Ganesh Dash[*]

This study tries to assess the impact of e-learning on the stakeholders, especially teachers and students, and the differences. COVID-19, the current pandemic, is taken as the context. A structural equation modeling approach is undertaken, and PLS-SEM (partial least squares) (multi-group) method is chosen. Perceived Usefulness and Perceived Ease of Use are the independent constructs, with Behavioral Intention to Use being the dependent construct. Satisfaction is taken as a mediator, and Choice is used as a moderator. One hundred ninety-seven teachers and two hundred seventy-nine students comprise the sample. Results show that teachers' perceived usefulness has a significant and positive impact on their satisfaction. For both teachers and students, perceived ease of use has a significant and positive impact on behavioral intention. Satisfaction is a successful mediator for teachers but not for the students. Choice has proved to be a good moderator for the relationship between perceived ease of use and behavioral intention to use. The study is unique as a new moderator (choice) is introduced to the modified model, and in-depth analysis is conducted to assess the relationships and the differences between the two groups. Further, it is a multi-national study enhancing its universal implications.

Keywords: e-learning, pandemic, SEM, PLS, teachers, students, satisfaction, choice

Introduction

In today's knowledge economy environment, e-learning embodies an unconventional means of teaching and learning, and numerous organizations utilize these learning methods to develop the employees and students (Sawang, Newton, & Jamieson, 2013). E-learning can be defined as "the delivery of training and education via networked interactivity and a range of other knowledge collection and distribution technologies." It has also been described as a distance education that uses internet-based technology (ICT) and a learning management system (LMS) (Derouin, Fritzsche, & Salas, 2005). In today's technological environment, e-learning platforms are becoming critically important. Due to this sudden technological advancement in the education sector, various e-learning platforms are readily available to students. E-learning is also famous as web-based learning and is provided convenient and timesaving with the internet's help.

Furthermore, the e-learning methodology offers flexibility to students and learners to use it anytime and anywhere. Therefore, e-learning systems have become an important tool to impart a flexible mode of education to college

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students. Likewise, an online learning system is defined as an information system through which various learning aids like audio, video, and text can be assimilated through electronic mails, interactive sessions, conferences, assignments, and quizzes (Lee, Hsieh, & Ma, 2011). Therefore, this research is conducted to understand the young mind's views on e-learning and develop and validate a model utilized in adopting e-learning practices. The model would be beneficial and applicable to the e-learning systems of various universities and colleges. To understand the adoption process of e-learning Platforms, researchers have used different adoption theories.

This study builds upon the Technology Acceptance Model (TAM) (Davis, 1989) and extends the same with all the constructs validated in the context of E-learning technology. There are two major stakeholders in e-learning: teachers and students. In this study, the author has tried to find the significant differences in their perceptions of usefulness, ease of use with their satisfaction levels, and the resultant behavioral intention to use. Whether satisfaction mediates the proposed relationship in the same manner or differently for both is the focus. Further, a new moderator "choice" is added to verify the interaction effect is the same for both or not (Dash & Chakraborty, 2021a). Ultimately, the author has tried to compare these two groups' adoption of eLearning induced by the current pandemic. This study provides specific implications for the Governments, regulatory bodies, platform providers, and administrators to improve the existing system. Taking both the countries' progress in implementing the e-learning system and the resultant impact on the stakeholders, i.e., the teachers and the students, is the author's focus in this study.

The following section deals with a review of existing literature and consequent hypotheses development. It ended up with an integrated conceptual framework to be tested with empirical data. Section three discussed the methodology and section four discussed the results. Section five provided a general discussion with implications. The last two sections dealt with limitations, future directions, and the conclusion of the study.

Literature Review

Numerous elements are involved in shaping the technology usage of the faculty members (Stockless, 2018) that can enhance or damage the adoption of the same. Attitude towards technology (Mehta, 2021; Teo, Luan, & Sing, 2008), perceived usage, or technology-need fit (Mehta, 2021; Aubusson, Schuck, & Burden, 2009; Uzunboylu & Ozdamli, 2011) is considered as the elements. Major studies with empirical evidence from across the globe have found that perceived usage and ease of use can affect the technology adoption by teachers (Mehta, 2021; Keong & Wah, 2017; Kalogiannakis & Papadakis, 2019). Numerous studies have been carried out on teachers' acceptance of technology (Scherer, Siddiq, & Tondeur, 2019); these studies appear to be focusing on two trends – incorporation of digital competencies in curricula and assessment (Beller, 2013; Siddiq et al.,

2016) and encouraging teachers to use technology in their teaching (Shute & Rahimi, 2017; Straub, 2009).

The achievement of any data framework relies upon using the clients' framework (Almaiah, 2018). As a result, in terms of the online learning framework, the understudy adoption of e-learning is one of the fundamental indicators for online learning framework achievement. A few studies in the previous literature have concentrated on concerns related to online learning selection in several countries worldwide. For example, Saad, Alias, & Ismail (2013) used TAM with the IDT model to scrutinize the fundamental factors that affect Malaysian college goers' use of an e-learning system. According to the results, relative points of interest, recognizability, trialability, saw similarity, intricacy, and saw pleasure are the factors that affect learners' judgment to use an online learning system in Malaysia.

UAE was used as a contextual analysis for a quantitative study by Salloum et al. (2019). The findings revealed that four variables (imaginativeness, efficiency, confidence, and knowledge sharing) were correlated with improved online learning system acceptance among learners. Brown and Charlier (2013) examined the factors that influence understudy adoption of e-learning based on TAM3. He discovered that fun-loving personality, self-adequacy, and uneasiness when using PCs, perception of outside influence, emotional expectations, and perceived importance were the most important factors of online learning approval. In any case, social effect, provability, and perceived enjoyment were not related to the acceptance of e-learning systems in Saudi Arabia. Almaiah, Jalil, and Man (2016) suggested a new structure based on the Delphi strategy for evaluating the achievement variables of online learning system use in Saudi Arabia. Results included 11 essential components grouped into four spaces that promoted site efficiency, innovation choices, top administration support and e-learning knowledge among faculty and students.

At one of the universities in Saudi Arabia, Mukred et al. (2019) used the UTAUT model to examine the variables affecting understudies' use of e-learning frameworks. They discovered that expectations about execution and exertion affected e-learning acceptance. Chang, Hajiyev, and Su (2017) found that emotional expectations, experience, and happiness influenced e-learning acceptance in Azerbaijan. TAM was also used to analyze factors affecting e-learning identification. Self-adequacy, emotional standards, happiness, nervousness, and involvement in using computers significantly affected understudies' acceptance of e-learning (Soyşen, 2016; Abdullah & Ward, 2016). In general, researchers discovered that scholarly staff information on learning innovations, understudy information on PC systems, and specialized foundations were essential factors in promoting successful e-learning recognition in Saudi Arabian colleges (Alhabeeb & Rowley, 2017; Sabr & Neamah, 2017).

The critical challenges in selecting an e-learning platform in developing countries were a lack of ICT knowledge, a helpless system base, and a lack of substance improvement (Hasan & Bao, 2020). Another study discovered that system attributes, web comprehension, and PC self-viability are the key issues that impede the effective implementation of an e-learning framework in the classroom

(Vershitskaya et al., 2020). Three critical challenges of e-learning, according to a comparative study conducted in Kenya, are a flawed ICT system, a lack of professional skills, and budgetary constraints (Vershitskaya et al., 2020). According to Schaffer (2004), inadequate interface design, insufficient specialized assistance, and a lack of IT skills are the main roadblocks to successful usability.

Various e-learning apps are available in the market and at the college and university levels. India has the "SWAYAM" platform, which is offering many courses for free. Due to the pandemic like the Coronavirus, these apps and various e-learning courses are very demanding (Parthasarathy, 2020). The schools cannot run with physical contact due to the pandemic. Everyone needs to keep a safe distance from another and create e-learning or distance learning programs for those the classes have not happened (Faherty et al., 2019). Ash and Davis (2009) illustrated that e-learning programs could be supported by various mediums like TV, internet, radio, email, etc., during the pandemic like Flu. Countries that are not having proper infrastructure related to the technologies in schools find it challenging to implement the e-learning infrastructure at the COVID-19 pandemic (Sintema, 2020).

Hypotheses and Conceptual Framework

Taking the various constructs from previous theories and models (modified for e-learning), the author developed the following relationships separately for the teachers and the students. The author created a mediation-cum-moderation model for the same. It is a multi-group analysis of both the groups individually.

Impact of Perceived Usefulness on Satisfaction and Behavioral Intention to Use

Perceived usefulness can be described as the amount of enrichment added to the job performance when a new technology is employed to complete the job (Davis, 1989). It is always considered the primary antecedent of adopting new technology, especially e-learning (Salloum et al., 2019; Dash, Kiefer, & Paul, 2021; Dash & Chakraborty, 2021a; Tarhini, Hone, Liu, & Tarhini, 2017; Tan, Ooi, Sim, & Phusavat, 2012). Online learning usage and selection among clients is a complex problem for some schools, both in developed and developing nations, but it has been found that there is a lesser concern in developed countries about their learners' ability to understand and use the e-learning system, as significant complex strides have only been taken, as per written works (Wilson & Berne, 1999). Alzahrani (2015) demonstrated that the complexities of introducing an e-learning system in developed countries remain a reality amid the computerized divide with developing countries. PU always plays a massive role in boosting the students' and teachers' satisfaction levels (Dash & Chakraborty, 2021a; Mahmodi, 2017; Hsia, Chang, & Tseng, 2014). Empirical evidence proves that PU positively affects the teachers' and students' satisfaction with e-learning (Islam, 2011). Similarly, the user's perception of the technology's usefulness automatically drives her to use the

same (Cheng, 2011; Dash & Chakraborty, 2021a; Salloum et al., 2019). Hence, it is proposed that:

H1(a): For the teachers, perceived usefulness has a significant and positive impact on satisfaction.
H1(b): For the teachers, perceived usefulness has a significant and positive impact on behavioral intention to use.
H1(c): For the students, perceived usefulness has a significant and positive impact on satisfaction.
H1(d): For the students, perceived usefulness has a significant and positive impact on behavioral intention to use.

Impact of Perceived Ease of Use on Satisfaction and Behavioral Intention to Use

Perceived ease of use can be described as the perception of the degree of simplicity provided by the new technology to the user (Davis, 1989). According to Kenan, Pislaru, Othman, and Elzawi (2013), the primary reasons for the booming of Libya's e-learning activities are social, political, and financial imperatives. During ongoing years, planning and implementing e-learning frameworks have developed drastically (Hogo, 2010), and e-learning programs worldwide play a significant role in educating and teaching human beings (Franceschi, Lee, Zanakis, & Hinds, 2009). It executes as another preparation technique, which supplements customary strategies (Vaughan & MacVicar, 2004). Its last aspiration is to manufacture a propelled civilization for residents and support inventiveness and development (Kim & Santiago, 2005). This new outlook changes training from instructor-focused to student-focused (Lee, Yoon, & Lee, 2009). It has been found that an interactive video conferencing system has been introduced in the elementary schools in Greece, and it is providing good benefits for the students (Anastasiades et al., 2010). The recent effect of the Coronavirus on humanity accelerated e-learning in India (Saxena, 2020). Like PU, PEU is always considered to enhance the satisfaction level of the users (Salloum et al., 2019; Dash & Chakraborty, 2021a; Mahmodi, 2017). Further, if the user is confident about the ease of using the specific technology, her behavioral intention goes up (Tarhini, Hone, Liu, & Tarhini, 2017; Jaber, 2016; Salloum et al., 2019; Dash & Chakraborty, 2021a). In e-learning, PEU plays a considerable role in raising the user's satisfaction level and her behavior intention to use (Mohammadi, 2015). Hence, it is proposed that:

H2(a): For the teachers, perceived ease of use has a significant and positive impact on satisfaction.
H2(b): For the teachers, perceived ease of use has a significant and positive impact on behavioral intention to use.
H2(c): For the students, perceived ease of use has a significant and positive impact on satisfaction.
H2(d): For the students, perceived ease of use has a significant and positive impact on behavioral intention to use.

Impact of Satisfaction on Behavioral Intention to Use

User satisfaction leads to a positive behavioral intention to use the technology (Dash, Kiefer, & Paul, 2021; Dash & Chakraborty, 2021a). When the technology fulfills the user's needs or desires, her satisfaction level goes up, and subsequently, her intention to use the product is positively influenced (Mohammadi, 2015). Major empirical studies have found that user satisfaction positively affects the behavioral intention to use (Hassanzadeh, Kanaani, & Elahi, 2012; Dash, Kiefer, & Paul, 2021a). Hence, it is proposed that:

H3(a): For the teachers, satisfaction has a significant and positive impact on behavioral intention to use.
H3(b): For the students, satisfaction has a significant and positive impact on behavioral intention to use.

Satisfaction as the Mediator

Although both PU and PEU positively affect behavioral intention to use, they indirectly affect satisfaction (Dash & Chakraborty, 2021a; Salloum et al., 2019). The mediating role of satisfaction plays a huge role, especially when the behavioral intention is not significantly affected by the original determinants (Jaber, 2016). In e-learning, this finding is more crucial. Hence, it is proposed that:

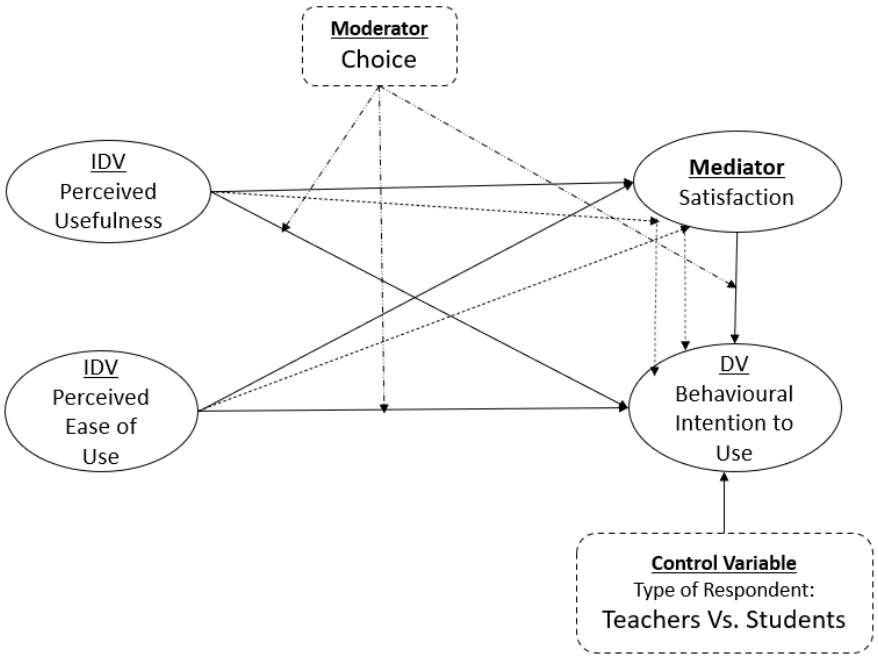
H4 (a) (b): For the teachers, satisfaction plays the mediator between perceived usefulness, perceived ease of use, and behavioral intention to use.
H4 (c) (d): For the students, satisfaction plays the mediator between perceived usefulness, perceived ease of use, and behavioral intention to use.

Choice as the Moderator

Similarly, an option must be provided to the users so that the outcome can be the best. The choice is considered a moderator in this study as it was felt that any e-learning technology must have alternatives for each feature and aspect (Dash & Chakraborty, 2021a; Bolliger & Wasilik, 2009). Option-less e-learning is boring and mundane, and it dampens the satisfaction level. Hence, the author has taken Choice as a moderator that influences the relationship of PU→BIU, PEU→BIU, and SAT→BIU. Therefore, it is proposed that:

H5 (a) (b) (c): For the teachers, choice moderates the relationship of perceived usefulness, perceived ease of use, and satisfaction with behavioral intention to use.
H5 (d) (e) (f): For the students, choice moderates the relationship of perceived usefulness, perceived ease of use, and satisfaction with behavioral intention to use.
All these hypotheses are depicted through a conceptual model in Figure 1.

Figure 1. Conceptual Framework



Methodology Used

Overview

As this study is part of a project work, the proposed model remains the same as the project. However, the focus was on the control variable for this study: type of respondent (teachers vs. students) and the difference in the estimated model for these two groups. First, the survey instrument was developed, and the collected data went through normality, reliability, and validity tests before running the SEM.

Instrument Development

Data collection was conducted through a structured questionnaire. Two sections were developed in the same. The first one mainly contained demographic and control variables, and the second section included the five constructs with sixteen items under them. Each item was developed into a statement with the option provided in "Strongly Disagree=1" to "Strongly Agree=5" format. The constructs and the items with literature supports are provided in Table 1.

Table 1. Constructs, Items and Major Literary Works

Construct	Items Tuned for E-Learning	Contribution
Perceived Usefulness (PU)	4 Items useful; improves the effectiveness of learning; improves overall course effectiveness; improves my productivity.	Dash and Chakraborty (2021a); Lee, Yoon, and Lee (2009); Masrom (2007); Liaw (2008); Sánchez-Franco, Martínez-López, and Martín-Velicia (2009); Imamoglu (2007); Ong, Lai, and Wang (2004)
Perceived Ease of Use (PEU)	3 Items easy to use; easy to understand; easy to find information.	
Satisfaction (SAT)	3 Items satisfaction with resources and quality. satisfaction with the provider/ platform. satisfaction with the stakeholders (teacher/ student).	Dash and Chakraborty (2021a); Dash, Kiefer, and Paul (2021); Zhang, Cao, Shu, and Liu (2020); Dečman (2015); Venkatesh, Morris, Davis, and Davis (2003)
Behavioral Intention to Use (BIU)	3 Items prefer e-learning to traditional learning. willing to participate in other e-learning opportunities in the future. e-learning should be implemented in other courses/	
Choice (CHO)	3 Items use with own choice; happy with choice; not forced to choose.	Dash and Chakraborty (2021a)

Table 2. Participants in the Study

		Total					
		Type of Respondent					
		Teacher	%	Student	%	Total	%
Age (years)	<30	52	10.92	74	15.55	126	26.47
	31– 45	98	20.59	149	31.31	247	51.89
	>45	47	9.84	56	11.77	103	21.64
	Total	197	41.35	279	58.65	476	100
Gender	Male	122	25.63	149	31.31	271	56.94
	Female	75	15.72	130	27.34	205	43.06
	Total	197	41.35	279	58.65	476	100
Education	UG	0	0	141	29.62	141	29.62
	PG	91	19.11	127	26.68	218	45.79
	PhD	106	22.24	11	2.35	117	24.59
	Total	197	41.35	279	58.65	476	100

Participants Details

As mentioned earlier, the data was collected as part of the e-learning project. Four hundred seventy-six respondents were finalized after the initial screening of the filled-in questionnaires. One hundred ninety-seven teachers and two hundred seventy-nine students from two nationalities (India and Saudi Arabia) were included. A hybrid sampling design was adopted that included stratification and convenience. Details of the participants are provided in Table 2.

Instrument Assessment

Exploratory factor analysis was the first step to be conducted to generate the constructs, and five constructs with more than 73% variance explained (good enough with just approx. 26% loss of information) (Ruscio & Roche, 2012). Then, a confirmatory factor analysis (CFA) (see Figure 2) was run further with the help of IBM SPSS Amos 24 (IBM, 2016). Finally, model fit indices were assessed, which met the thresholds set by eminent researchers (Nunnally, 1994) (see Table 3). Composite reliability, Cronbach alpha, AVE, and MSV values were also extracted with the help of various testing methods, including the Fornell and Larcker criterion (1981) (see Table 4).

Figure 2 and Table 3 depict the model fit of the measurement model developed. CFA revalidates the EFA findings of good factor loadings for all the items under the obtained constructs. Table 4 further boosts our model. Both CR and Cronbach alpha are greater than 0.78 (minimum observed), much above the cut-off value of 0.7. AVE values for the five factors were greater than 0.58 (minimum observed), much above the cut-off value of 0.5. For each of the constructs, AVE was greater than MSV. With all these measures, the data can be said to be ready for further analysis, i.e., testing the hypotheses (Dash & Paul, 2021; Dash & Chakraborty, 2021b).

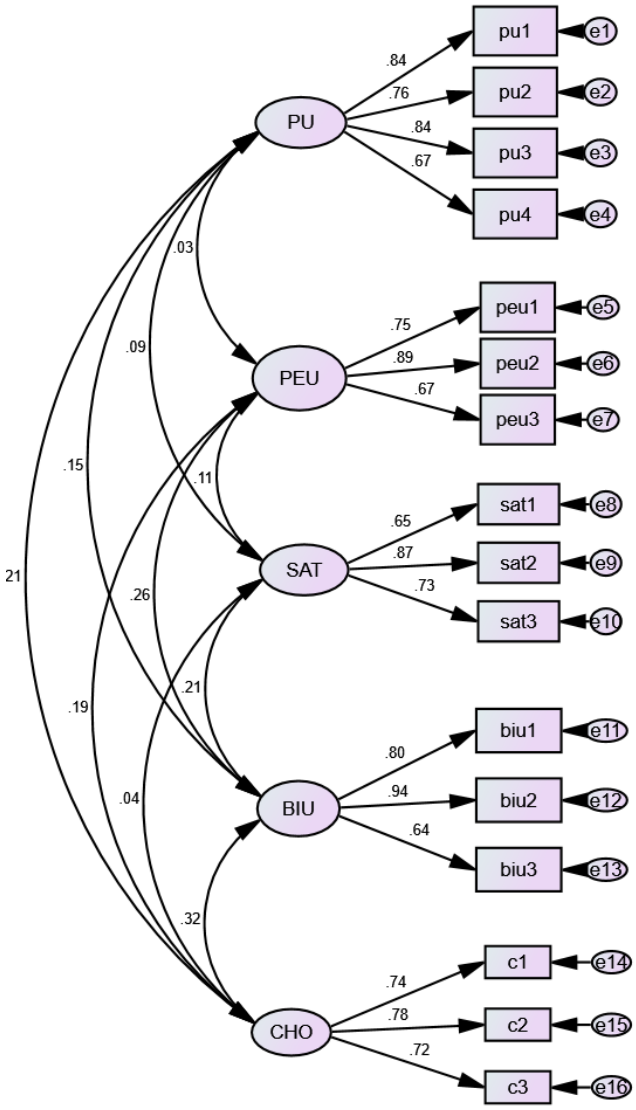
Table 3. Goodness-of-Fit Measures for CFA

Absolute Fit Measures	CMIN/df	2.95
	Goodness-of-fit Index (GFI)	0.93
	Adjusted goodness-of-fit Index (AGFI)	0.90
	Root mean square residual (RMSR)	0.06
	Root mean square error of approximation (RMSEA)	0.07
Incremental Fit Measures	Tucker-Lewis Index (TLI)	0.92
	Normed Fit Index (NFI)	0.91
	Comparative Fit Index (CFI)	0.94

Table 4. Other Assessments of the Measurement Model

	CR	**Cronbach Alpha**	**AVE**	**MSV**	**BIU**	**PU**	**PEU**	**SAT**	**CHO**
BIU	0.85	0.83	0.67	0.103	**0.806**				
PU	0.85	0.85	0.61	0.043	0.147	**0.782**			
PEU	0.82	0.81	0.60	0.066	0.256	0.029	**0.775**		
SAT	0.81	0.80	0.59	0.044	0.210	0.085	0.113	**0.759**	
CHO	0.79	0.78	0.58	0.103	0.321	0.207	0.190	0.040	**0.746**

Figure 2. CFA of the Constructs



Results and Discussion

The conceptual model was synced with the empirical data to test the hypotheses, and a structural equation modeling-based path diagram was developed. Smart PLS 3.3.3 (Ringle et al., 2015) was used to do the same. Multi-group analysis was conducted to have a comparative look. Figures 3 and 4 represent the SEM path diagrams for the teachers and the students, respectively.

Figure 3. Path Analysis (Teachers)

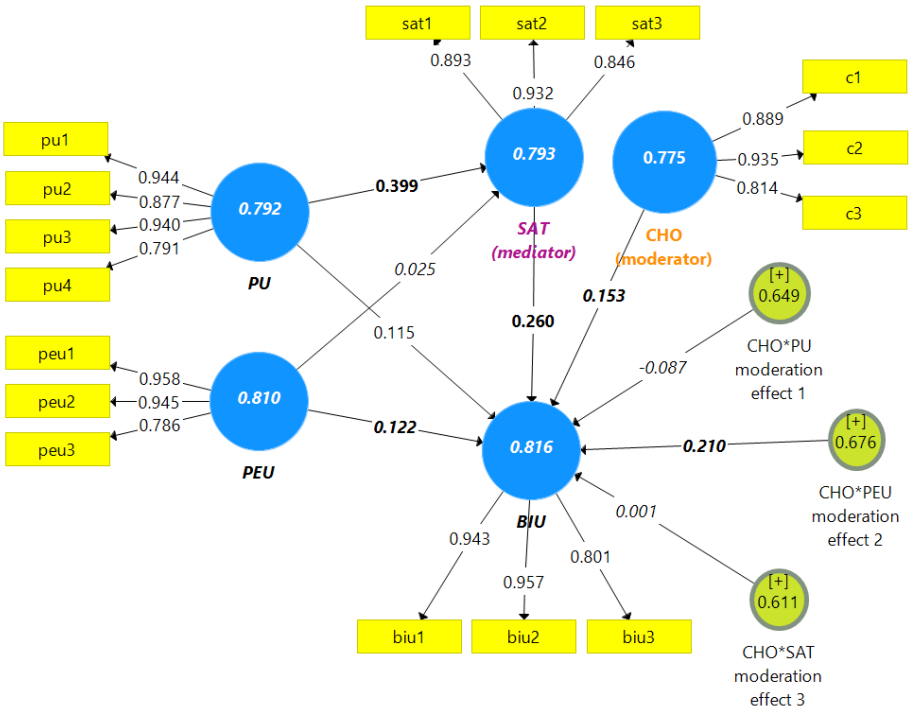
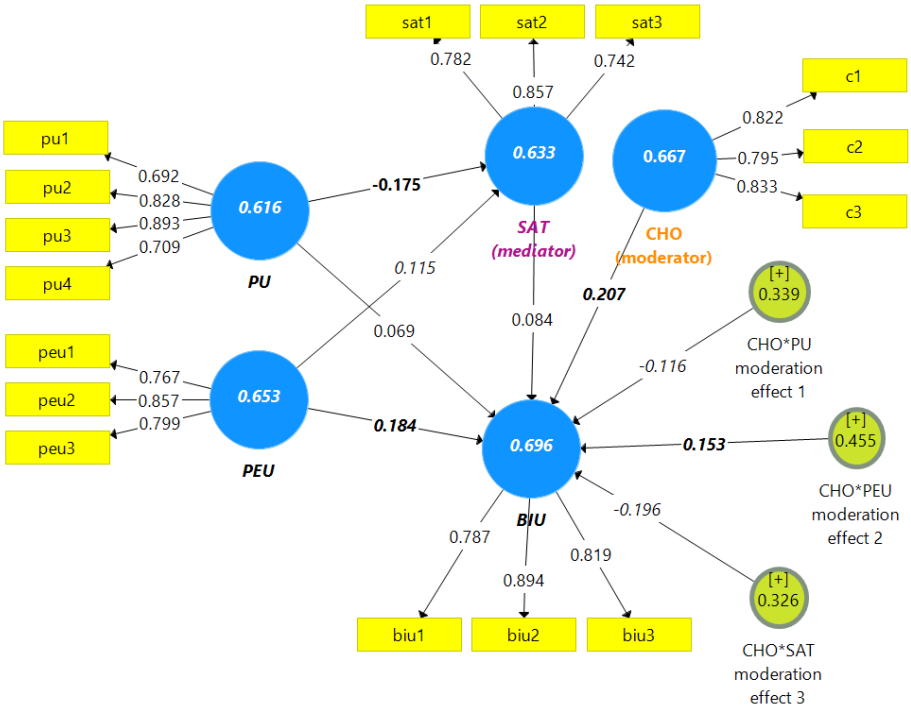


Figure 4. Path Analysis (Students)



Teachers: It has been found that perceived usefulness has a significant and positive impact on satisfaction, and perceived ease of use does not impact satisfaction significantly. Hence, H1 (a) is accepted, but H2 (a) is not accepted (see Figure 3, Tables 5-6). Here satisfaction is the mediator and choice as the moderator. Perceived ease of use significantly impacts behavioral intention, whereas perceived usefulness has a non-significant effect on behavioral intention. Hence, H1 (b) is not accepted, but H2 (b) is accepted (see Figure 3, Tables 5-6). Further, satisfaction too hugely affects behavioral intention to use. Hence, H3 (a) is accepted (see Figure 3, Table 7).

Students: It has been found that perceived usefulness has a significant but negative impact on satisfaction, and perceived ease of use does not impact satisfaction significantly. Hence, both H1 (c) and H2 (c) are not accepted (see Figure 4, Tables 5-6). Here satisfaction is the mediator and choice as the moderator. Perceived ease of use significantly impacts behavioral intention, whereas perceived usefulness has a non-significant effect on behavioral intention. Hence, H1 (d) is not accepted, but H2 (d) is accepted (see Figure 4, Tables 5-6). Further, satisfaction does not affect behavioral intention to use it significantly. Hence, H3 (b) is not accepted (see Figure 4, Table 7).

Table 5. H1: PU on SAT & BIU (Teachers and Students)

Hypothesis	**Hypothesized Relationship**			**Estimate**	**Accepted/ Rejected**
H1(a)	*PU (T)*	→	*SAT (T)*	**0.39****	Accepted
H1(b)	*PU (T)*	→	*BIU (T)*	0.11	Rejected
H1(c)	*PU (S)*	→	*SAT (S)*	**-0.17***	Rejected
H1(d)	*PU (S)*	→	*BIU (S)*	0.06	Rejected

** p < 0.01; * p < 0.05

Table 6. H2: PEU on SAT & BIU (Teachers and Students)

Hypothesis	**Hypothesized Relationship**			**Estimate**	**Accepted/ Rejected**
H2(a)	*PEU (T)*	→	*SAT (T)*	0.02	Rejected
H2(b)	*PEU (T)*	→	*BIU (T)*	**0.12***	Accepted
H2(c)	*PEU (S)*	→	*SAT (S)*	0.11	Rejected
H2(d)	*PEU (S)*	→	*BIU (S)*	**0.18****	Accepted

** p < 0.01; * p < 0.05

Table 7. H3: SAT on BIU (Teachers and Students)

Hypothesis	**Hypothesized Relationship**			**Estimate**	**Accepted/ Rejected**
H3(a)	*SAT(T)*	→	*BIU (T)*	**0.26****	Accepted
H3(b)	*SAT(S)*	→	*BIU (S)*	0.08	Rejected

** p < 0.01; * p < 0.05

The first three hypotheses provided an exciting picture. PU has a substantial impact on the users' satisfaction. Nevertheless, the similarity stops here. Teachers have a positive perception of usefulness, whereas students have a distinct negative perception. In this study, it was clear that the students think negatively about the usefulness of e-learning technology. The primary reason might be hidden in the

demographic variables, which should be explored in future studies. However, this result is unexpected and not in line with existing studies too.

It should be noted that the study was conducted during a pandemic, and there might be many other factors responsible for the same. Regarding the teachers, the finding aligns with the previous literature (Dash & Chakraborty, 2021a; Mahmodi, 2017; Hsia, Chang, & Tseng, 2014). PU has no significant impact on BIU for both groups. Both the teachers and the students positively perceive usefulness's effects on behavioral intention, yet not significantly. There is not much difference between both groups. This finding aligns with the previous literature, although many studies had reported significant impacts (Cheng, 2011; Dash & Chakraborty, 2021a; Salloum et al., 2019). PEU has no significant effect on satisfaction (for both teachers and students) but affects BIU significantly (for both groups). Satisfied or not, all the users perceive ease of use as a significant factor that affects their final behavioral intention to use. This finding provides many implications for the service providers to raise the PEU quotient to gain customers. Satisfaction might not be essential as presumed as the findings in general indicate. This finding aligns with the previous literature (Tarhini, Hone, Liu, & Tarhini, 2017; Jaber, 2016; Salloum et al., 2019; Dash & Chakraborty, 2021a). Teachers consider satisfaction has a significant role in shaping their BIU, but students do not think so. The finding is closely linked to the students' negative perception of usefulness in enhancing satisfaction. Although the students disagree with the teachers for this hypothesis, the result is still positive. It might be improved with a more extensive and diverse sample from the students. This finding aligns with the previous literature (Hassanzadeh, Kanaani, & Elahi, 2012; Dash, Kiefer, & Paul, 2021). The underlying difference can be explained clearly through the following hypothesis that tests the mediation role of satisfaction.

Satisfaction as the Mediator

As it was clear from the third hypothesis that satisfaction had no impact on BIU (students), it encouraged the author to find out the mediation effects of satisfaction. Results of the mediation effects are provided in Table 8. Both the direct and indirect effects are assessed. The same is done by bootstrapping and calculating indirect effects with significance levels. It was found that SAT had a significant indirect impact on the relationship: PU (T) → SAT(T) → BIU(T).

Nevertheless, for all other mediated relationships, the indirect effect was negligible. Hence, H4 (a) is accepted, and H4 (b) (c) (d) is not accepted. The result was expected as it was already known that PU does not affect BIU significantly but hugely affects SAT. Further, SAT has a significant effect on BIU. Therefore, it can be concluded that teachers perceive usefulness as a critical factor for their satisfaction, which affects BIU significantly even though it has no direct impact on BIU.

Table 8. Satisfaction as the Mediator

Relationship	Hypothesis	Direct Effect	Indirect Effect	Result
PU (T)→ SAT(T) → BIU(T)	H4 (a)	0.11	**0.10****	Full
PEU(T) → SAT(T) → BIU(T)	H4 (b)	**0.12***	0.01	No
PU (S)→ SAT(S) → BIU(S)	H4 (c)	0.06	-0.00	No
PEU(S) → SAT(S) → BIU(S)	H4 (d)	**0.18****	0.00	No

** p < 0.01; * p < 0.05

Table 9. Moderation Effects of Choice

Effect of "Choice" on the Relationship	Hypothesis	Estimate	Accepted/ Rejected
PU(T) → BIU(T)	H5(a)	-0.08	Rejected
PEU(T) → BIU(T)	H5(b)	**0.21****	**Accepted**
SAT(T)→ BIU(T)	H5(c)	0.00	Rejected
PU(S) → BIU(S)	H5(d)	-0.11	Rejected
PEU(S) → BIU(S)	H5(e)	**0.15***	**Accepted**
SAT(S)→ BIU(S)	H5(f)	-0.19	Rejected

** p < 0.01; * p < 0.05

Choice as the Moderator

The author introduced choice as a new construct in a recent related study and used it as a moderator to the relationship between PU, PEU, SAT, and BIU (Dash & Chakraborty, 2021a). Table 9 shows that the moderation effect of choice is almost the same for both teachers and students. Choice moderates the relationship between PEU and BIU for both the teachers and the students, whereas it has no role in other relationships. Hence, H5 (b) (e) are accepted, and all other hypotheses are rejected. CHO (T) strengthens the positive relationship between PEU (T) and BIU (T). Similarly, CHO (S) strengthens the positive relationship between PEU (S) and BIU (S) too. The moderation effects are visualized in Figures 5 and 6.

Figure 5. Graphical Representation of Moderating Influence of Choice on PEU (Teachers): H5(b)

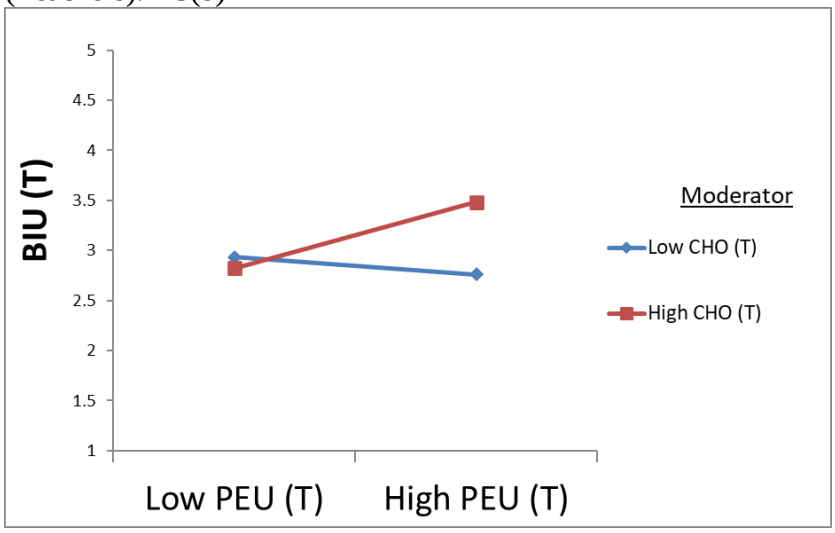
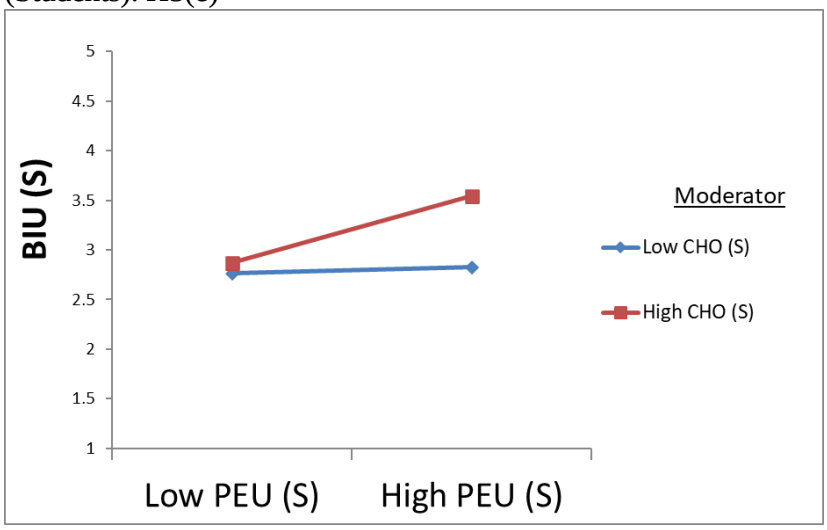


Figure 6. Graphical Representation of Moderating Influence of Choice on PEU (Students): H5(e)



Implications & General Discussion

Teachers must utilize this period to boost their skill sets. They can contribute to research to find better and more practical solutions. They can explore different LMS platforms to understand essential tools and features (Dash, Akmal, & Wasiq, 2021). Curriculum enrichment is one of the significant tasks that teachers must do to adapt to e-learning. Teachers must act as mentors in online interaction and support the success path of the students. As physical interaction is limited, teachers must present course clarity and structure with an excellent online presence. The learning community concept must be strengthened with a heavy online presence with AI tools. E-learning requires agile and learned educators. Hence, they must be well prepared to solve queries instantly with online discussion boards. Lack of preparation might result in embarrassment for the educators and the institutions. Learning analytics must be used to understand and execute the changes needed. Online resources must be shared abundantly to support the students' activities and engagement. Continuous communication is a must through various online tools for suitable intervention when required.

Similarly, students must perform their tasks as desired by the teachers. They should act as true mentees to the mentors. Maximum utilization of the LMS tools to solve their issues and problems should be promoted. Proper attention in the online sessions should be given. Timely submissions of tasks such as assignments and assessments must be followed. Unrelated queries or discussions must be avoided. Digital fatigue should be reduced by engaging in other activities. Administrators play a massive role in these times. They must facilitate the interaction of the teachers and students by providing necessary support. All the non-teaching activities must be supported and solved by them. Numerous problems faced by the teachers and students must be solved through an online grievance solution mechanism. Many Saudi Universities, especially, SEU have a

robust digital infrastructure for the same. Indian institutions lack the necessary means for the same. Both Governments must step in wherever required, especially when enforcement of regulations is required.

Similarly, many institutions with access to LMS implemented online teaching. However, many Universities struggled for few days to put everything in place. SEU led this process by imparting training and providing technical support to needy institutions. The government launched many online platforms to support e-learning for all levels starting from primary to university levels. Now, classes are being conducted through various LMS (Blackboard, Moodle, Canvas, etc.), assessments are being conducted through the same LMS or dedicated applications like Swiftassess (GamaLearn), and use of online meeting platforms (Webex, Zoom, Google Meet, etc.) are booming. In addition, social media are being used for imparting educational purposes. Schools in Saudi Arabia have started using platforms launched by the Government and private players like Classera (Dash & Chakraborty, 2021a).

In India, the reputation of e-learning is growing as it brings about a change in perspective in students' lives. This sharpens the students' abilities while offering the ease of learning anytime, anywhere! It has opened fresh avenues for students headed to explore and learn at their speed and time. There is an enormous opportunity for creativity to be integrated into the teaching industry, students' liking for new advancements and products increases. The development of virtual instruction in India is backed by growing discretionary cash flow, decreased online training expense, internet infiltration, cell phone client base, and expanded employability. Instructive examples also evolve quickly: few freelance students, few progressive students, and students from varied backgrounds. Besides student learning, ICT in education is being used to enhance inventiveness, teamwork, and knowledge sharing. ICT in training educational plans for students and instructors has been developed and introduced worldwide at the national level (Mehta, 2021; Sudevan, 2020). To view and distribute all instructive e-assets, NCERT developed an ePathshala. The presentation of SWAYAM contains another significant development by GoI. SWAYAM offers a single platform for online courses that utilize ICT and covers all advanced education subjects and aptitude division courses to ensure the availability of high-quality advanced education at an affordable cost. E-learning is funded by the Government of India (GoI). GoI has effectively developed apparatuses and inventions to advance it despite this. Substance growth, R&D innovation, human resource development programs, and staff training initiatives to enhance proficiency are examples of these activities. To reach out to people from all walks of life, the Indian government recently launched the PM e-VIDYA stage, which includes new DTH channels, one for each class. Such attempts have shown that a substantial part of the school population is profitable. In the wake of the COVID-19 emergency, India sees an eLearning blast (Sudevan, 2020).

Limitations & Future Directions

Although the author tried our level best during this pandemic, this study encountered few limitations that can be addressed in future studies. To begin with, although the researcher received enough responses to make a good study, around 700 samples were expected. The primary reason behind the same was the digital fatigue of the respondents. Secondly, it was planned to include physical expert opinion mechanisms in both countries, which were partially successful due to extended lockdowns and shutdowns. Thirdly, the time constraint of 6-9 months limited our venture and cut-short a comprehensive model to a manageable model. This provides a golden opportunity to include all the antecedents and consequents in a future study. Finally, our own digital and mental fatigue caused huge issues to maintain the momentum in two countries with multiple factors.

This study provides a massive opportunity for future research works. The author has considered teachers and students as the stakeholders. Nevertheless, administrators and platform providers can also be considered in the future. Although this study is the first to compare two Asian nations, there can be a developed vs. developing country approach with more nations involved. Specific impacts of demographic and socioeconomic factors must be investigated in detail. More antecedents and consequents of the existing constructs should be explored. For teachers and students, the model need not be the same. Individual models with distinct features must be developed with empirical evidence.

Conclusion

The primary objective of the study was simple. The author tried to assess the impact of the pandemic and subsequent adoption of e-learning by two stakeholders: teachers and students and the differences. Almost two hundred teachers and three hundred students from two countries were considered for this study. Two other objectives: satisfaction as a mediator and role of choice as a moderator in shaping the perceptions and the resultant differences, were also discussed. A new modified model was developed, and PLS-SEM was used to validate the same. Results show that teachers' perceived usefulness has a significant and positive impact on their satisfaction. Perceived ease of use has a substantial and positive impact on the behavioral intention of both teachers and students. Satisfaction is a successful mediator for teachers but not for the students. Choice has proved to be a good moderator (for both teachers and students) for the relationship between perceived ease of use and behavioral intention to use. In this study, it was clear that the students think negatively about the usefulness of e-learning technology. The primary reason might be hidden in the demographic variables, which should be explored in future studies. This result is unexpected and not in line with existing studies too.

The current pandemic will go away sooner or later, but the transition to e-learning might not be reversing soon. Blended learning will be the benchmark of

future learning modes. Teachers and students must evolve and adapt to this new normal of the post-COVID higher education sector.

Acknowledgments

This study is part of the e-learning project: "Transition to E-Learning: By Choice or By Force – A Cross-Cultural and Trans-National Assessment" funded by the Deanship of Scientific Research at Saudi Electronic University. It is a multi-group study with two comparative studies: India vs. Saudi Arabia (nationality) and Teachers vs. Students (stakeholder). In this study, the author has focused only on the stakeholders irrespective of nationalities. The author extends his appreciation to the Deanship of Scientific Research at Saudi Electronic University for funding this research work.

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Teacher Perceptions of Self-Efficacy in Teaching Online During the COVID-19 Pandemic

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To examine the effects of the sudden shift to online instruction due to the COVID-19 pandemic in the early months of 2020, we sought to get a firsthand understanding of the experiences of teachers who were required to make the change to full online teaching. Teaching online requires technological knowledge, but it also requires a different pedagogy in order to keep students engaged and motivated to learn. Many educators indicated that this was a significant challenge. Our goal was to illuminate teachers' experiences in order to include their voices in changes to educator preparation programs. A total of 699 complete survey responses were received representing educators in several grade levels working in nine states in the United States. Qualitative analysis revealed that many responses were related to extant research on teachers' self-efficacy. Thus, this paper will shed light on the experiences of educators during the first semester of 2020 including the months of January through April, and teachers' perceived efficacy. We find that teachers felt more efficacious regarding aspects of online teaching over which they felt an internal locus of control, such as delivery of curriculum and their own skill in the use of technology. For items over which they had less control, such as parental support and involvement, student motivation, and student access to adequate technology, teachers indicated much less efficacy. The majority of responses paint a complicated and somewhat dismal picture of the loss of personal connection with their students. Based on these data, recommendations for both education preparation programs, and policy are discussed such as districts and schools must provide sufficient professional learning opportunities and create a culture of collaboration amongst teachers that can assist them in building internal school capacity for good online instruction for their students. The COVID-19 pandemic should be used as an opportunity to evaluate gaps in digital equity and make positive strides to ensure all students, regardless of race, disability, economic background, or geographic location, have full access to quality online education.

Keywords: teacher preparation, educator preparation, online teaching, COVID-19, self-efficacy

Introduction

In the early months of 2020, the globe was faced with a growing coronavirus pandemic named COVID-19. Initial hopes that the pandemic would be contained to a few hot spots were quickly lost and governments around the world had to simultaneously determine how to best combat the virus and maintain some

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semblance of normal life. Schools in the U.S., in particular, were caught squarely in that fraught conversation. As fears of the virus increased, so too did voices that schools must remain open. Ultimately, many school districts decided that they must indeed close their doors and shift to an online learning environment. Thus, they engaged in a variety of modalities such as synchronous and asynchronous online delivery of instruction. Many had to navigate this shift over the course of a single weekend. What few anticipated was a 100% online delivery of all curricula to all students in all grade levels. With this extreme change in teaching and learning came many difficulties for which teachers were unprepared and left them feeling less than efficacious in their work. To examine the effects of this shift to online instruction, this study sought to get a firsthand understanding of the experiences of teachers who were required to make the change to full online teaching during the first semester of 2020.

The use of technology in the classroom is not new by any stretch of the imagination. In fact, it is an accreditation requirement for most teacher education programs. Thus, its use in one form or another in the classroom, and in educator preparation programs is a requirement (Voithofer & Nelson, 2020). Research suggests that these requirements are typically in the form of facilitating classroom experiences that otherwise would be difficult to accomplish within the four walls of a classroom (Riegel & Tong, 2017). However, Ottenbreit-Leftwich et al. (2011) studied the integration of technology in educator preparation programs and found that teacher educators and teachers had differing views regarding how to utilize technology in the classroom and what tools were relevant. Opinions differ regarding the value of technology as an instructional tool in the classroom. Li (2007) indicates that teachers' beliefs may affect their level of use and typically saw technology as supplemental or as an extension which was often eliminated when instruction was focused on the basics though students believed that technology facilitated learning well. It is possible that many teachers held this belief that technology is supplemental to the "real" teaching and, therefore, struggled with its use in the change to online teaching.

In addition, the digital divide, or the gap between those who have access to technology and those who do not, creates another layer of difficulty in online learning. Factors influencing this gap include income level, age, race, education, and physical abilities (Huffman, 2018). Many students did not have adequate access to online learning technologies, including internet access and devices, to be successful during the shift to online learning. It is estimated that 13.5 million school-aged children in the U.S. lack either broadband internet or a computer (National Education Association, 2020). Homes with multiple students were faced with having to share one computer in the home, perhaps with parents who were also forced to work from home. Despite teachers' best efforts to deliver effective online learning, many students, especially those from low income and minority families (Reddick, Enriquez, Harris, & Sharma, 2020) and students in rural areas (National Education Association, 2020), were unable to benefit due to limited access.

Teaching online requires not only technological knowledge but also a different pedagogy in order to keep students engaged and motivated to learn (Prensky,

2001). In a brick-and-mortar classroom, teachers are able to interact with students face to face on a daily basis. Teachers are able to build relationships with students and families and make instructional modifications, as needed, in real time. Teaching in an online environment often removes the more personal encounters between students and teachers, making it difficult for teachers to receive the student-specific information they need to find success. The perceived self-efficacy of teachers for online teaching is a critical factor in their success because it influences whether coping mechanisms would be initiated by an individual under stress, how much effort they will commit to a given task, and how long that level of effort will be sustained in the face of adversity (Bandura, 1977). If a teacher experiences failure early on in online teaching, they may be more likely to feel non-efficacious overall. Once established, self-efficacy tends to generalize to situations that are similar, which includes not only teaching, but also effectively communicating and working with families, which is critical for student success (D'Haem & Griswold, 2017).

Emotional arousal that occurs during stressful situations can also inform expectations of efficacy. Generally, the greater the stress and anxiety caused by a situation, the less efficacious people report feeling, even if they have had previous successful experiences (Bandura, 1994). Additionally, feelings of ineptitude can cause even more fear and anxiety than the original circumstances provoke. Considering that many teachers had their first experience teaching online during a deadly, worldwide pandemic, it is likely that they were already experiencing a high level of stress and anxiety that affected their feelings of accomplishment with their students.

An additional factor that can have a significant effect on teachers' self-efficacy is perceived locus of control. Heider (1958) defined this as the degree to which an individual attributes what happens to them to their own behaviors versus to outside forces over which they do not have control. If a teacher perceives an internal locus of control, they believe their actions and abilities will influence the outcome. On the other hand, a perceived external locus of control may cause the teacher to attribute success or failure on more powerful forces, such as the school system or family systems. These two competing views are often reported, respectively, as feelings of power or powerlessness in a given situation (Gilmor & Minton, 1974).

Research has shown that teacher self-efficacy can affect students' academic and social-emotional outcomes (Herman, Hickmon-Rosa, & Reinke, 2018), teacher burnout and attrition (Grant, 2006; Yıldızlı, 2019), and implementation of instructional and/or behavioral strategies (Poulou, Reddy, & Dudek, 2019). There is also significant evidence to show that self-efficacy is not static; rather, there are methods by which teachers can increase their self-efficacy in skills that are required to implement evidence-based instruction, including those necessary to teach online (Watson, 2006; Yoo, 2016). Unfortunately, the circumstances under which teachers needed to engage in online teaching during the pandemic may not have allowed enough time for building self-efficacy.

This purpose of this survey study was to determine in what areas teachers perceived struggles and victories. Our goal was to illuminate teachers' experiences with online schooling in order to include their voices in changes to educator

preparation programs (EPP). Thus, this paper will focus three specific survey questions that shed light on the experiences of educators during the first school semester (January – May) of 2020 and teachers' perceived efficacy. The primary research question was, "What are teachers' experiences with mandated online schooling?" Related secondary questions were, "How prepared were teachers to teach entirely online?" and "What significant challenges did they face. Qualitative data analysis revealed that many responses were related to extant research on teachers' self-efficacy. Thus, this paper will focus on survey questions that shed light on the experiences of educators during the first school semester of 2020 and teachers' perceived efficacy. Implications and recommendations for EPPs based on these responses will follow.

Methods

Table 1. Participant Demographics

	Number of Responses	Percent of Responses
Setting		
Rural – Small Town	381	54.5
Suburban – Middle/Lower Class	126	18.0
Rural – Country (farming, agriculture)	117	16.7
Suburban – Upper/Middle Class	64	9.2
Urban (inner city)	51	7.3
Other	22	3.1
Grade Bands		
PreK	15	2.1
K–2	102	14.6
3–5	118	16.9
6–8	138	19.7
9–12	233	33.3
Other (e.g., alternative school)	93	13.3
Diversity		
0–10% diverse	281	40.2
11–20% diverse	184	26.3
21–30% diverse	76	10.9
>30% diverse	147	21.0
Prefer not to say	11	1.6
Teaching Experience		
1–3 years	111	15.9
4–7 years	112	16.0
8–15 years	199	28.5
16–23 years	155	22.2
24+ years	122	17.5

Note: Definitions of Grade bands:

- Elementary Grade Levels
  - PreK: designation of 'pre-kindergarten' for students aged approximately 4-5 years old.
  - K-2: Kindergarten – 2nd grade includes three grade levels for students aged approximately 7-9 years old.
  - 3-5: Includes three grade levels for students aged approximately 9-11 years old.
- Secondary Grade Levels
  - 6-8: Includes three grade levels for students aged approximately 11-13 years old.
  - 9-12: Includes three grade levels for students aged approximately 14-18 years old.

Definition of Diversity in Demographics: Diversity relates students who identify their race or ethnicity as other than white. Identification may include American Indian/Alaska Native, Asian, Black/African American, Hispanic/Latinx, Pacific Islander, or more than one ethnicity/race.

Once Institutional Review Board approval from Southern Utah University was obtained, an electronic survey was designed using the Qualtrics survey platform and distributed via direct email and social media groups. A total of 699 complete responses were received representing educators in several grade levels working in nine states (see Table 1). The majority of responses came from educators working in Utah.

Two Likert scale prompts were used to measure knowledge and perceived efficacy for online teaching (See Table 2). After initial examination of the responses, two qualitative survey questions, "What insights into teaching have you gleaned from teaching online?" and "Do you believe this online experience will change schooling when you return? Why or why not?", were individually analyzed and coded for overarching themes. Results will be organized and reported according to the ways in which the concept of self-efficacy is demonstrated through these two qualitative survey items. In this section we review the themes that were identified through our qualitative analysis. Where relevant, we include the demographic information to add context to the respondents' words.

Results

Perceived Knowledge and Self-Efficacy

In response to the prompt, "I know how to deliver rigorous instruction online," nearly 50% of the respondents agreed or strongly agreed, while only a quarter of the respondents disagreed or strongly disagreed. Approximately 27% of respondents indicated that they were unsure if they possessed the requisite knowledge to deliver rigorous online instruction (See Table 2). When asked to respond to the prompt, "I am confident in my online teaching abilities," responses were very similar to the previous question. Approximately 57% of respondents agreed or strongly agreed; 17% disagreed or strongly disagreed, and 25% of respondents were unsure. Overall, these responses seem to indicate that most teachers felt they had the requisite knowledge to teach online and that they felt as though their endeavors were efficacious.

Table 2. Perceived Knowledge and Self-Efficacy Responses

	Number of Responses	**Percent of Responses**
I know how to provide academically rigorous instruction online (N=553)		
Strongly agree	46	7.3
Agree	256	40.5
Not Sure	172	27.2
Disagree	137	21.7
Strongly disagree	21	3.3
I am confident in my online teaching abilities (N=556)		
Strongly agree	69	12.4
Agree	251	45.1
Not Sure	141	25.4
Disagree	84	15.1
Strongly disagree	11	2.0

Insights Gained from Teaching Online

This novel experience for teachers was likely to produce a new understanding or provide insights into teaching that otherwise may not have been revealed. To understand what teachers gained from this shift to online instruction and how it might affect their teaching in the future we asked, "What insights into teaching have you gleaned from teaching online?"

To that prompt, there were 544 reviewed and accepted responses. The vast majority of responses (n = 313) to this prompt were related to a difference between face-to-face instruction and online pedagogy, in which teachers drew a distinction between their efforts in a face-to-face setting and their efforts in an online teaching setting. Next in quantity were references to the home environment and motivation to complete work (n = 183). Following in quantity were mentions of use of technology (n = 118), personal connection with students (n = 92), preparation to teach in an online setting (n = 83), specific training and ability to work in an online setting (n = 45), the ability to differentiate in an online setting (n = 42), and fewest in number of items coded were references to streamlining instruction (n = 13). The topic gaining the greatest number of codes, face-to-face vs. online pedagogy, will be included through the discussions of the other topics for this prompt because they serve to elaborate on what was intended for that main topic.

There were two distinct themes that arose from the teacher responses regarding teachers' locus of control. Teachers gave more favorable and positive remarks regarding elements of instruction over which teachers felt an internal locus of control. Comparatively, they gave less favorable and negative remarks over those elements of which they felt an *external* locus of control. For example, teachers' most numerous responses related to the home environment and motivation to complete work. Very few indicated that there was a positive result or experience with the shift to online instruction. Many commented that parents were unconcerned with schooling. One teacher remarked, "Parents view visual arts as an extra that can be pushed aside and disrespected" (Teaching 8–15 years, 21–30% diverse student population, mix of low- and middle-income community). Another said, "There is very little parent support. Parents truly expect us to do the bulk of all educating, rewards, consequences, discipline, etc. and want very little to do with any of it" (Teaching 16–23 years, 11–20% diverse student population, mostly low-income community). Teachers also expressed great concern with the difficulties to maintain contact with home and ensure students were working and learning. The distance created significant challenges.

Many teachers directly remarked on the physical use of technology. In fact, these responses accounted for the second greatest items coded within this prompt. There were many positive comments from teachers, especially regarding conditions they viewed with an internal locus of control. One teacher related that this has given them an opportunity to reevaluate their curriculum. Others remarked on a newfound value of technology in the classroom in that they could leverage its use to improve their instruction and student learning in areas such as extending the classroom, remediation, and differentiation. However, many others negatively commented on the use of technology. These related to the difficulty of students

navigating a variety of platforms without the support of peers, as is typical in a classroom. Beyond the actual use of technology, teachers mentioned the lack of availability of devices and sufficient access to the internet. One teacher stated, "It is very difficult, and the lack of resources our students have is becoming more prevalent" (Teaching 24+ years, 11–20% diverse student population, mix of low- and middle-income communities).

Based on these responses, though not overwhelmingly, teachers struggled to transition to online instruction and learning. It would appear that teachers tried very hard to deliver meaningful instruction in an online setting, but the unfamiliar setting and lack of preparation for such a move, left teachers questioning their long-held assumptions about teaching. One teacher's sentiment seems to encompass the feelings of many:

> I feel overwhelmed by many of the long-held misconceptions we (especially me) have had as educators. In the past, I never thought class size was as big of an issue as some of my colleagues. I lied to myself and told myself I was really great at connecting with kids, even in big groups. I don't know how to adequately provide 180 students a year with emotional and academic support. They deserve so much more. And, I am capable of so much more, but not with this workload. A builder can build one immaculate home at a time, or even a few, but have you ever lived in tract housing? We're building tract homes. (Teaching 16–23 years, 0–10% diverse student population, mostly middle-income community)

From the qualitative responses to this question about new insights, it is not possible to ascertain to what degree teachers' efforts were successful, only that they were perceived as extremely difficult and teachers only felt efficacious when they perceived an internal locus of control, even though the majority indicated feeling efficacious on the Likert questions.

Expectations for Next Year

There were 562 reviewed and accepted responses to the question "Do you believe this online experience will change schooling when you return? Why or why not?" Many items were double coded to add specificity. The topic with the most codes was titled "Future of Education with Technology" (n = 432). In descending order of code totals are, Using Technology, (n = 229), Remediation/Academically Behind (n = 89), Snow Days (n = 7) and Discipline (n = 3).

Many of the comments related to this prompt seemed to communicate optimism for the future of education after COVID-19. Generally, educators had the belief and expectation that they would be better prepared in the future if this or a similar situation were to occur again, citing increased awareness of available technology tools and skill in using them. One teacher stated,

> Yes. I will implement some of the online lessons I used when students are back in school. Who knows if this will occur again. Maybe we can help our students feel more prepared for this type of learning by preparing them in the classroom. (Teaching 16–23 years, 0–10% diverse student population, mix of low- and middle-income students)

Without directly mentioning *blended learning*, which is something of a hybrid model "that include[s] some aspect of face-to-face learning and online learning" (Hrastinski, 2019), there were responses that hinted at this modality. One teacher's response included, "I, for one, will integrate some of the resources I have used online in a live setting when we return (Teaching 8–15 years, 11–20% diverse student population, mix of middle to high income community).

There were also many responses about how teachers view technology as a resource that can assist with remediation, with students who are absent, and especially with the elimination of "snow days." One teacher also commented on the positive effect this might have on students' physical and mental health, saying,

> I think this could be helpful to help students that are absent to keep up with their class by connecting to lessons and school work online. I hope this helps students to stay home when they feel sick instead of coming to school because they are worried they will miss too much work. (Teaching 1–3 years, 0–10% diverse student population, mix of middle to high income community)

Notably, many teachers admitted that they felt better prepared to differentiate for individual students' needs when they returned to face-to-face instruction since having to teach online.

Many educators remarked that the online learning that was implemented was not effective for many students and that there will be students academically behind and will require remediation. For example, one teacher remarked, "There will be learning gaps. Reteaching will need to occur" (Teaching 8–15 years, 0–10% diverse student population, mix of low- and middle-income community). There were a few comments that focused specifically on lack of mastery of necessary prior knowledge and having to reteach what should have been taught already. Several educators also remarked that many students, parents, and community members would mistake the education that happened as a result of COVID-19 as true online learning when, in fact, it was far less adequate. One participant expressed this well, saying, "If ANYONE THINKS WHAT WE JUST DID FOR TWO MONTHS is Home School, they are mistaken!! We punted! We hit the "Big Rocks" - we tried to do things students can do at home--with little or no support" (Teaching 24+ years, 0–10% diverse student population, mix of middle to high income community).

Several teachers remarked how this glimpse into the homes of their students would impact the way they planned their instruction in the future. One teacher stated,

> Yes, in many ways it taught me to be much more efficient in providing immediate feedback for students. This was only true for problems requiring a fairly low level of cognitive demand. However, seeing the inequities in student's home lives has changed forever the type of homework I will assign. From now on I will assign low level practice that can easily be done at home with little to no support and QUICKLY. I will save the deep, engaging, "good stuff" for the classroom. (Teaching 16–23 years, 0–10% diverse student population, mostly middle-income community)

Another area that garnered its fair share of comments was the treatment of teaching as a profession. Several teachers shared the sentiment that this rapid shift to online learning should show the general public the importance of the work teachers do and, therefore, should increase the respect for the field as a whole. Teachers mentioned factors such as class size, salary, the appreciation of in-person education, and teachers being "taken for granted" as elements they hoped would change for the better after COVID-19, but several remarked that they did not have high expectations this would occur. One teacher lamented,

> I believe it will change public education dramatically. In a perfect world, teachers will get a lot more respect, schools will get more funding, and fewer students will be packed into Utah classrooms. Unfortunately, I don't hold out a lot of hope. (Teaching 24+ years, >30% diverse student population, mix of middle and high-income community)

One teacher's comment captured many of the mixed sentiments expressed whether this experience would change education. They stated,

> Yes. How could it not? Some things have adapted tremendously well to online, and they should STAY online. Other things have been derailed and are basically non-functional. We need to evaluate what actually gets to stay in education after this, and what should be online. (Teaching 8–15 years, 0–10% diverse student population, mix of low- and middle-income community)

Overall, while many teachers intend to take what they have learned from this emergency shift to online teaching and create a better in person learning environment, several of the teachers' comments indicate that this online educational experience has done more harm than good for the future of education.

Discussion

Much can be learned from the educators' responses in this study. This purpose of this survey study was to better understand in what areas teachers perceived struggles and victories during the sudden shift to remote instruction during the initial phases of the COVID-19 pandemic. The pandemic forced unavoidable circumstances onto all involved in the education of students, but the sudden shift to online instruction did not need to cause the angst and emotional stresses that were indicated in respondents' responses. The following discussion will explain what we learned in relation to our research questions and teacher's sense of self-efficacy.

Our primary research question was "What are teachers' experiences with mandated online schooling, and related secondary questions were "How prepared were teachers to teach entirely online?" and "What significant challenges did they face?"

The integration of technology in education is not new as it has been a focus of EPPs for some time (Riegel & Tong, 2017), yet as we have seen, its use was

neither fully integrated nor were administrators, teachers, students and parents aptly prepared for what they experienced. The lack of prior preparation and integration caused significant stress and emotional cost to teachers and likely academic losses to students. However, the educators surveyed demonstrated confidence in situations in which they perceived an internal locus of control, such as curriculum design and the integration of technology when they resume a "normal" school year. Where their perceived locus of control was limited, such as support at home, student access to technology, learning how to use new learning management platforms, gaps in learning and remediation, they demonstrated concern and doubt in their own efficacy to teach effectively and, in some ways, they were forced to do the minimum.

Teachers also referenced their experiences with varying levels of support by caregivers and state, district and school administrators. Approximately 75% of responses related to home or administrative support were negative. Many remarked that caregivers were overwhelmed, or otherwise unable to facilitate the online learning of their students. As D'Haem and Griswold (2017) found connection to home is critical for student success in an online setting. Similarly, many teachers remarked at difficulties they had reaching students. Some students had never used email as a primary means of communication and other students were never heard from again once the shutdown began. Because of the difficulties contacting and engaging students, many remarked about how they had to streamline their curriculum and cut the "fluff." Time was limited and transitions were difficult, so adjustments were made to ensure that the most critical curriculum was delivered at the expense of some of the fun work that teachers generally employ to make the classroom and learning enjoyable. Similarly, some teachers bemoaned that their curriculum had been reduced to packets.

The suddenness of the shutdown presented difficulties that many respondents struggled to manage. However, there were some who had begun creating a digital curriculum and digital presence long before the shut down, and for them, the struggles were not as prevalent. When asked what they learned from this experience and how they felt this may affect the future of education, many remarked that they will apply some of the successful tools they utilized when they re-enter the classroom in the fall. Among those realizations, some remarked that they see opportunities to better differentiate instruction using technology than they had before, and some remarked that snow days may be a thing of the past because it will be a far simpler thing to shift to online instruction if the weather turns problematic. When answering those same questions, some remarked that they believed parents and community members may have a greater sense of respect for teachers and their work than before the shutdown.

It is incumbent upon educational leaders working with Local Education Agencies (LEAs) and Educator Preparation Programs (EPPs) to address the concerns identified by educators for a number of reasons, including quality of instruction, student learning, student access to instruction, and growth and popularity of online learning. LEAs and EPPs should seek to improve their programs to ensure that inservice and preservice teachers have adequate understanding and practice in delivering high quality instruction in an online

setting, in turn developing an internal locus of control regarding these factors. It is in this light that we make the following recommendations.

Recommendations

Preparation in Use of Technology for Online Learning

When teachers feel that they have sufficient control over their instruction they are likely to feel more confident and thus deliver better instruction (Herman Hickmon-Rosa, & Reinke, 2018). Therefore, teachers need sufficient preparation and practice with online instruction so that they experience the same levels of confidence in an online setting as they do in a face-to-face setting (Lei, 2009). To facilitate this, LEAs and EPPs must allocate sufficient resources of time and money to online instruction preparation. This includes training and encouragement to utilize technological resources as a regular part of instruction whether students are in the classroom or attending remotely. Training should enable teachers to determine which tools and strategies work best for face-to-face instruction and which tools work best for online instruction at their specific grade level (D'Angelo & Wooley, 2007; Ottenbreit-Leftwich et al., 2011) and provide ample opportunities to practice using these during clinical experiences. If the use of technology were a regular part of instruction, teachers would gain the confidence necessary to be successful in both settings (Casey & Rakes, 2002).

Few respondents in this study indicated that they received the majority of their online instruction preparation during their preservice teacher training. For those who have been teaching more than 10 years, that may not be a surprise; however, for those teaching fewer than 10 years, this should be startling to educator preparation professionals. Teaching in an online setting must become a regular and embedded part of preparation programs including learning management systems, planning, assessment, and delivery that are unique to the online setting. For inservice teachers who lack this skill, it must be provided through professional development or other inservice trainings. Without sufficient instruction and practice teachers will not be able to transfer what they have learned for face-to-face instruction into an online setting.

Preparation for Effective Online Engagement

Research has long demonstrated that fostering active student engagement is positively correlated with student achievement (Council for Exceptional Children & Collaboration for Effective Educator Development, 2017; Lei, Cui, & Zhou, 2018). Teacher education devotes a considerable amount of time teaching educators how to build relationships with students, use appropriate questioning strategies, and implement collaborative strategies, all which have been shown to increase student engagement in learning. Unfortunately, almost all of this instruction is based on students and teachers being in the same physical classroom space and little attention is paid how this may be accomplished in an online setting. Teachers need to learn which engagement strategies differ in the online environment and be

fluent in using those that work best for students. Bond and Bedenlier (2019) identified four important factors in student engagement: teachers, curriculum and activities, peers, and family.

Teachers. First, student engagement is more likely when students view teachers as effective in using technology for teaching and when they appear supportive to student needs. As stated above, teachers need to be effective in using technology tools, but of equal importance is that teachers reach out to students to build relationships and offer assistance in the online environment. As this study showed, teachers found difficulty in maintaining a connection with students. Teachers and students were unfamiliar with how to engage with each other in a remote setting. Teachers need to be present in online courses, providing regular and personalized feedback to students (Ma, Han, Yang, & Cheng, 2015), and students also need practice with how to maintain this connection with the teacher and each other. Further, teachers need to be clear with their expectations for assignments and make themselves available to students if they encounter difficulties and to be clear with students how to request help. If teachers consistently encourage students to ask questions and reach out when they need assistance, and then follow-up with students to ensure understanding, students are more likely to be more engaged (Bao, 2020).

Curriculum and Activities. Second, the curriculum and activities chosen for online use need to be relevant and challenging to students (Mahmood, 2021; Mayer, 2019). Assignments that involve collaboration and that are related to real life are more likely to create active student engagement. Teachers must be careful to avoid "busy work" and assignments that seem redundant, both of which promote disengagement. Mayer (2019), referencing a constructivist model, includes recommendations for online delivery that carefully designs instructional content by reducing cognitive load for extraneous tasks in order to maximize learning on generative tasks. In sum, the recommendations amount to wisely including materials and designing assignments that keep the focus on the learning through natural uses of language and gestures while simultaneously minimizing wasted efforts like searching for relevant information, links, or cluttered interfaces.

Peers. The third factor, peers, is closely related to the factor of curriculum. Using instructional strategies that promote active learning with peers, in both face-to-face and online settings, is valuable for student engagement (Rands & Gansemer-Topf, 2017) and students need to feel a sense of community with peers and instructors (Lear, Ansorge, & Steckelberg, 2010). Students need to be able to see and have meaningful social interactions with each other, even in an online environment. Classes need to be structured so that, even if a student does not have video capabilities, there is a picture of each student visible to the rest of the class. Also, interactive activities need to focus on true interactions centering on investigation of authentic problems, not just rote responses to a discussion topic (Martin & Bolliger, 2018). Teachers can utilize cooperative learning outside of classroom instruction to promote student connections, as long as they are attentive to grouping structures and reliability of group members (Kupczynski, Mundy, Goswami, & Meling, 2012). LEAs and EPPs need to ensure that all of the above

factors influencing student engagement in online settings are encompassed in the curriculum for teachers.

Family. The fourth factor, family, is one that was mentioned by teachers as critical to the success of online teaching and learning. Parental involvement in student learning can have a large impact on student engagement (Bond & Bedenlier, 2019). Teachers perceived that many parents were not supportive of teachers' efforts during the beginning of the pandemic and this contributed to less student success and increased teacher frustration. Given that many parents were also quarantined at home during the early months of 2020 due to business closures and work from home orders, the pandemic most likely created additional stress for them in addition to having their children learn from home. Since research shows that parental expectations towards education are a contributing factor in students' motivation and self-efficacy toward learning (Boonk, Gijselaers, Ritzen, & Brand-Gruwel, 2018), teachers must be prepared to facilitate parents' involvement, whether learning takes place inside the classroom or online.

Preparation for Working with Families

Many teachers in the study took exception to parents who appeared to be unconcerned about their student's education once instruction shifted completely online. Extant research has shown that parent-teacher collaboration is a critical factor in school success, both in academic and social skills (Carter, 2002), but successful partnerships did not appear to be the norm for the teachers in the study. It must not be assumed that families know how to be involved in the education of their children. Teaching is one of the only professions in which it is expected that those receiving the service (families) have an understanding of how to assist the professional. Effective teachers know how to communicate expectations to parents in a non-threatening manner and are able to teach parents how to create a home environment that encourages learning (Carter, 2002).

Of all the factors mentioned by teachers in the survey, working with families is most likely the one area in which teachers are least prepared when they graduate from EPPs (Epstein & Sanders, 2006). Although EPP faculty and preservice teachers both name communication with parents as being important, they also voice concern about the lack in depth of preparation for developing actual partnerships with parents (D'Haem & Griswold, 2017). If EPPs are only training future teachers how to write newsletters and conduct non-confrontational parent-teacher conferences, those teachers will be ill-prepared to discuss concerns with parents or to cultivate family partnerships to ensure student success. Preservice and inservice teachers must be given the necessary tools for working with diverse families and have ample opportunities to witness how skilled inservice teachers and administrators gain the trust and cooperation of families.

Recommendations for Policy

Raising Up the Teaching Profession

Education has seen years of falling enlistment into the teaching profession and years of rising attrition. A sense of failure or inability to perform well contributes to this problem (Herman, Hickmon-Rosa, & Reinke, 2018). As we have seen in this study, teachers neither felt prepared for, nor sufficiently supported in, their endeavors to teach online. Research has shown that school-based teacher networks, opportunities for collaboration, teacher input and decision-making power, and participation in school mentoring programs are all related to lower teacher attrition rates (Borman & Dowling, 2008). All of these factors depend upon adequate funding for schools and the advocacy of school leadership for changes in these working conditions that matter most to teachers. In order for teachers to be better prepared to teach online, schools must provide sufficient professional learning opportunities and create a culture of collaboration amongst teachers that can assist them in building internal school capacity for good online instruction for their students. Without sufficient investment in resources for online instruction, efforts to move to a virtual setting may worsen these already negative trends (Borman & Dowling, 2008; Darling-Hammond, 2003).

Access to Resources for All Students

Many respondents in this study remarked that students "disappeared" once school was fully online or that they had issues accessing the intended online resources. Many students, because of financial or geographical reasons, are unable to participate in their education in an online setting (National Education Association, 2020) and this is something over which teachers have no control. Online instruction can be a digital solution for those who are unable to attend in a regular setting, but many areas lack sufficient access to make this a reality. In order to move toward digital equity for all students, several policies and practices need to be enacted at the federal level. Affordable high-speed broadband should be available to all in the U.S., similar to a public utility like electricity, and every student in public school should have provided, at public expense, a device with the necessary software to complete schoolwork. The federal government should provide adequate funding and technical support for collaboration between schools, state departments, and other stakeholders to collect and evaluate data on students who need additional technological assistance. Additionally, that assistance should be provided both during and after school hours to ensure access to all families, regardless of work schedules and daytime availability. The COVID-19 pandemic should be used an as opportunity to evaluate gaps in digital equity and make positive strides to ensuring all students, regardless of race, disability, economic background, or geographic location, have full access to online education.

Conclusion

Open-ended survey responses provided an insightful look into teachers' experiences as they prepared for or thought about the unusual close to the 2019–2020 school year due to the abrupt COVID-19 closure. The majority of responses paint a complicated and somewhat dismal picture the loss of personal connection with their students. Some indicated a resigned understanding that the closure was unavoidable, and that students and teachers' safety was paramount. Others indicated that those involved did the best they could under the circumstances while also worrying about the academic and social losses their students would likely experience. These concerns were expressed only second in quantity to the negative emotions described by teachers.

This shutdown event has provided teachers, parents, caregivers, educational leaders, and policymakers an opportunity to review the use of technology to enhance education and to ensure equal educational opportunities for all students. EPPs should use the experiences of teachers to expand the provision of knowledge and skills to preservice teachers so that they are better prepared to teach in all environments. Likewise, policymakers should listen to the voices of teachers to learn of the triumphs and struggles faced during the COVID-19 pandemic and provide the necessary resources and supports to close the gaps in digital equity.

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Studying Habits in Higher Education Before and After the Outbreak of the COVID-19 Pandemic

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The COVID-19 pandemic has caused many changes in all areas, including education. In this paper, we discuss the changes in the studying habits of higher education students brought about by the new modes of education. The research was conducted in Slovenia at the University of Maribor on a sample of 272 students. We investigated whether there had been changes in studying time, studying space, mode of studying and learning during lectures, social elements, and the advantages and barriers of distance learning. We found differences in certain studying habits related to the time and space of studying which are mainly associated with the prohibition of movement and socializing outside the household. We noticed a decline in motivation and its connection with lowering learning goals and students finding it harder to focus on learning. However, we also found that the new mode of studying brings greater flexibility for students, so some want to continue to study in this way.

Keywords: studying habits, higher education, online education, pandemic, COVID-19

Introduction

The spread of the COVID-19 pandemic has affected all sectors of society and education in particular (Flores & Gago, 2020). Rahiem (2021) says that the transition to working and studying from home, which took place rapidly, caused numerous issues for the education sector, including higher education, with university students dealing with significant obstacles to their learning process. The outbreak of COVID-19 resulted in a digital revolution in the higher education system, with online lectures, teleconferencing, digital open books, online examination and interaction in virtual environments (Strielkowski, 2020, cited in Kapasia et al., 2020).

For some students and teachers, this has meant enormous changes in the educational process. Not all of them are used to working online using various platforms and learning management systems, nor are they used to not seeing their peers face to face. Students are confronted with various challenges, some of which could become a real problem. Farooq, Rathore, and Mansoor (2020) identified difficulties such as lack of institutional support, lack of student engagement, difficulties with internet accessibility, issues with online assessments and broader

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problems with understanding online education dynamics. Kapasia et al. (2020) showed that students face stress, depression, anxiety, poor network connectivity and an unfavourable study environment. Learning at home can be made difficult by siblings and other distractions. Rahiem (2020), cited in Raheim (2021), on the other hand, found out that learning remotely at home allowed students the flexibility to control their own time, which provided them with additional time for self-care and family. Rahiem's (2020) study also explained the technology barriers and challenges in using ICT. Students face device issues such as incompatible devices and sharing devices with other family members; internet connectivity issues such as unstable connection and limited or non-available internet access; the costs of internet access and new devices; and the skills needed for using new programs and apps.

All these changes, challenges and problems influence the way students learn and their studying habits. In our research, we wanted to determine whether students had changed their studying habits during the COVID-19 pandemic, i.e., whether the pandemic has influenced the way students learn. Are specific changes in studying habits related to inadequate ICT equipment, poor internet connection, less accessibility to teachers, reduced communication with classmates and reduced collaboration with classmates? And has the motivation of students to learn during the pandemic fallen?

Theoretical Background

Studying habits can be described as methods and means of obtaining information (Urh & Jereb, 2014). This may take place at the conscious or unconscious level. They help students organize their efforts to solve problems, develop skills, acquire knowledge and complete school obligations (Carter, Bishop & Kravits, 2011). In the psychology literature, habits are usually defined as behaviours activated automatically by recurring environmental cues and are seen as being typically formed through repetitive behaviour and learned stimulus–response associations (Volpp & Loewenstein, 2020). Habit formation is the process by which actions become automatic. We can create habits without intending to acquire them. Or we can cultivate or eliminate them intentionally (Psychology Today, 2021). Habits are routines of mostly subconscious regular repetition behaviour (Urh & Jereb, 2014, cited in Butler & Hope, 1995). Once patterns are developed, people take actions without a conscious decision to do so without the behaviour being proximally motivated by the deliberate pursuit of specific goals (Gardner, 2015). Old habits are hard to break and new ones are hard to form. That is because the behavioural patterns we repeat most often are etched into our neural pathways. Habits may persist even when attention or motivation declines. The good news is that it is possible to form new habits (Psychology Today, 2021). An important implication is that to change behaviour, one must often undo existing habits by managing exposure to cues and creating new patterns (Wood & Rünger, 2016).

Good studying habits are vital for improving learning and retention capacity, and they are not difficult to pick up. Undoubtedly, students face many issues in

their daily lives which compete for their attention (Ho, 2020). As already mentioned, the COVID-19 pandemic raised many additional obstacles students must overcome. What makes it difficult for a student to focus on learning. The issues the pandemic raised will never go away completely. Students need to be proactive and improve their studying habits, which can help them study over a given period of time. They need to realize why studying habits are essential and cultivate them to enhance their knowledge. Finding the right selection and implementation of studying habits can result in a more effective and efficient mastery of new knowledge that allows students to work more easily and better and improve adaptation both to changes resulting from the pandemic and to more general changes.

According to Loveless (2021), some students can get through school with minimal effort while others cannot. Successful students achieve their success by developing and applying effective studying habits. They schedule the times throughout the week when they are going to study and they stick to their schedule. Students who study occasionally usually do not perform as well as students with a plan and a schedule. Study time should become a part of students' daily routines. Compressing all of the study time into a few long days is not always working and is stressful. Time for studying should be every single day. Consistency and self-discipline are crucial. Developing good study habits will become a routine and help one maintain good performance throughout the study year. When scheduling study hours, students should choose blocks of time when they are at peak performance (Develop good habits, 2021). Some people work best in the mornings, others at night.

Taking breaks in between study sessions is very important. Prolonged studying is tiring. One cannot learn effectively when tired or under pressure. Taking breaks will refresh the brain and help absorb new information (Ho, 2020). White (2014) states that the 15-to-20-minute window is productivity's "golden hour". From our experience working with higher education students for over 20 years, we can say that studying for one hour and then taking a break helps students learn better.

Grohol (2016) says that many students make the mistake of studying in a place that is not conducive to concentrating. Students should choose an appropriate place to study where there are few distractions. Trying to study in a living room with a TV, a computer with games or even other people can be very difficult or even impossible.

Before we start studying, we need to ensure we have everything we need for work, from notebooks, books, pencils and calculators to drinking water, so we can study without unnecessary interruptions. Taking snack food and drinks to the study location will eliminate trips to the kitchen which break concentration (Chadron State College, 2021).

According to Zegarra (2019), it is essential to understand that there are many different learning styles and that each person will retain information better in different ways. Visual learners learn best from pictures, graphs and diagrams. They remember something by visualizing a picture of it in their mind. Auditory learners discover information by listening and interpreting information through pitch, emphasis and speed (Gilakjani, 2012). Kinesthetic learners learn through

physical activities. They use body, sense of touch and hands to learn. Logical learners need to use reasoning, logic and systems. Verbal learners favour using words and linguistic skills. Social learners like to learn with others or in groups (Zegarra, 2019). Solitary or intrapersonal learners prefer learning alone. It is essential to understand one's best learning style for successful learning. Working in groups enables students to get help from others, better and more quickly complete assignments, and teach others (Loveless, 2021). Some students prefer to practise by themselves. They practise by doing old exams and quizzes, depending on the course and availability (Grohol, 2016).

Another significant issue is taking good notes. These are beneficial and help to learn and remember important information. It is essential to understand not to take notes of everything, only of what is necessary. When teachers emphasize something, students should write it down (Develop good habits, 2021). A note-taking style might also depend on the learning style described above. For example, if someone is more of a visual learner, drawing diagrams in notes will help remember what is essential. But taking notes is not enough: revising them along with other class material is necessary. Successful students revise what they have learned. A well-known revision cycle is to revise shortly after the material was first presented and studied, then again the following week, the following month and six months on. The process of repetition does not have to be very long, and one does not have to repeat everything, only key points and keywords. If you do not revise, you can forget 80% of what you have learned in a few weeks. Frequent revision throughout the course will pay off during exams and ease pre-exam anxiety (Chadron State College, 2021).

Loveless (2021) states that simply learning without direction is not effective: students must know what they need to accomplish during each learning session. So before starting, a learning session goal that supports the overall academic goal needs to be set.

Enough quality sleep and food are essential studying habits that most learners do not manage properly – getting a good night's sleep and eating healthily influence the learning process. Students who consume unhealthy food, do not drink enough water and have little quality sleep will find it hard to retain information (Ho, 2020). In other words we must bear in mind that healthy living habits have a significant impact on learning abilities.

But there is one other component needed for successful study: taking responsibility for studying. According to Miller (2010), taking responsibility makes a lot possible in our lives. Taking responsibility for education means taking responsibility for homework, academic choices, seeking support if needed, attitude (believing in ourselves, being willing to learn), interactions with others, confidence and growth. If one works hard to learn effectively, the improved skills will soon become a habit and result in higher grades, knowledge, wisdom and confidence.

Method

Sample

The study sample consisted of 272 students from the University of Maribor, Slovenia. Of the 272, 35.8% were male and 64.2% were female; 81.6% were undergraduate and 18.4% postgraduate students; 74.6% were regular and 25.4% part-time students. Social science students accounted for 70.2% of the sample and the natural and technical sciences students for 29.8%.

Questionnaire and Procedure

The questionnaire contained closed questions referring to (i) general data (gender, level of study, mode of study and field of study), (ii) studying habits, and (iii) advantages and barriers of distance learning. The studying habits module was divided into four sub-modules: studying time (7 items), studying space (6 items), mode of studying (26 items) and learning during lectures (5 items). In addition, we included four items related to social elements. All 48 items were measured on a 5-point Likert-type frequency scale. Students were asked to choose from "1=Never", "2=Rarely", "3=Sometimes", "4=Often" and "5=Always" separately for the time before the pandemic and for the period of the pandemic. In addition, students were asked to indicate their average studying time per day.

Advantages and barriers of distance learning during the pandemic were studied using 19 items. Students were asked to indicate the level of agreement on a 5-point Likert-type scale from "1=I do not agree at all" to "5=I agree completely".

The online questionnaire was presented to students by professors during lectures and tutorials. Participation in this research was voluntary. The study was reviewed and approved by the ethics committee at the Faculty of Organizational Sciences, University of Maribor.

All statistical tests were performed with SPSS. Parametric tests (One – Samples *t*-Test, Paired – Samples *t*-Test, Paired – Samples Proportions Test, and Independent – Samples *t*-Test) were selected for normal and near-normal distributions of the responses.

Results

To determine to what extent and how the COVID-19 pandemic affected students' studying habits, means and standard deviation values for each of the 48 items in (ii) and overall of the sub-modules were calculated and then compared using a one-tailed Paired – Samples t-Test. Statistically significant differences were confirmed for *studying space* items and for *learning during lectures* items. Detailed results are given in Tables 1 to 5.

Statistically significant differences in the *studying time* sub-module were revealed for items 3, 4, 5 and 6 (see Table 1). Specifically, the test results showed that students studied on average more often in the morning and at night before the

pandemic than during it pandemic, while during the pandemic students studied on average more often in the afternoon and evening than before it.

Table 1. Descriptive Statistics for Studying Time Items and Results for t-Test

		Before Pandemic		**During Pandemic**			
	Studying time	**Mean**	**SD**	**Mean**	**SD**	***p***	
1	I prepare a studying schedule (plan for a week or a month).	2.91	1.379	2.98	1.464	0.143	
2	I study all the time.	2.87	1.213	2.97	1.265	0.079	
3	I study in the morning.	**2.96**	1.256	2.77	1.312	0.000	**
4	I study in the afternoon.	2.91	1.103	**3.36**	1.196	0.014	*
5	I study in the evening.	2.87	1.328	**3.15**	1.359	0.036	*
6	I study at night.	**2.40**	1.458	2.13	1.410	0.015	*
7	I study structured with breaks (e.g., 1 hour of studying, 15 minutes of rest).	3.50	1.272	3.00	1.345	0.191	
	Overall	2.87	0.593	2.91	0.696	0.117	

*: $p<0.05$; **: $p<0.01$

Statistically significant differences in the *studying space* sub-module were revealed for items 1, 2, 3 and 5 (see Table 2). Due to restrictions on movement and socializing during the pandemic, it is not surprising that students studied more often in the library or with classmates before the pandemic and more often at home, usually in the same room, during the pandemic.

Table 2. Descriptive Statistics for Studying Space Items and Results for t-Test

		Before Pandemic		**During Pandemic**			
	Studying space	**Mean**	**SD**	**Mean**	**SD**	***p***	
1	I study in a library.	**1.54**	0.948	1.11	0.491	.000	**
2	I study at home.	4.72	0.539	**4.80**	0.583	.013	*
3	I study at my classmate's place.	**1.68**	1.008	1.34	0.814	.000	**
4	The presence of others bothers me.	3.47	1.388	3.50	1.409	.208	
5	I always study in the same room.	3.78	1.143	**3.93**	1.096	.002	**
6	Before studying, I make sure that there are no disturbances (TV, telephone, etc.).	3.44	1.267	3.40	1.334	.221	
	Overall	**3.10**	0.527	3.01	0.515	.000	**

*: $p<0.05$; **: $p<0.01$

Statistically significant differences in the *mode of studying* sub-module were revealed for items 3, 4, 12, 13, 15, 16, 17, 25 and 26 (see Table 3). Studying in pairs or groups was more common before the pandemic. Monitoring students via video surveillance, especially if there are several students in a group, is very challenging, and there may be several options for using illicit devices like smartwatches, smartphones, magic calculators, live stream wifi glasses and others during exams. As the test results showed, during the pandemic, students used such devices more often than before. During distance education, students received a lot of e-material, which they studied directly via computer, whereas before the

pandemic, they had preferred to learn from printed notes or books and they more often learned from other students' notes. While students did not often ask others to test their knowledge before the pandemic, they did so even less during it. It is also crucial to note that students found it harder to start studying and stay focused during the pandemic.

Table 3. Descriptive Statistics for the Mode of Studying Items and Results for t-Test

		Before Pandemic		**During Pandemic**			
	Mode of studying	**Mean**	**SD**	**Mean**	**SD**	***p***	
1	I prepare carefully for studying (I take care of everything I need).	3.92	0.950	3.96	1.068	0.209	
2	I study alone.	4.53	0.711	4.57	0.784	0.191	
3	I study in pairs.	**1.92**	1.053	1.74	0.986	0.000	**
4	I study in a group.	**1.64**	0.871	1.48	0.822	0.002	**
5	I study with the help of mind maps.	2.26	1.215	2.20	1.244	0.093	
6	I study from the exams/tests.	3.28	1.227	3.24	1.310	0.232	
7	I study by completing tasks.	3.74	1.063	3.76	1.095	0.357	
8	I study by heart.	2.93	1.072	2.87	1.100	0.105	
9	I ask my classmates about unclear notions or terms.	3.42	1.165	3.35	1.198	0.097	
10	I find an explanation for unclear terms by myself.	4.01	0.860	4.05	0.917	0.159	
11	I ask the teacher about unclear notions or terms.	2.59	1.171	2.51	1.222	0.076	
12	I am using cheat sheets or other illicit devices (smart devices etc.) for exams.	1.50	0.840	**1.65**	0.903	0.001	**
13	I study from a book.	**3.04**	1.131	2.90	1.208	0.010	*
14	I study from my notes.	4.26	0.920	4.23	1.014	0.246	
15	I study from other students' notes.	**2.58**	1.251	2.43	1.259	0.002	**
16	I read the notes in e-format directly from my computer.	2.37	1.207	**2.82**	1.417	0.000	**
17	I study more easily from printed material than from a computer.	**4.30**	1.014	4.21	1.139	0.030	*
18	Before I finish studying, I ask someone to test me.	**1.84**	1.131	1.70	1.027	0.002	**
19	I find it challenging to connect theory with practical examples.	2.27	1.050	2.29	1.073	0.246	
20	I help myself with examples of other seminar assignments.	3.07	1.216	3.08	1.280	0.403	
21	I connect the learning material with other knowledge (also with other subjects etc.).	3.63	0.979	3.64	1.038	0.365	
22	I need help or instructions.	1.68	0.923	1.70	0.964	0.357	
23	I learn with pleasure.	3.05	1.116	2.99	1.192	0.128	
24	I revise the studyed material.	3.41	1.063	3.39	1.096	0.371	
25	I find it hard to start studying.	3.25	1.160	**3.42**	1.233	0.006	**
26	I find it challenging to stay focused – while studying, my thoughts tend to wander.	3.13	1.092	**3.34**	1.165	0.001	**
	Overall	2.99	0.329	2.98	0.377	0.427	

*: $p<0.05$; **: $p<0.01$

Re-designing the educational process from face-to-face to distance learning resulted in different patterns of student behaviour during lectures. This was confirmed by statistically significant differences for all *learning during lectures* items (see Table 4). Before the pandemic, students took notes more often, memorized more during lectures and participated in discussions more often.

Classes seemed less interesting to them during the pandemic, but they also estimate that they learned more by writing seminar papers.

Table 4. Descriptive Statistics for Learning During Lectures Items and Results for t-Test

		Before Pandemic		**During Pandemic**			
	Learning during lectures	**Mean**	**SD**	**Mean**	**SD**	***p***	
1	I take notes during lectures.	**4.01**	1.071	3.58	1.241	0.000	**
2	I remember a lot from the lectures.	**3.82**	0.894	3.53	1.017	0.000	**
3	I get bored during lectures.	2.63	0.945	**2.97**	1.026	0.000	**
4	I learn a lot by participating in discussions.	**3.64**	1.063	3.45	1.182	0.000	**
5	I learn a lot by writing seminar papers.	3.27	1.156	**3.40**	1.210	0.002	**
	Overall	**3.48**	0.534	3.38	0.572	0.002	**

*: $p<0.05$; **: $p<0.01$

Statistically significant differences in the *social elements* sub-module were revealed for items 1 and 2 (see Table 5). During the pandemic, fewer jobs were available for students. This could be one of the reasons why students devoted less time to student emplyment during the pandemic and more time to sleep compared to the time before the pandemic, as the test results show.

Table 5. Descriptive Statistics for Social Elements Items and Results for t-Test

		Before Pandemic		**During Pandemic**			
	Social elements	**Mean**	**SD**	**Mean**	**SD**	***p***	
1	I also have a full or part-time job while at university.	**3.45**	1.534	3.19	1.681	0.004	**
2	I get enough sleep.	3.44	1.162	**3.70**	1.107	0.000	**
3	I have healthy eating habits.	3.56	1.059	3.63	1.145	0.159	
4	The course is a big responsibility for me.	4.19	0.837	4.22	0.926	0.177	
	Overall	3.66	0.700	3.68	0.752	0.282	

*: $p<0.05$; **: $p<0.01$

In addition to studying habits, we were also interested whether there were changes in studying time. Students indicated how much time, on average per day, they studied before and during the pandemic. The results are presented in Table 6.

Table 6. Descriptive Statistics of Studying Time Items and Results for Proportions Test

Studying time	**Before pandemic**	**During pandemic**	***p***	
Up to two hours	69.9 %	65.5 %	0.086	
Two to four hours	25.8 %	26.8 %	0.407	
More than four hours	4.2 %	**7.7 %**	0.030	*

*: $p<0.05$; **: $p<0.01$

Sample results show that the proportion of students with longer studying times was higher during the pandemic. Using the one-tailed Paired–Samples Proportions

Test, it was confirmed that the proportion of students who studied for more than four hours per day on average was statistically significantly higher than before the pandemic.

To identify advantages and barriers that distance learning has introduced during the pandemic and how these affect students' studying habits, we inferred from responses to the 19 elements listed in Table 7. Students were asked to indicate the level of agreement on a 5-point Likert-type scale from "1=I do not agree at all" to "5=I agree completely". Mean values of responses with standard deviations are also given in Table 7.

Table 7. Descriptive Statistics of During-the-Pandemic Items

	Advantages and barriers of distance learning	**Mean**	**SD**
1	During the pandemic, my motivation to study has dropped.	2.85	1.318
2	During the pandemic, I have spent more time studying.	2.96	1.192
3	During the pandemic, I have needed assistance more often.	2.37	1.098
4	Studying has seemed much more difficult to me during the pandemic.	2.67	1.291
5	During the pandemic, I have been under more stress due to my studying.	2.71	1.266
6	During the pandemic, my communication with classmates has declined.	3.64	1.270
7	During the pandemic, my collaboration with classmates has declined.	3.48	1.309
8	The pandemic has drastically changed my studying habits.	3.09	1.229
9	Due to the pandemic, I have not had a suitable studying environment/space.	2.15	1.115
10	The pandemic has increased my digital literacy (the ability to find, evaluate and compile clear information through the use of computer programs and tools).	3.59	1.111
11	Due to the pandemic, I have lowered my learning goals.	2.10	1.111
12	I have not had the appropriate ICT equipment to study during the pandemic.	**1.85**	0.944
13	I have not had a suitable internet connection to study during the pandemic.	1.98	1.026
14	Teachers have been less accessible during the pandemic.	2.12	0.932
15	Teachers have been less interested in teaching during the pandemic.	2.13	0.974
16	Assessment of knowledge during the pandemic has not been appropriate.	2.27	1.054
17	Due to the pandemic, I have had difficulty accessing learning material.	2.75	1.164
18	I prefer distance learning to traditional learning.	3.16	1.410
19	Distance learning gives me more flexibility.	**3.93**	1.201

The item with the highest mean value (3.93) was item 19, "Distance learning gives me more flexibility." This was also the only item for which the one-tailed One–Samples t-Test confirmed an average agreement score statistically significantly higher than 3.5 (t=5.156, p=0.000), which confirms that distance learning for students represents a more flexible form of study compared to the classical one. The item with the lowest mean value (1.85) was item 12, "I have not had the appropriate ICT equipment to study during the pandemic." The one-tailed One–Samples t-Test confirmed that students on average disagree with statements 3 (t=2.368, p=0.042), 9 (t=1.148, p=0.000), 11 (t=2.100, p=0.000), 12 (t=1.851, p=0.000), 13 (t=1.981, p=0.000), 14 (t=1.124, p=0.000), 15 (t=2.129, p=0.000) and 16 (t=2.268, p=0.001), as the average agreement score is statistically significantly lower than 2.5.

A one-tailed Independent Samples t-Test was used to study the differences in the presented items according to gender (male, female), level of study (undergraduate,

postgraduate), type of study programme (regular, part-time), and field of study (social sciences, natural and technical sciences).

In studying gender differences, a significant difference was found for item 6, "During the pandemic, my communication with classmates has declined." The average agreement score for male students was found to be higher than that for female students (t=2.143, p=0.017).

When comparing student responses by the level of study, differences were confirmed for items 1, "During the pandemic, my motivation to study has dropped." (t=3.333, p=0.001), and 15, "Teachers have been less interested in teaching during the pandemic." (t=2.491, p=0.007). For both items, undergraduate students' average agreement score was higher than that of postgraduate students.

Analysis for the type of study programme showed significant differences for items 1, "During the pandemic, my motivation to study has dropped." (t=3.746, p=0.000), 7, "During the pandemic, my collaboration with classmates has declined." (t=2.096, p=0.019), and 8, "The pandemic has drastically changed my studying habits." (t=3.195, p=0.001). For all these items, the average agreement score for regular students was found to be higher than for part-time students.

In terms of field of study, the average level of agreement proved to be significantly different in more than half of the items when comparing groups of students. For all the following items listed below, the average agreement score for students of natural and technical sciences was found to be higher than that for social sciences students: 1, "During the pandemic, my motivation to study has dropped." (t=1.671, p=0.048), 2, "During the pandemic, I have spent more time studying." (t=1.836, p=0.034), 3, "During the pandemic, I have needed assistance more often." (t=2.441, p=0.008), 4, "Studying has seemed much more difficult to me during the pandemic." (t=2.001, p=0.023), 8, "The pandemic has drastically changed my studying habits." (t=1.706, p=0.045), 9, "Due to the pandemic, I have not had a suitable studying environment/space." (t=2.018, p=0.022), 11, "Due to the pandemic, I have lowered my learning goals." (t=1.907, p=0.030), 12, "I have not had the appropriate ICT equipment to study during the pandemic." (t=1.890, p=0.030), 14, "Teachers have been less accessible during the pandemic." (t=2.281, p=0.012), and 16, "Assessment of knowledge during the pandemic has not been appropriate." (t=2.677, p=0.004).

As the analysis of students' studying habits showed that during the pandemic they have found it harder to start studying and to concentrate, they got bored during lectures, and used illicit devices for exams, we also checked whether this was due to specific barriers of distance learning (16 items were selected from Table 7). For this purpose, Pearson Correlation analysis was used. The results are presented in Table 8.

Table 8. Correlation Analysis Results

Correlations	**I am using cheat sheets or other illicit devices (smart devices etc.) for exams.**	**I find it hard to start studying.**	**I find it challenging to stay focused – while studying, my thoughts tend to wander.**	**I get bored during lectures.**
During the pandemic, my motivation to study has declined.	0.243**	0.431**	0.383**	0.444**
During the pandemic, I have spent more time studying.	-0.131*	0.104	0.103	0.085
During the pandemic, I have needed assistance more often.	0.059	0.207**	0.219**	0.163**
Studying has seemed much more difficult to me during the pandemic.	0.020	0.240**	0.229**	0.181**
During the pandemic, I have been under more stress due to my study.	0.027	0.271**	0.288**	0.138*
During the pandemic, my communication with classmates has declined.	-0.024	0.105	0.119*	0.077
During the pandemic, my collaboration with classmates has declined.	0.001	0.154*	0.120*	0.085
The pandemic has drastically changed my studying habits.	0.032	0.099	0.144*	0.209**
Due to the pandemic, I have not had a suitable studying environment/space.	0.046	0.116*	0.153*	0.151*
Due to the pandemic, I have lowered my learning goals.	0.130*	0.226**	0.222**	0.259**
I have not had the appropriate ICT equipment to study during the pandemic.	0.006	0.015	0.091	0.125*
I have not had a suitable internet connection to study during the pandemic.	0.056	0.138*	0.187**	0.224**
Teachers have been less accessible during the pandemic.	0.125*	0.037	-0.009	0.310**
Teachers have been less interested in teaching during the pandemic.	0.256**	0.111	0.087	0.373**
Assessment of knowledge during the pandemic has not been appropriate.	0.105	0.165**	0.104	0.371**
Due to the pandemic, I have had difficulty accessing learning material.	0.040	0.115	0.148*	0.220**

*: $p<0.05$; **: $p<0.01$

Discussion

The COVID-19 pandemic has caused many changes in education. In this research, we tried to determine whether the changed modes of studying have also caused changes in the studying habits of higher education students. We found that the modes of studying have indeed had an impact and changed certain studying

habits of students, but not all of them. Changes in studying time, i.e., when students study (morning, afternoon, evening or night) were noticed. Before the pandemic, students studied more in the morning and at night, while during the pandemic, they have tended to study more in the afternoon and evening. This could be related to the restricted movement and prohibition of specific activities and socializing and the decline in student employment during the pandemic. Instead of going out with friends, doing sports activities, or working in the afternoon and evening, students could study. We did not detect changes in the duration of studying, except for those studying for four or more hours a day. The proportion of students with longer studying time during the pandemic was higher. Although Li and Lalani (2020) state that some research shows that students can learn faster online and that e-learning requires 40–60% less time to learn than a traditional classroom setting, we did not identify a shorter duration of studying. There were no differences in preparing the schedule or curriculum or studying breaks. Those who carefully planned before the pandemic and took breaks continued to do so during the pandemic. Students stated that they had no problems organizing studying time and combining it with other responsibilities. For some, it was even easier.

As expected, students studied more often in the library or with classmates before the pandemic and more often at home, usually in the same room, during the pandemic. In Slovenia, libraries were closed for a few months, and socializing outside the household was not permitted. We think these are the main reasons for students staying and studying at home. However, there were no changes detected regarding distractions during study. Those who could provide a learning environment free from distractions (telephone, television, radio, etc.) before the pandemic also maintained this during it.

Students who already studyed from exam assignments before the pandemic also did so during it. They also asked classmates or teachers for clarifications to the same extent as before. So despite stating that communication and collaboration with classmates had diminished, they remained connected and helped each other in cases of unclarity. It turned out that before the pandemic, they had studied primarily from classical textbooks and used other students' notes, while during the pandemic they studied more from e-materials, despite stating that they found it easier to learn from printed than from electronic sources. In many cases, they had no choice but to study from electronic sources, either because of the movement restriction and inability to access written material or because they did not have printers and could not print notes.

It turned out that the students did not have any problems in combining theoretical and practical knowledge or with connecting the learning material with other knowledge (also with other subjects etc.) as a result of the new mode of studying. But it was harder for them to start studying during the pandemic, they had problems staying focused and their thoughts tended to wander. This can be related not only to a decline in motivation, but also to the pandemic situation itself. Pudelko (2020) says that research in cognitive sciences today confirms what we know intuitively: learning requires attention, time and mind availability. We are paying attention to emotionally charged information. Not surprisingly, then, in a

context full of messages about the dangers of the pandemic, students find it difficult to focus sustainably on their studies.

We did not find any statistically essential differences related to stress due to study before and during the pandemic. Some students stated that distance learning is more suitable for them because there is no contact with people, which otherwise causes them the most stress. On the other hand, Kapasia et al. (2020) found that students have faced stress, depression and anxiety during the pandemic that has affected their learning.

Our research showed that students who had difficulties studying and staying focused lowered their learning goals and have not had a suitable studying environment/space during the pandemic. We also found that students who have needed a little more help/instructions during the pandemic have had difficulties staying focused and were bored during lectures.

In addition, we found a slight increase in the use of cheat sheets and other illicit devices (smartdevices etc.) during exams during the pandemic. We might attribute this to the more complex control of cheating in remote knowledge testing and students finding it easier to cheat. Reedy, Pfitzner, Rook, and Ellis (2021) also discovered that some students perceived cheating to be easier in online exams. But we also associated this factor with a decline in motivation and students lowering their learning goals. The research also connects the increased use of illicit devices with students' opinions that teachers have been less accessible and less interested in teaching during the pandemic. We think that all these factors encouraged students to use illicit devices during exams.

We were surprised that students took notes to a greater extent before the pandemic than during it. It also turned out that they remembered more from the lectures before the pandemic. It seems that students perceive the teacher and the courses differently live than over the net and therefore retain more. As already mentioned, students have been more bored during lectures during the pandemic than they were before it. That explains why they learned less by participating in discussions and more by writing seminar papers. Chakraborty et al. (2021) also found that students feel that they can interact better with professors in a physical classroom. As with some other factors, the increase in boredom during lectures was also associated with decreased motivation. The research showed that increased boredom during classes is associated with students lowering their learning goals and the opinion that teachers are less accessible during the pandemic and less interested in teaching. Higher boredom was also related to students' view that assessment of knowledge during the pandemic has not been appropriate and difficulties with accessing learning material. Kundu and Bej (2021) also found that many students were critical of the online multiple-choice question and the effectiveness of this type of examination.

As already mentioned, student employment turned out to have declined during the pandemic. Students were more likely to report getting enough sleep during the pandemic than before, which may also be related to the decline in student employment. Other studies also reported that students had extended their sleep time during the pandemic. Wright et al. (2020) found that students increased their sleep duration by 30 minutes during weekdays and 24 minutes at weekends.

The percentage of those who had seven or more hours' sleep per night increased from 84% to 92%. Blume, Schmidt, and Cajochen (2020), meanwhile, found that sleep duration had increased by 13 minutes.

Eating habits did not change during the pandemic, nor did the attitude towards study. Those for whom study represented a great responsibility before the pandemic said that it also did during it. The pandemic also did not affect regular revising of course material or learning pleasure.

We found that specific changes in studying habits are mostly not related to inadequate ICT equipment, poor internet connection, reduced communication with classmates or reduced collaboration with classmates. But we identified some changes related to less accessibility of teachers and students' perception that teachers are less interested in teaching. Some students stated that they have had problems with more demanding material in school because communication with professors is more complicated.

The study showed that online learning for students represents a more flexible learning form than the traditional one. Despite the decline in student employment, some students stated that the greater flexibility due to distance learning has allowed them to work regularly. Many stated that they have gained time for learning because they do not have to commute to lectures. They say the pandemic has even made their courses more accessible. Several other researchers also found that the main advantage of online learning was its flexibility. Gherhes, Stoian, Farcasiu, and Stanici (2021) found that the surveyed students considered the main benefits of online learning during the pandemic: flexibility of working time, the comfort of working from home and the variety of documentation sources, while Muthuprasad, Aiswarya, Aditya, and Girish's (2021) results indicate that flexible schedules and convenience are the major benefits of online learning. Online education offers students the opportunity to study at their own pace and at a time of their convenience. Hence flexibility and convenience are significant drivers behind the demand for online education.

Conclusion

The study found that the pandemic has caused specific changes in students' studying habits, especially in terms of when and where they study, with whom they study, how they take notes during lectures, how they participate in discussions, and how much sleep they get. However, it has not affected the preparation for learning itself, cooperation in cases of uncertainty, learning sources or the need for additional help.

More than study habits, the new mode of working has affected the well-being of students. They largely missed socializing with classmates and contact with their teachers. Some stated that they were lazy at first but got back into a routine quickly and got used to it and that they would even have a problem going back to the faculty again. Many believe that distance learning should be introduced as a permanent mode of learning or at least allow a choice between traditional and online learning. For some, online learning is very convenient, and some even do

not wish to return to the traditional classroom. They state that online learning is better in terms of time and finances and is more comfortable and that such learning does not seem more difficult.

Thus it would make sense in further research to examine what suits students in their study, what they like about online learning and what they miss to enrich the online learning experience. In all likelihood, future studies will need to be more tailored to the needs of the individual. From the students' answers here, it can be seen that online learning has proved to be much more suitable for some, while others wish to return to the traditional classroom and lecture hall. Some students state that it has been a positive experience for them and refer to there being no commutes to faculty, to the comfort of home, and to adequate toilet breaks and refreshments. One of them also stated that his grade point average had risen during the pandemic. As a negative experience, many students mention the lack of personal socializing with classmates, but this is not an especially worrying issue for others, because they are connected via Zoom and Messenger. One student also wrote that everything is good for something: you just have to look at the situation positively. Again others hope to get back to the faculty as soon as possible. Furthermore, the wishes and needs of individuals are also very different depending on the field of study. Therefore it would be reasonable to focus further research on the possibility of adapting courses to individual needs or individual students' studying habits not just during the pandemic.

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Examining Early Career Teachers' Formative Practices to Inform and Support Continuous Improvement in Educator Preparation Programs

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This year-long, multiple case study followed a small group (*N*=6) of graduates from an initial licensure Education Preparation Program (EPP) into their classrooms to observe their first year as licensed teachers in United States public schools. The study's purpose was twofold: 1) to explore the extent to which this group used formative assessments in their classrooms to positively impact student learning, and 2) to examine strengths and areas for improvement within our EPP based on our observations of the teacher participants' practice and impact on their students. Multiple data sources were collected and analyzed. Based on participant interviews, survey data, and observations, findings indicate that our EPP coursework and clinical experiences contribute to beginning teachers' effective use of formative assessments to impact student learning. However, findings support recommendations for EPP continuous improvement. This study highlights the importance of completing self-studies to determine strengths of an EPP and areas for improvement so EPPs, teachers, and K-12 students have greater success. To increase the effectiveness of teacher training, EPPs must continuously evaluate the efficacy of their educator preparation programs including evaluating their graduates' ability to transition from pre to in-service teachers and implement effective pedagogical practices that promote student success.

Keywords: formative assessment, educator preparation, continuous improvement

Introduction

Educator preparation programs (EPPs) are tasked with ensuring they graduate beginning teachers who have both pedagogical knowledge and instructional and managerial skills to effectively meet the needs of K-12 students (Worrell et al., 2014). To ensure that EPPs provide teacher candidates with relevant and high-quality preparation that positively impacts student learning, EPPs need to evaluate the quality and effectiveness of their preparation programs through various reliable measures and make adjustments based on data for continuous improvement (Feuer, Floden, Chudowsky, & Ahn, 2013; Worrel et al., 2014).

This multiple case study followed six first year public school teachers in the United States to explore the extent to which this group used formative assessments in their classrooms to positively impact student learning, and to examine strengths and areas for improvement within our EPP specifically related to formative

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assessment. The participants represented three licensure programs: undergraduate elementary/middle school, graduate elementary general education, and graduate special education. Multiple sources of data (e.g., observations, surveys, interviews, student work samples, assessment data) were used to understand the novice teachers' thoughts and practices related to implementing formative assessments and their impact on their students' academic growth. The authors of this paper are faculty who teach across the initial licensure programs. The findings from this research study were used to support continuous program improvement within the EPP preparing K-12 teachers in our initial licensure programs and for state and national accreditation reporting to document our effectiveness and plan for continual improvement in our initial licensure programs.

Literature Review

Formative Assessment

Formative assessment is the process by which teachers continually collect evidence of student understanding and skill, and provide students with specific and relevant feedback necessary to move forward and be more successful in their learning (Black & William, 1998; Heritage, 2007; Moss & Brookhart, 2019). The term 'formative assessment' has been defined and redefined over the decades starting with Scriven (1967) who used the term 'formative evaluation' to describe the role evaluation played in improving curriculum. Sadler (1989, p. 120) added a revised perception of formative assessment stating that, "[f]ormative assessment is concerned with how judgments about the quality of student responses (performances, pieces, or works) can be used to shape and improve student's competence by short-circuiting the randomness and inefficiency of trial-and-error learning". A decade later, Black and Williams (1998, p. 140) provided a more nuanced definition of formative assessment "to refer to all those activities undertaken by teachers-and by their students in assessing themselves-that provide information to be used as feedback to modify teaching and learning activities. Such assessment becomes formative assessment when the evidence is actually used to adapt the teaching to meet student needs".

Though the definition of formative assessment has morphed over the better half of a century, this essential, in-process, evaluation practice is seen as a linchpin of student success as it enables teachers to collect relevant student data that can be used to improve instruction to more effectively target students' needs. Included in formative assessment is the ability to clearly state learning goals, provide specific feedback, and understand how to move students through a progression of learning (Heritage, 2007). The element of providing specific, timely feedback is especially important as it has been tied to student outcomes (Hattie & Timberely, 2007).

Novice Teachers and Formative Assessment Practices

Teachers can impact student learning and achievement though the degree to which this can occur depends largely on a teacher's ability to skillfully use a range of teaching strategies (Darling-Hammond, 2000; Hattie, 2003; Holzberger, Praetorius, Seidel, & Kunter, 2019; Lekwa, Reddy, Dudek, & Hua, 2019; Stronge, 2002; Stronge, Tucker, & Hindman, 2004). There has been debate about teacher quality in relation to years of experience with some research indicating that novice teachers are less effective than more experienced teachers (Clotfelter, Ladd, & Vigdor, 2007). However, more current research posits that there is no evidence that teachers with 0-3 years of experience are less competent than their more veteran colleagues (Graham, White, Cologon, & Pianta, 2020).

Almost 50 years ago, Lortie (1975) stated that effective teachers continuously monitor their students' learning and use the information to improve their teaching. Research demonstrates that pre-service teachers gain a wide range of understanding of how to implement formative assessment practices during their time in clinical experiences and coursework during licensure programs (Cowan, 2009; DeLuca & Klinger, 2010). However, while preservice teachers recognize the value of formative assessment as a method for improving instructional practice (Bennett & Cunningham, 2009), understanding and effectively implementing formative assessment practices are two different things. Once in the classroom, novice teachers still desire more formative assessment knowledge and skills to better support their students and have a greater impact on student learning (Frey & Fisher, 2011; Furtak et al., 2015).

Even for experienced teachers, there are some aspects of formative assessment that are more easily achieved than others. For example, Johnson, Sondergeld, and Walton (2019) found that sharing learning goals, providing criteria for success, and providing feedback were all areas in which even master teachers needed more support. The researchers conclude that teacher education and professional development programs should focus more intentionally on these more difficult to implement aspects of formative assessment.

Since many novice, as well as experienced, teachers struggle to use formative assessment effectively to inform their instruction (Lamberg, Gillette-Koyen, & Moss, 2020; Saclarides & Gerardo, 2018), additional emphasis is being placed on formative assessment in both teacher preparation and professional development training. The goal is to help pre and in-service teachers develop and strengthen formative assessment skills and their ability to positively impact student learning (Darling-Hammond et al., 2009; Garet et al., 2011; Greenberg & Walsh, 2012; Taras, 2007). Pre and in-service training is essential because a challenge facing novice teachers is that even if their time as a teacher candidate provided some training and opportunities to implement formative assessment during clinical experiences, the demands and school culture of the beginning teacher's first job may not be conducive to the innovative and dynamic teaching required for formative assessment (Hamodi, López-Pastor, & López-Pastor, 2017). Furthermore, research suggests that from early career onwards, teachers and their students

benefit from ongoing professional development in the area of formative assessment (Kiemer, Seidel, Gröschner, & Pehmer, 2015; Furtak et al., 2015).

Continuous Improvement of Educator Preparation Programs

Research suggests that teacher quality is a significant factor in predicting, impacting, and improving student achievement (Aaronson, Barrow, & Sander, 2007; Hattie, 2003; Holzberger, Praetorius, Seidel, & Kunter, 2019; Lekwa, Reddy, Dudek, & Hua, 2019; Rivkin, Hanushek, & Kain, 2005). As the effect of quality teaching on student achievement persists over several years, Konstantopoulos and Chung (2011) emphasized that producing high quality pre-service teachers is critical. Thus, EPPs need to understand the practices most likely to produce quality teachers and ensure they are providing the most efficient and effective teacher preparation to their candidates. Analyzing its programs' effectiveness allows EPPs to see areas of strength and areas that need improvement so adjustments can be made to programs, courses, and clinical placements. This practice of continually collecting, examining, and using data for decision-making, commonly known as continuous improvement, uses a problem-solving approach to study and improve education and systems to help ensure the cultivation of educators who are prepared to fulfill their future roles and responsibilities as teachers (Dean, Lauer, & Urquhart, 2005; Langley et al., 2009; White, Hirschboeck, Donahue, & Torre Gibney, 2020).

Given that teacher quality is crucial to student success and FA is one practice that contributes to that success, the research questions guiding this self-study are as follows:

1. How do early career teachers' formative assessment practices impact student learning?
2. How do the study's findings guide us as teacher educators to provide a more effective teacher preparation program for our teacher candidates so their students have greater success?

Method

Our study used a multiple case studies approach to investigate the research questions (Yin, 1994). We recruited participants via email stating that participation was voluntary and open to students graduating with initial teacher licensure who had secured employment as a teacher in a local school district. Participants that responded were selected based on the programs represented in this study which included elementary/middle school licensure undergraduates, and the elementary general education and special education graduate programs. Each program had two participants (N=6) represented in the study.

We collected data throughout one academic year including semi-structured interviews and observations, informal and formal assessments completed in school and through distance learning due to COVID-19 (e.g., state reading assessments, curriculum-based measures (CBMs), individualized education plans, participant-

completed surveys of teacher effectiveness based on Silver, Strong, & Associates survey) (Noell, Brownell, Buzick, & Jones, 2014). To ensure more accurate and robust findings, we conducted interim and sequential analysis of individual cases and across cases (Miles & Huberman, 1994). To answer the research questions under investigation, we triangulated the study's quantitative results and qualitative findings to form meta-inferences (Teddlie & Tashakkori, 2009) which guided our recommendations for continuous program improvement.

Data Collection

Semi-Structured Interviews. We created open-ended interview questions to solicit participants' perspectives related to formative assessment practices, factors that impact student achievement, participants' areas of pedagogical strength, and areas in need of improvement related to supporting student achievement, beliefs about- and recommendations for- their teacher preparation program. We developed the formative assessment related interview questions based on essential components of formative assessment (Wylie & Lyon, 2016) and sought to align additional questions to our national accreditation reporting needs. We interviewed each participant three times over the course of the study using the semi-structured interview protocol.

Observations. We observed each participant during the first months of their teaching using the Candidate Preservice Assessment of Student Teaching (CPAST). CPAST is a formative and summative evaluation tool used to measure teacher candidates' pedagogical knowledge/skills, including evaluation of formative assessment practices, and professional dispositions during the student teaching practicum. CPAST is a 21-row rubric with a 0-3 scale (does not meet, emerging, meets expectations, exceeds expectations). We selected the CPAST because it is a valid and reliable observation tool (Kaplan, Brownstein, & Graham-Day, 2017) and the teacher participants were familiar with the structure as this was the same evaluation tool used during participants' clinical experiences by their university supervisors.

Survey. At the beginning and end of the study, we administered a teacher effectiveness survey basing questions on the Silver Strong teacher effectiveness framework (2011). We selected questions from the teacher effectiveness survey that best aligned to our first research question and the focus of the study, modifying to better fit our focus, timeframe, and participants. The participants self-assessed their effectiveness for various indicators on a 1-4 rating scale (novice, developing, proficient, and expert). "The ultimate goal of this framework is to create a common language for talking about what constitutes high-quality teaching and how classroom practice can be improved" (Silver, Strong, & Associates, 2011, p. 1).

Informal and Formal Formative Assessments. We collected de-identified assessment data from all teacher participants. These assessments included universal screening data (e.g., state reading assessment (STAR), i-Ready, easyCBM), and

teacher created-classroom assessments (e.g., quizzes, homework, exit tickets, worksheets, journal entries, Seesaw activities, Google Surveys, Google Doc assignments).

Evidence and Findings

Data analysis revealed that participants have a positive impact on student learning through their use of formative assessment practices. The following cases present multiple illustrative examples of teacher impact on student learning and share participants' formative assessment practices that positively influence student learning.

Case 1

This teacher participant is a sixth grade language arts teacher who teaches in an urban, linguistically and culturally diverse school setting. The classroom demographics include several students on individualized education programs, several English learners, and students identified as talented and gifted. To demonstrate this teacher's use of formative assessment practices, we provide data from Fall and Spring of the academic year (Table 1).

The teacher's goal was to measure student mastery of the English language arts standard, "Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text" (*CCSS 6Rl.1*). To do this, students completed this formative assessment, "Describe one internal character trait of the protagonist in your reading book and provide evidence to support your answer". The teacher graded each response based on a rubric.

Table 1 illustrates the growth from Fall to Spring on the standard. For example, in the Fall, there were no students who demonstrated mastery (i.e., scoring a 4). In the Spring 25% of students demonstrated mastery. Additionally, in the Fall 66% of students could not cite textual evidence to support analysis of the text (i.e., scoring a 2). In the Spring, this number decreased by 43%, indicating that fewer students struggled with this skill. These examples illustrate that this teacher's instruction over time positively influenced most students' ability to meet the standard. The teacher used strategies such as informal daily assessments, sentence frames for writing and speaking, color-coding signal strategy for elaborating and citing evidence in writing to develop and strengthen students' initial skills related to the standard.

Table 1. Percentage of Sixth Grade Students who Demonstrated Learning on a Common Formative Assessment (CFA) in English Language Arts (CCSS 6Rl.1)

Formative Assessment	**Fall (n=47)**	**Spring (n=40)**	**Percentage Δ**
4	0%	25%	+ 25%
3	0.2%	38%	+ 38%
2	66%	23%	- 43%
1	32%	15%	- 17%

Note. The highest score on the CFA was a 4. The lowest score on the CFA was a 1.

In semi-structured interviews, this sixth grade teacher explained that informal formative assessments guide instructional planning; "Formative assessments also provide me timely, specific, and important data to guide and direct my instruction".

Case 2

In another instance, a fourth grade teacher participant, teaching in a rural community with a large percentage of economically disadvantaged students, shared results of this class's performance on formative assessments in reading and mathematics. The proficiency benchmark in reading and math is earning a score of 70% or higher on each assessment. Table 2 provides math and reading class data. The math results show assessment results midway through two different modules and then, again, at the end of each module.

Table 2. Percentage of Whole Class (N=19) at/above Benchmark in Two Different Formative Assessment Cycles [Reading (R) and Math (M)]

	October	**May)**	**Percentage Δ**
(R) Comprehension	65%	75%	+ 10%
(R) Vocabulary	70%	83%	+ 13%
(M) Module 3	Mid-47%	Post-63%	+ 16%
(M) Module 4	Mid-52%	Post-78%	+ 36%

Additionally, this teacher shared standardized STAR Assessment (Renaissance Learning, 2019) reports taken in September at the beginning of the academic year and again, six weeks later in mid-October for both math and reading. Reading assessment measures included: word knowledge and skills, comprehension strategies and constructing meaning, analyzing literary text, understanding author's craft, and analyzing argument and evaluating text. Math assessment measures included numbers and operations, algebra, geometry, measurement, data analysis, statistics, and probability. This assessment data is typically collected five times over the course of the academic year; however, due to COVID-19 and the move to remote instruction, assessments were completed less frequently with no end of year data collection. Data from each round of assessment helped the teacher with planning and instruction for the whole class and in planning support for individual students (see Table 3). This teacher explained that:

> When you're teaching 20+ students, it's easy for things to slip through the cracks; small gaps in student learning that you would never notice during whole group discussion or casual observation. Formative assessments give me a direct look at where my students stand and help me key in on specific aspects I need to focus on or review…Alternatively, I can identify strengths in my students and have the ability to either use those strengths in helping them, or understand that I may not have to spend as much time on certain concepts. Using formative assessments allows me to make the most of my time and my students' time in the classroom.

Table 3. Percentage of Whole Class Meeting Benchmark and Below Benchmark during Two Different Standardized Assessment Cycles of STAR Testing (N=19)

	Math-At/Above Benchmark	**Math-Below Benchmark**	**Reading-At/Above Benchmark**	**Reading-BelowBenchmark**
September	21%	79%	42%	58%
October	26%	74%	53%	47%
Percentage Δ	+ 5%	- 5%	+ 11%	- 11%

The teacher attributed growth to a variety of factors including purposeful planning and instruction as well as frequent formative assessments, feedback to support student learning, and opportunities for additional practice. More specifically, the participant shared that he used a variety of informal and formal formative assessment practices supporting development of skills in mathematics and reading. The teacher explained, "I've changed the way I approach things entirely. Earlier in the year I provided less opportunity for students to produce individual, concrete work, which made it more difficult for me to measure their levels of understanding. As I moved deeper into the year, I began providing more opportunities for students to demonstrate their understanding in a measurable way".

Most common informal practices used across subject areas include conferencing with students, conversations with the whole class and individual students, and observations. In the area of mathematics, additional informal formative assessment practices included asking students to write an answer on an erasable white board. In reading, informal formative assessment practices include fluency tests and weekly vocabulary activities. Formal formative assessment practices used by this teacher participant varied across subject areas. In math, the teacher commonly used exit tickets, homework/problem sets, weekly reviews, Reflex Math (fluency computer program), and STAR (state reading assessment). In reading, the teacher frequently used weekly vocabulary/comprehension quizzes, STAR Testing, and Freckle (comprehension computer program).

As a shift in teaching practices occurred mid project due to COVID-19, the teacher shared additional informal and formal formative assessment practices used during remote instruction. For math, students completed problem sets each week submitting responses electronically to the teacher for review. Then, the teacher sent individualized feedback to the student electronically. If the problem set met the proficiency standard, the student completed an exit ticket electronically, which was reviewed by the teacher. To offer additional support, the teacher conferenced with students through Zoom three times per week using data from problem sets to promote student growth. In reading, students used iReady (an interactive storytelling software with prompts and quiz at the end) to complete their reading assignments. The teacher used iReady student data to adjust instruction and support learning.

Case 3

A special educator participant working in an elementary learning resource center shared how formative assessment was used to guide teaching and support students' learning in math and reading. During an observation of a math support

session, the teacher participant worked one-on-one with a third grader on an individualized education program for a learning disability in math. The teacher used multiple formative assessments (e.g., white board activities, observation, academic games, frequent checks for understanding using verbal and physical responses, ended the lesson with an exit ticket, etc.). Based on the observation, participant self-analysis, student data, and the post observation interview, using formative assessment allowed the teacher participant to closely monitor student understanding and frequently adjust instruction during the math lesson.

The teacher participant shared how using formative assessment to monitor student performance and adjust instruction was a factor in helping students meet their individualized education program goals earlier than anticipated. This participant attributed student learning gains, in part, to the use of formative assessment to adjust instruction to meet each student's individual learning needs. For example, this teacher used a section of a completed assignment to collect baseline data and was intentional in monitoring student performance and tracking student progress toward goals. "Using formative assessments effectively forces the teacher to develop a sequence that meets the student's specific needs". For instance, in reading, to gauge fluency and accuracy, the teacher had students read a paragraph aloud while collecting data on speed, phrasing, and accuracy. In math, the teacher reviewed independent work on a math problem to determine if students were able to apply new skills. The teacher participant believes that reviewing student performance and conferencing with students is important stating that, "By increasing the opportunities for formative assessments, I am increasing opportunities for me to provide feedback". Additionally, the teacher explained that a benefit to students is that, "This gets them thinking more about their learning and hopefully increases engagement for the student".

During the teacher's final interview, the teacher participant stated, "We have relied a lot on informal formative assessments. My planning has become much more intentional. I have been looking for items to include in assignments that more easily meet the function of being a formative tool. I am trying to design assignments that have opportunities for formative assessments built into them. This makes it more natural for the student".

Common Formative Assessment Practices across Cases

The three cases above illustrate common formative assessment practices and demonstrate growth of their students over the academic year. Moreover, data from all six study participants show that there were common informal and formal formative assessment practices (see Table 4) used across a majority of our cases that permeated into remote learning.

Table 4. Types of Common Formative Assessment Practices Used Across Cases

Informal	checks for understanding (*fluency checks, read alouds, reading responses, cold calling, asking for oral elaboration or explanation, prompt responses*), warmups/bell ringers, discussion, conferencing, observation, pair-share, review of student work
Formal	quizzes, homework, presentations, individualized education programs, CBM, testing (*STAR, iReady, Reflux*), formal writing pieces *(paragraphs, 1-page responses, drafts of reports*), graphic organizers
Remote Learning	technology aided engagement, instruction and assessment *(Flipgrid, Kahoot, Padlet, Google Forms, Google Slides, Google Docs, Zoom)*

Discussion

These three cases illustrate how formative assessment is used to support student learning including how participants purposefully planned, fostered relationships and rapport with students, connected learning to student interest, and cultivated and maintained a positive learning environment.

Purposeful Planning

Purposeful planning lays the foundation for student learning and success. According to Fischer and Frey (2011), purposeful planning requires teachers to intentionally create lesson objectives and clearly communicate lesson objectives so students understand the learning expectations and specific learning goals. Study participants varied regarding their perceived ability to turn standards into clear learning goals and targets. Only three participants felt proficient, with one identifying as expert, one as developing, and one as only at a novice level. Another survey question related to planning asked about the ability to design, organize, and break down lessons into manageable segments. Participants rated themselves as proficient (N=4, 66.7%) and developing (N=2, 33.3%).

Relationships and Rapport

We also observed teacher/student conversations that demonstrated positive rapport which was also discussed during pre and mid-project interviews. Several practices we noted included: learning about students and including personally relevant class examples, showing enthusiasm about teaching, being passionate about the subject matter, and calling students by name. Moreover, the teachers smiled, were respectful in verbal and non-verbal interactions, made eye contact, offered positive specific verbal praise, and created a collaborative culture of learning (Wylie & Lyon, 2016). Study participants answered several survey questions related to their relationships and rapport with students. In response to the question, *How would you rate yourself at getting to know your students and incorporating their interests, aspirations, and backgrounds into the curriculum?* four of the six

teachers in the study stated that they were proficient or expert. Another question asked participants to rate themselves at showing they care about their students. All six participants rated themself as experts. Being skilled at rapport-building is important because rapport promotes student desire to listen, learn, and collaborate which then increases the likelihood for success on formative assessments and overall in school (Pianta & Stuhlman, 2004).

Connecting Learning to Student Interest

Student interest in a topic is a powerful motivator that energizes learning and increases academic success (Harackiewicz, Smith, & Priniski, 2016). In observations, we saw classroom materials reflecting students' interests such as incorporating technology that allowed for individualization and using student-selected materials. Survey results revealed that five of the six teachers in this study feel proficient or expert in regard to their ability to get to know their students and incorporate student interests into the curriculum. Beginning lessons with thought-provoking activities or asking questions that reflect student interest or activate prior knowledge helps teachers capture student interest. Study participants felt less confident in this area with three rating themself as developing, two felt proficient, and only one teacher felt like an expert in this area.

Maintaining a Positive Learning Environment

Research supports that when teachers create and maintain a positive learning environment, student academic achievement increases (Ali & Siddiqui, 2016). Five of six teachers responded as proficient or expert in response to the survey question about their ability to establish a manageable set of classroom rules and procedures and communicate with students about them. This self-reported data is consistent with what was observed during our classroom observations of the study participants. During our observations, we witnessed teachers using a variety of effective classroom management practices such as posting rules and expectations, using positive verbal and non-verbal communication, and having and following consistent management procedures (Marzano, 2005). Creating a positive culture of learning (Wylie & Lyon, 2016) is a crucial component of making formative assessment work.

Implications and Recommendation for EPP Improvement

Implications

Critical to the practice of formative assessment is that teachers and students are continually engaged in three questions, "Where am I now?, Where am I headed?, and How do I close the gap?" (Wylie & Lyon, 2016). All teacher participants rated themselves on the survey as novice or developing in response to the question, *How would you rate yourself at helping students review learning*

goals and targets, assess their level of achievement, and "close the gap" when goals are unmet? The novice and developing ratings signal a concern that early career teachers may need more support to answer these three essential questions related to formative assessment.

Based on multiple data sources, evidence exists to support that our EPP is mostly effective in preparing beginning teachers related to their ability to positively impact student learning through use of formative assessments. According to survey results and interviews, there were no areas that indicate poor preparation by our EPP. Teacher participants stated that pedagogical knowledge - planning, teaching, assessing - gained from their EPP is translating into their classroom practice in varying degrees based on the teacher and their environment. Also, the teacher participants shared they acquired knowledge and skills to cultivate and manage a positive learning environment for student success. However, responses in the final interview to the question, *what else would you have liked to learn or gain from your classes/course work and clinical experiences in your teacher training?* Indicate a general desire for more practical application and explicit opportunities to provide feedback for students in a timely and efficient manner. Teacher participants stated that they would have benefitted from a more comprehensive plan for incorporating formative assessment into their teaching practice including in lesson plans and student data analysis. Lastly, there were varying strengths and weaknesses demonstrated by the three participants related to implementation of formative assessment and other variables that impact student learning. Participants were not equal in skills, knowledge, and confidence across the three initial licensure programs from which they came.

Recommendations

Recommendations for continuous improvement that arose from data collection include more intentional practices embedded in our EPP to help our candidates learn more effective ways to:

- Review learning goals and targets, assess student achievement levels, and close the academic gap through data analysis.
- Select more effective practices to help students meet learning goals.
- Exposure to a wide variety of formative assessment practices.
- Observation of more diverse, effective informal and formal formative assessment practices implemented in the clinical setting from a variety of skilled practitioners.
- Incorporate effective practices that engage students in diverse forms of thinking.
- Provide additional ways to differentiate learning and support for students at the ends of the learning continuum (e.g., Special Education, Talented and Gifted).
- Learn more effective ways to organize and manage the paperload related to progress monitoring and use of assessment data.
- Providing individualized and specific feedback.

Limitations

This study only consists of six early career teachers, which is a small representation of the early career teachers who graduated from our programs. It is possible that their experiences may not fully represent other early career teachers' experiences. Further, all teachers in this study had varying experiences in their clinical sites during their programs. It is possible that these teachers gained differing knowledge during clinical practice. Additionally, early career teachers in a study may want to be perceived as being effective so they may not be as forthcoming or truthful in their impact on student achievement or may be overly critical of their practices and rate themselves lower (or less effective) than what is actually occurring. Lastly, this study was conducted during school closures resulting from COVID-19 which decreased the number of planned observations and reduced opportunities to observe practices that may have developed over the year which could have impacted student achievement.

Conclusion

Through the research question, *How do early career teachers' formative assessment practices impact student learning*?, we learned that teacher participants felt prepared in several areas to positively impact student learning through formative assessments. Teachers collected several types of formative assessment data to inform their teaching and led to student learning for most students. We also found that areas for continuous program improvement include increasing opportunities to provide specific feedback and increased guidance related to selecting effective instructional strategies that help students achieve learning goals. Moreover, teacher participants needed support in data collection, analysis, and implementation systems.

Further, while we followed six teachers who participated in three different licensure programs, we will need to consider the data and its implications for our EPP as a whole instead of individual programs that work in isolation. Feuer, Floden, Chudowsky, and Ahn (2013, p. 94) state that:

> People will have to be guided to think about the program as a whole, rather than their own little piece of it. They will have to be encouraged to think outside of the box, be open to major changes that might be indicated, and not limit themselves to tinkering with minor details of the program as it currently exists.

EPPs need a better understanding of the practices most likely to produce effective beginning teachers, within and across programs, and seek to use data to make programmatic decisions that can lead to meaningful and continuous improvement. Self-studies, like this one, can prove useful to EPPs, the students they serve, and PK-12 students in the local school districts.

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An Interactive Decision Support System for College Degree Planning

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Many students in the Unites States enter college without having decided on a focus for their studies, and thus are faced with choosing from a large number of potential majors and associated very complex sets of degree requirements which can include many courses in other areas of study. Academic advisors use academic planning tools to help students make decisions about class schedules, selecting an academic major or minor, planning for graduation, and many other academic related activities. There is a dearth of decision support systems for degree planning, mainly due to the complexity of degree requirements, and thus many existing academic planning tools utilize static documents or PDF files for displaying information pertaining to degree requirements and course prerequisites. This work considers the complexity of degree requirements and presents the design and implementation of an efficient interactive decision support system that helps students explore degree completion paths.

Keywords: degree planning, academic advising, academic decision making, decision support system, college degree planning

Introduction

Many universities employ direct communications between academic advisors and students as the primary advising system. Academic advisors are either faculty or professional advisors employed by an academic unit. During an advising session, advisors use academic planning tools to help students make decisions about class schedules, selecting an academic major or minor, planning for graduation, and many other academic related activities. Many existing academic planning tools utilize static documents or PDF files for displaying information pertaining to degree requirements and course prerequisites. Nevertheless, current students are digital natives who expect advising resources to be online and available in a user-friendly format. Due to the complexity of degree requirements and prerequisite dependencies, it is a challenge to develop and maintain systems that can analyze students' academic progress toward a degree.

Degree requirements vary in structure from one academic institution to another, and some of the requirements can be considerably complex. Most of the degree requirements are specified in terms of number of units, credits, or courses that must be taken to satisfy each requirement. Requirements may refer to additional attributes such as course level (lower-division vs. upper-division) or a student's

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minimum grade point average (GPA). In addition, some of the courses may not be taken until a minimum number of units has been earned. Courses may only count once in the major or minor, either as a required course or as an elective, but not as both. There may be hidden prerequisites (i.e., prerequisites of a prerequisite course that may not be explicitly listed as a part of any other requirements) and other requirements such as selecting major/minor emphasis areas. Major/minor requirements are often defined in terms of a set of course requirements that covers specific subjects or areas of knowledge. Many courses specify prerequisites that are outlined using a list of courses, all of which or a subset of which must be completed successfully in order to satisfy the prerequisites. In addition, a few of the prerequisites may be tied to course grades to ensure students acquire the necessary knowledge for getting the maximum benefit from the next course. Since it is difficult to define a standard format for representing degree requirements, most of the existing academic planning tools use custom-made systems that are difficult to scale up.

This paper will focus on developing a Decision Support System (DSS) for degree planning. First, we identify possible degree requirement types and use a data structure that can represent such requirements. Then we create a DSS that helps students select a major along with the courses needed to satisfy additional degree requirements beyond those for the major. These additional requirements often include the selection and completion of a minor in a subarea and the completion of so-called general education (GE) requirements spread across a wide variety of topics. To demonstrate the potential of the decision support system, we describe an implementation based on degree requirements and majors/minors offered at University of Wisconsin-Whitewater (UWW), a mid-sized U.S. public institution with about 11,000 students, which has 574 pages of course information and degree requirements covering more than 150 possible majors and about 120 possible minors. A student generally has a choice of focus areas within the major and there are about 15,000 different course sequences that meet the Computer Science major requirements for a BS degree at UWW. In addition to deciding upon and meeting the requirements of both a major and minor, a student wishing to complete a degree is faced with the challenge of selecting courses that meet general education requirements that specify the minimum number of credits needed in a variety of additional subareas, such as Communication Skills, Calculation Skills, Quantitative and Technical Reasoning, Cultural Heritages, World of Ideas, Communities, Physical Health and Well-Being, and Racial/Ethnic Diversity.

Literature Review

It is estimated that 20 to 50 percent of students enter college in the United States as undecided or undeclared, without having decided on a focus for their studies, and more than 50 percent of students change their major at least once before graduation (Gordan, 2015). There are many reasons for the indecision of college students, including decision-making difficulties, gender differences,

cultural differences, indecisive students, and types of career indecision (Soria & Stebletin, 2013). Many undecided students are skeptical about how their personal strengths and limitations relate to coursework required in particular majors. Furthermore, choosing a major may depend on personal interests, job market, program cost, or the complexity of graduation requirements (Pozzebon, Ashton, & Visser, 2014). Many students make initial choices based on their interests but change their majors because of changing career interests or academic interests (Bullock-yowell, McConnell, & Schedin, 2014). Wang and Orr (2019) used data analytics to inform decision-making in academic advising and supporting undecided students' academic success. Halasz and Bloom (2019) examined the resources students identified as most valuable and the factors most influential in their decision to transition out of majors. Streufert (2019) investigated the effects of alternative advising, such as coping with loss, managing anxiety, and restoring self-efficacy, and on renewing focus of undeclared students so that they stay focused and graduate on time. Marade and Brinthaupt (2018) examined reasons for students to change a college major. Iyer and Variawa (2019) used supervised Machine Learning classification algorithms to analyze the potential inclination of the undecided/undeclared first-year engineering students at the University of Toronto. Glaessgen et al. (2018) examined the challenges and experiences of first-generation undecided students transitioning to a new and unfamiliar academic environment. The relationship between academic major change and ten personality traits (the five broad and five narrow traits) was investigated in Foster (2017).

There has been an interest in developing interactive and visualization tools for academic curricula and advising. Marques, Ding, and Hsu (2001) presented a design and development of a web based academic advising system. Gutiérrez et al. (2018) presented a design and implementation of a Learning Analytics Dashboard for Advisers, LADA, to support the decision-making process of academic advisers through comparative and predictive analysis. Moreno, Bischof, and Hoover (2012) presented an interactive visualization tool for exploring course dependencies between courses. Dechter (2007, 2009) introduced an integer linear programing model for finding academic plans that would satisfy a given set of graduation requirements and other constraints in the shortest possible time. Kowalski and Ealy (1991) used artificial intelligence to design an expert system for the advisement of two-year community college students.

Prerequisite visualization tools are extremely useful for preparing academic plans. Zucker (2009) presented a curriculum visualization tool for developing and arranging the flow of courses for a particular program. Aldrich (2014) used the overall topology of the courses at Benedictine University to propose a directed acyclic graph for representing prerequisite relations where each edge represents a logical relationship such as all of or one of. Chen and Siyuan (2017) presented an interactive course selection scheme with prerequisite hierarchy. Their work includes visualization of all of, one of, or either-or logical relationships of courses offered at University of British Columbia. Samaranayake and Gunawardena (2020) introduced a graphical data visualization tool that enables students and advisors to easily understand course prerequisite structure and to readily determine paths that lead to the satisfaction of degree requirements.

There has been an interest in designing DSS for course planning. Siddiqui, Raza, and Tariq (2018) introduced a web-based group DSS for academic term preparation at a business college of a large Middle Eastern university. Roushan et al. (2014) presented a DSS for course planning. Miranda, Rey, and Robles (2012) developed a web-based DSS for course and classroom scheduling. Oladokun and Oyewole (2015) presented a DSS for university admission seekers. Al-Qaheri, Hasan, and Al-Husain (2011) presented a DSS for course scheduling. Most of these decision support systems are designed for course scheduling.

Students considering academic degrees in institutions outside the United States (US) often have less flexibility in selecting elective courses in those institutions, so they often feel challenged when addressing course plan flexibility in a US college or university. Thus, in addition to cultural and social adjustments, many international students are additionally stressed by the need to adjust to a new academic environment (Mesidor & Sly, 2016; Rienties et al., 2012). The process of registering for classes is often different from experiences that the international students have had at academic institutions in their country of origin. Students may also struggle with choosing a major. Some students may want to complete their degree requirements early. International students may come to the new university or college with a predetermined academic plan, but they are often not well informed about the US curriculum and may want to change their major after they are exposed to different areas of study and new career opportunities. The DSS helps such students discover their own preferences for courses of study and empowers them to visualize degree paths based on their interests and skills.

The complexity of degree requirements, prerequisite dependencies, and user preferences make the automated degree planning problem an inherently hard combinatorial optimization problem. Due to its complexity, the present commercial degree planning systems have avoided automation and limited their features to semester by semester drag and drop course selections. Integer programming models to generate degree plans with simplified requirements have been proposed in Dechter (2007, 2009). Although these models are useful for calculating lower bounds for comparison, they are intractable for practical systems which deal with complex degree planning problems with various constraints and are expected to provide fast solutions. This work considers the complexity of degree requirements and presents the design and implementation of an efficient DSS that helps students explore degree completion paths.

Method

Most college degree requirements are specified in terms of number of units, credits, or courses that must be taken to satisfy each requirement. First, we define a suitable data structure for evaluating degree requirements. A typical degree requirement belongs to one of the following categories:

- Type A: complete k courses from a set of p courses where $1 \leq k \leq p$

- Type B: complete at least m courses/units, but no more than n courses/ units from a set of p courses where $0 \leq m \leq n \leq p$
- Type C: complete k units from a set of p courses where $1 \leq k \leq p$
- Type D: combination of Type A, Type B, and/or Type C requirements

Type A, Type B, and Type C degree requirements are relatively easy to implement but Type D requirements are often complex and difficult to implement. There may be other requirements, such as GPA requirements, minimum number of credits/units needed to complete, internships, capstone projects, etc. Samaranayake and Gunawardena (2020) introduced a generic requirement type, named basic requirement, that is able to represent most of the college degree requirements. A basic requirement is a 7-tuple (A, T, C_{min}, C_{max}, U_{min}, U_{max}, δ), where A is a set of objects, T is the type of requirement (select number of objects, select number of units, etc.), C_{min} is the lower bound of courses, C_{max} is the upper bound of the courses, U_{min} is the lower bound of the units, U_{max} is the upper bound of the units, and $\delta: A \rightarrow \{1, 0\}$ is a function such that $\delta(A) = 1$ if A is a credit-bearing set of objects and $\delta(A) = 0$ otherwise. Any Type A, Type B, or Type C degree requirement can be represented using a combination of basic requirements. In this work, we use the basic requirements model to represent any degree requirement found in a college catalog.

Exploring Major and Minor Paths

When choosing a major or a minor, a student would normally have completed some courses that may count toward satisfying requirements for some of the majors or minors. In this section we define an efficient process for mapping completed courses to prospective majors or minors.

Let S be the set of all courses, M be the set of all majors, and N be the set of all minors offered by a degree-granting institution. A major path is a minimal set of courses that satisfies all the requirements of a college major and a minor path is a minimal set of courses that satisfies all the requirements of a college minor. It is possible to generate all possible major paths for the set of all the majors, M, offered at a given institution.

There are about 15,000 different course sequences that meet the Computer Science major requirements for a BS degree at UWW. Hence, there could be millions of possible major paths so it would be a daunting task to create and maintain such a collection of possible major paths. Instead, for a given student we first identify a subset M^C of M consisting of all the possible majors that would allow the student to complete the degree requirements in a timely manner, based on already completed courses.

Let $V = \{(s, m) \mid s \in S, m \in M\}$ be the set of all ordered pairs that connect courses to majors. In many universities, a single department offers majority of the courses satisfying a given major. Therefore, V is a relatively small subset of $S \times M$.

Let $M_i^R = \{R_{i1}, R_{i2}, \ldots, R_{ir}\}$ be the set of requirements for the major $M_i \in M$, where each requirement in R_{ij} is a predicate defined on a subset of S.

Let $C = \{c_1, c_2, \ldots, c_n\}$ be the set of courses completed (taken/waived) by a particular student and $V_c = \{(s, m) \mid s \in C, m \in M\}$ be the subset of V that defines a mapping between the set of completed courses C and the set of majors M.

Let M^c consists of majors accepting some or all courses in *C* and N^c consists of minors accepting some or all courses in *C*.

Using the set V_c, we can find an ordered list of majors $M^{c_i} = \{M_{i0}, M_{i1}, M_{i2}, \ldots, M_{ij}\}$ where the course c_i satisfies one or more requirements of each M_{ik} in M^{c_i}. Then $M^C = \bigcup_{i=1}^{n} M^{c_i}$. Hence, we can easily identify the set M^C for a given set of completed courses C. The set M^C consists of all the possible majors for which the student has completed at least one course, thus the set M^Chelps students find the major or majors that require the least number of units to complete. Although there could be majors/minors for which the student has taken no courses but which require fewer units for completion, since the student has some course experience in an area, that area is a suitable area for consideration.

Requirements for each major $M_i \in M^C$ can be expressed using a set of basic requirements and then we can use completed courses to evaluate completion levels of requirements for majors in M^C. We use the same process for exploring a set of possible minors, N^c of N, for identifying possible major/minor combinations for each major $M_i \in M^C$.

Upon exploring possible major/minor combinations, we can identify a set of courses needed to complete the remaining degree requirements while minimizing the total number of remaining credits needed for each major/minor combination. Such a process allows us to produce the shortest path in terms of credits needed for graduation.

Data Visualization Method

Major requirements, prerequisite conditions, and course rotations must be taken into consideration when planning courses for the completion of the degree. In general, prerequisites are completed/waived/transferred courses or test scores that must be completed before taking a specific course, and some of the prerequisites are tied to course grades and courses from other disciplines. Table 1 displays an example of the prerequisite conditions for a sample set of seven courses.

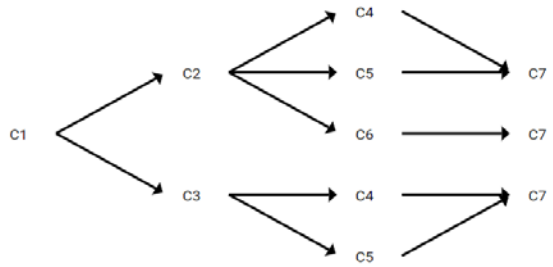
Table 1. Prerequisite Conditions for a Sample Set of Courses

Courses	**Prerequisites**
$C2, C3$	$C1$ with a grade of C or better
$C4, C5$	$C2$ with a grade of C or better or C3 with a grade of B or better
$C6$	$C2$ with a grade of C or better
$C7$	$C6$ or (C4 and $C5$), with a grade of C or better

Suppose a student wishes to select a major path that includes the course $C7$. In order to check if course prerequisites for $C7$ are satisfied or to find the shortest path for satisfying the prerequisites, it would be extremely helpful if the prerequisite structure can be visualized using a directed graph.

We use an adjacency matrix of a directed graph $D(V, E)$to represent course prerequisite structure (CPS) where nodes (V) represent courses and edges (E) represent prerequisite relationships. Table 1 contains information needed to define an adjacency matrix of the directed graphs for the sample set of courses. Figure 1 shows a directed graph depicting the prerequisite structure described in Table 1.

Figure 1. Prerequisite Conditions for a Sample Set of Courses

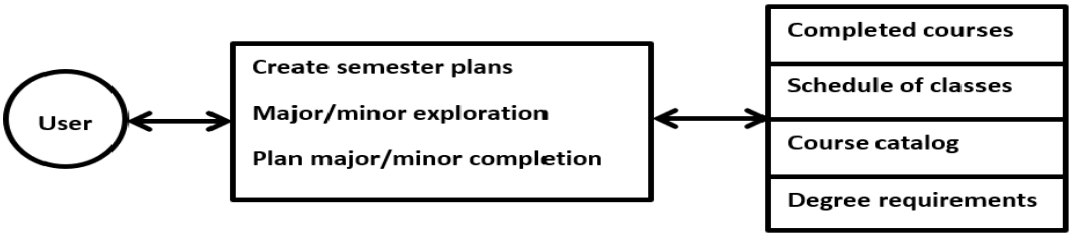


Existing degree planning tools show CPS using static data structures similar to Table 1. We utilize novel visualization tools introduced in Samaranayake and Gunawardena (2020) to visualize CPS for degree paths as a directed graph and then dynamically update the prerequisite structure using completed courses.

Implementation

The current implementation of the DSS is based on degree requirements and majors/minors offered at University of Wisconsin-Whitewater. Degree requirements are often specified in terms of course offerings. Therefore, each requirement is stored in a database using an appropriate format suitable for our algorithms. In order to speed up the process, we use the basic requirement type for storing each type of basic requirement. We use a relational database to store degree requirements and course information. A set of completed/waived courses is needed to explore major/minor combinations. Figure 2 shows the architecture diagram of the DSS system.

Figure 2. Architecture Diagram of the DSS System



Exploring Major and Minor Paths

The UW-Whitewater database consists of 154 majors, 121 minors, and 3300 courses. Students must complete at least 120 units. Some of the majors require an approved minor. Courses counted toward the major cannot be counted for a minor. Students must satisfy general education requirements. In addition, some majors require students to complete a separate mathematics requirement.

First, completed courses (Figure 3) are mapped to majors to identify the set M^C. Then, requirements for each major $M_i \in M^C$ are evaluated using the completed courses to produce the report in Figure 4. The output includes a list of possible majors. For each such major, it also includes a list of courses satisfying its requirements and the number of credits needed to complete the major. The first semester of the course history includes a list of courses completed, transferred, or waived by the end of the first semester.

Furthermore, the DSS provides a mechanism for displaying progress of the requirements for each possible major and minor. Figure 5 includes a list of requirements for the computer science major, general emphasis (BS).

Figure 3. Sample Report of Completed Courses

Course History:

Term	Subject	Cat	Title		Grade	Units Taken	Points	Type
Fall 18	AMERIND	102	INTRO AMER INDIAN STUDIES	GHDV	BC	3.00	7.500	TR
Fall 18	ANTHROPL	9999S	ANTHROPL ELECTIVES - GS	GEGS	C	3.00	6.000	TR
Fall 18	BIOLOGY	141	INTRODUCTORY BIOLOGY I	GEGL	BC	5.00	12.500	TR
Fall 18	BIOLOGY	257	INTRODUCTION TO ECOLOGY		A	3.00	12.000	TR
Fall 18	COMM	999	COMM ELECTIVES		AB	3.00	10.500	TR
Fall 18	COMM	9999H	COMM ELECTIVE - GH	GEGH	A	3.00	12.000	TR
Fall 18	ENGLISH	90W	FUNDAMENTALS OF ENGL - WAIVER		T	0.00	0.000	TR
Fall 18	ENGLISH	101W	FRESHMAN ENGLISH - WAIVER		T	0.00	0.000	TR
Fall 18	ENGLISH	102	WRITING/READING/RESEARCH		A	3.00	12.000	TR
Fall 18	ENGLISH	274	CREATIVE WRITNG	GEGH	A	3.00	12.000	TR
Fall 18	GENED	120	HISTORICAL PERSPECTIVES	GEGH	A	3.00	12.000	TR
Fall 18	GEOGRPY	9999L	GEOGRPY ELECTIVES - GL	GEGL	AB	4.00	14.000	TR
Fall 18	GEOLGY	999	GEOLGY ELECTIVES		A	3.00	12.000	TR
Fall 18	HISTRY	124	AMERICAN HISTORY TO 1877	GHDV	A	3.00	12.000	TR
Fall 18	HISTRY	154	WESTERN CIVILIZATION	GEGH	A	3.00	12.000	TR
Fall 18	MATH	40W	PRE - ALGEBRA - WAIVER		T	0.00	0.000	TR
Fall 18	MATH	41W	BEGINNING ALGEBRA - WAIVER		T	0.00	0.000	TR
Fall 18	MATH	141W	INTERMEDIATE ALGEBRA - WAIVER		T	0.00	0.000	TR
Fall 18	MATH	254	CALC/ANALYTIC GEOMETRY II		B	5.00	15.000	TR
Fall 18	PEGNRL	160	BEGINNING TENNIS	GEGP	A	1.00	4.000	TR
Fall 18	PHILSPHY	241	INTRO TO PHILOSOPHY	GEGH	A	3.00	12.000	TR
Fall 18	PSYCH	211	INTRODUCTORY PSYCHOLOGY	GEGS	D	3.00	3.000	TR
Fall 18	BIOLOGY	142	INTRODUCTORY BIOLOGY II	GEGL	C+	5.00	11.650	EN
Fall 18	COMPSCI	172	INTRODUCTION TO JAVA	GEGM	A-	3.00	11.010	EN
Fall 18	MATH	280	DISCRETE MATHEMATICS		C-	3.00	5.010	EN
Fall 18	MATH	342	APPLIED STATISTICS		C-	3.00	5.010	EN
Spring 19	COMPSCI	220	INTERMEDIATE JAVA		W	3.00	0.000	EN
Spring 19	COMPSCI	271	ASSEMBLY PROGRAMMING		F	3.00	0.000	EN
Repeat Code: EXPG - First Attempt Exclude from GPA								
Spring 19	ENGLISH	370	ADVANCED COMPOSITION		B	3.00	9.000	EN
Spring 19	MATH	355	MATRICES/LINEAR ALGEBRA		B-	3.00	8.010	EN
Fall 19	COMPSCI	220	INTERMEDIATE JAVA		C	3.00	6.000	EN
Fall 19	COMPSCI	271	ASSEMBLY PROGRAMMING		F	3.00	0.000	EN
Repeat Code: CRED - Repeated for Credit								
Fall 19	COMPSCI	381	JAVASCRIPT AND DHTML		B+	3.00	9.990	EN
Fall 19	COMPSCI	382	SERVER-SIDE SCRIPTING		F	3.00	0.000	EN
Fall 20	COMPSCI	223	DATA STRUCTURES		W	3.00	0.000	EN
Fall 20	COMPSCI	353	CYBERSECURITY LAW		B+	3.00	9.990	EN
Spring 21	COMPSCI	223	DATA STRUCTURES			3.00	0.000	IP

Figure 4. Initial Portion of Sample Output of Possible Majors

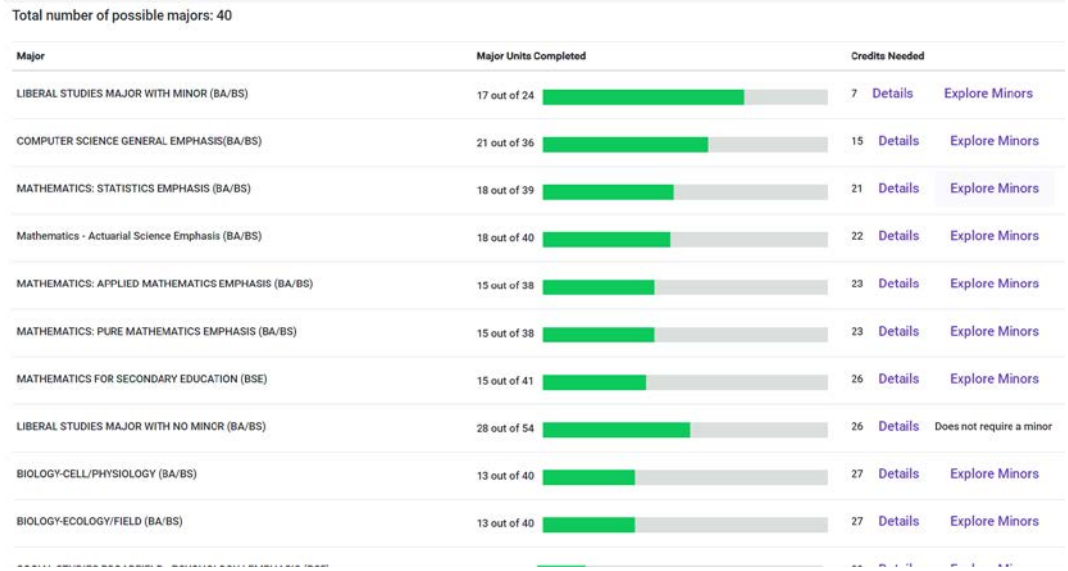
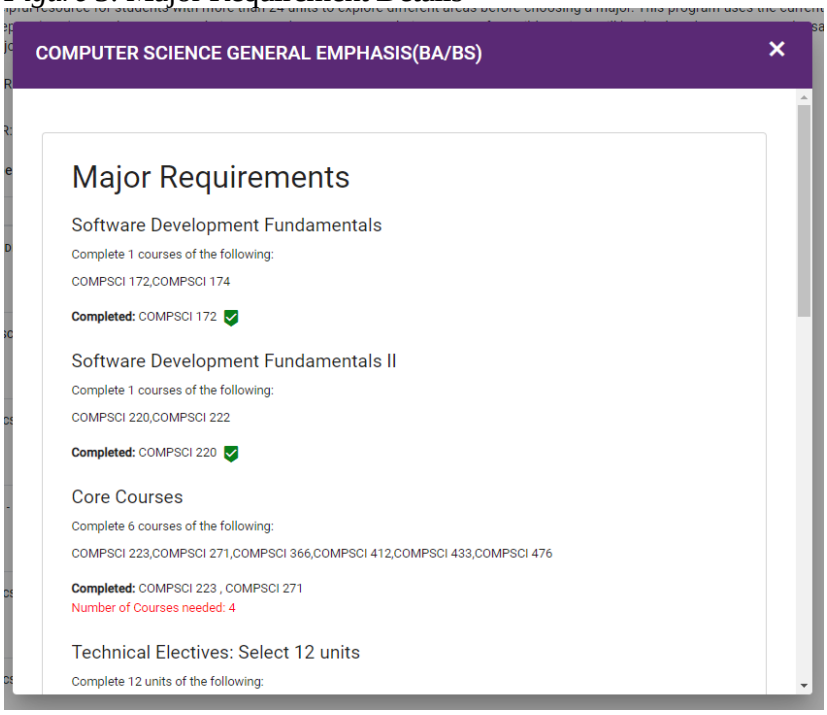
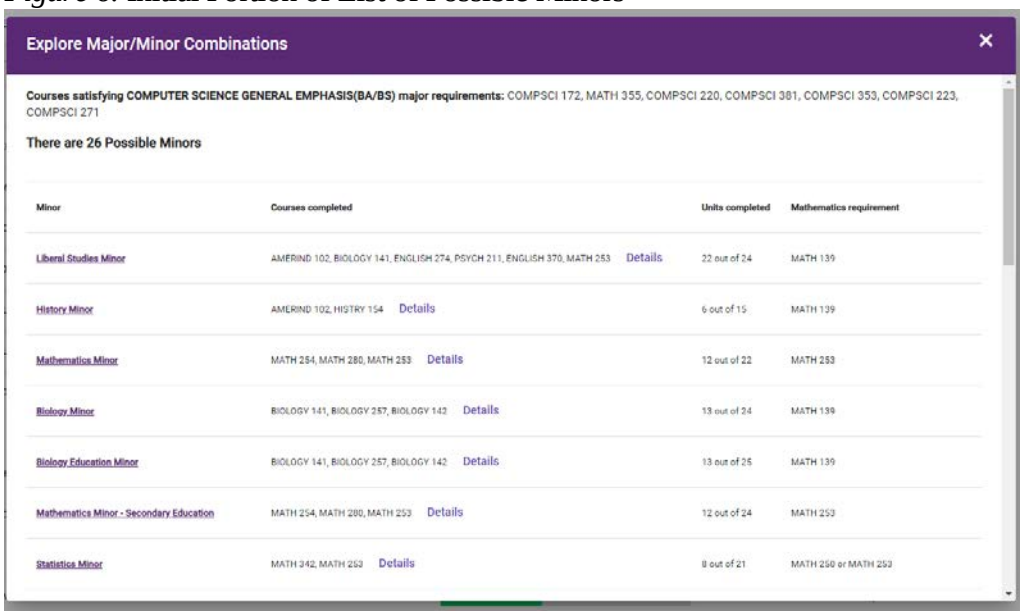


Figure 5. Major Requirement Details



In this sample execution, there are 40 possible majors in the set M^C. The DSS also provides a mechanism to explore minors for those majors that require an approved minor. Figure 6 includes a list of possible minors if the student chooses computer science general emphasis (BS) as the major. There are 26 possible major/ minor combinations for the selected major.

Figure 6. Initial Portion of List of Possible Minors



Semester Planning

The DSS system helps students select courses for the next semester by visualizing the available courses, based on the CPS. Figure 7 shows the CPS for computer science major general emphasis at UWW, prior to completing any of the courses in the major. Nodes with a stack of courses represent prerequisite courses where only one of the courses is needed to be taken to satisfy the prerequisite. If two or more arrows are pointing to the same child node, then each of the prerequisite relationships must be satisfied for the course list attached to the child node to be available. CPS is extremely useful for identifying any bottleneck conditions that may prolong the graduation date. For example, *Compsci* 223 and *Compsci* 271 are prerequisite courses for many of the 300-level or higher computer science courses. Hence, their prerequisites must be completed as soon as possible to minimize the time to complete the degree.

Figure 7. Course Prerequisite Structure for Computer Science General Emphasis

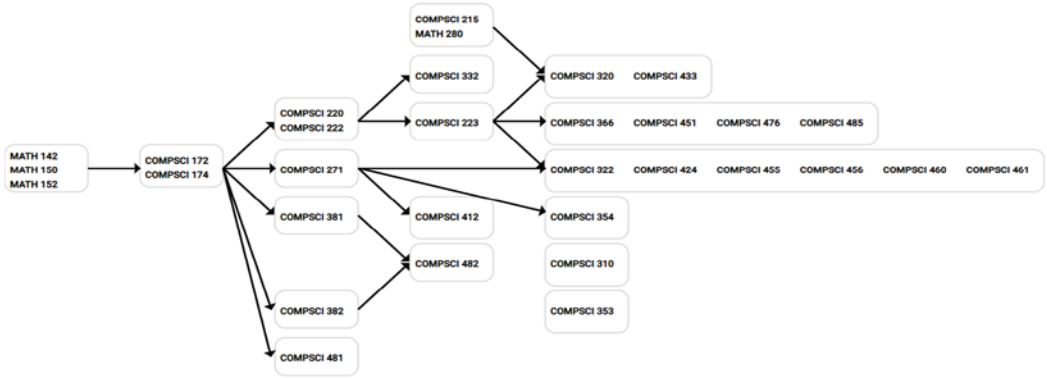
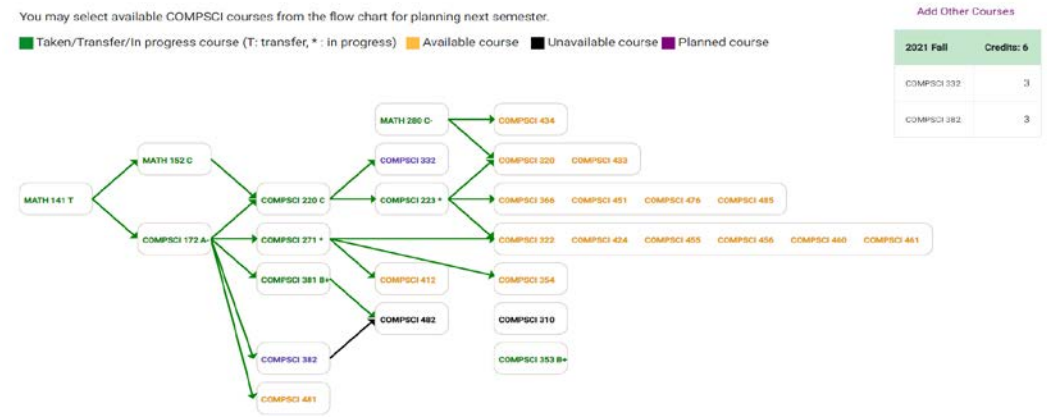


Figure 8 shows the semester plan page of the DSS. The semester planning page consists of a course prerequisite structure and a list of degree requirements

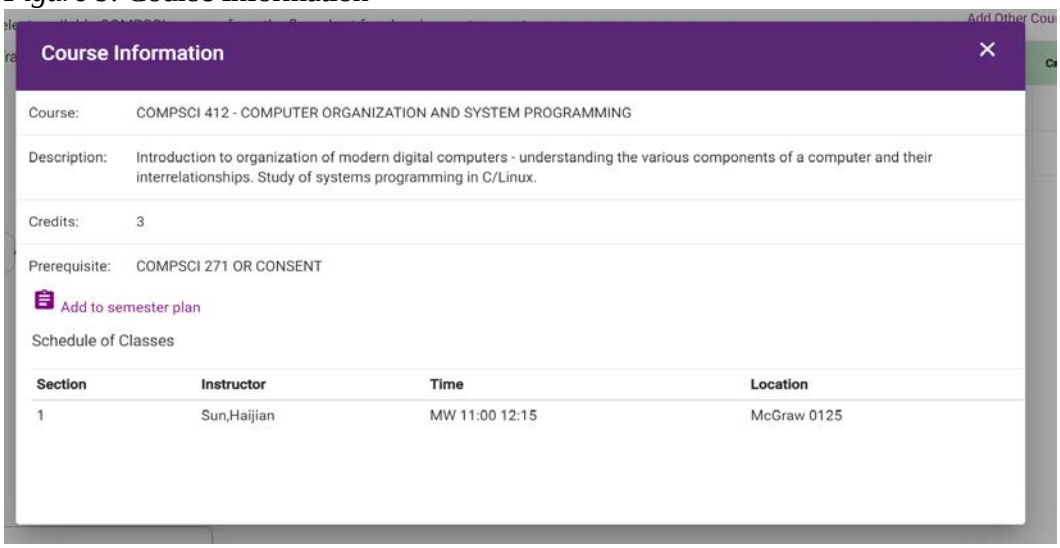
for a selected major. The list of degree requirements includes an indication of whether each requirement has been satisfied and courses credited towards satisfying each requirement. The CPS is updated dynamically to narrow down the major path choices, based on the completed and planned courses. Course grades are displayed where * represents grades for the courses that are in progress and the courses shown in purple are the courses planned for the next semester. Green arrows point to courses that are available to take in the next semester, based on the completed courses. The courses shown in orange are the courses whose prerequisites are satisfied and available for planning the next semester.

Figure 8. Semester Plan Page



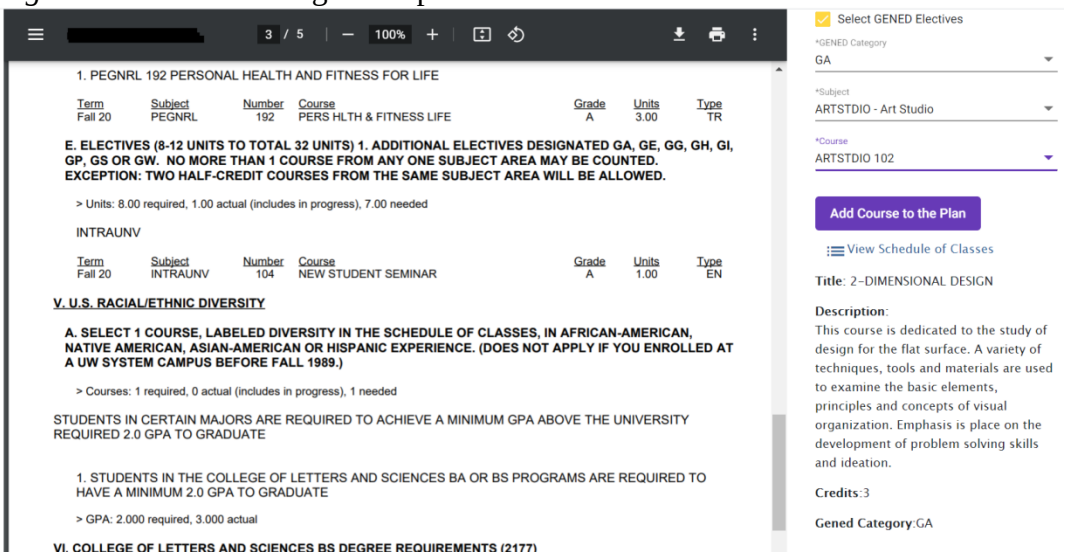
A dialog box is linked to each course shown in orange for students to view course information and course schedule. Students may use the CPS to select any of the courses shown in orange and add to the semester plan. Figure 9 shows the course information dialog box.

Figure 9. Course Information



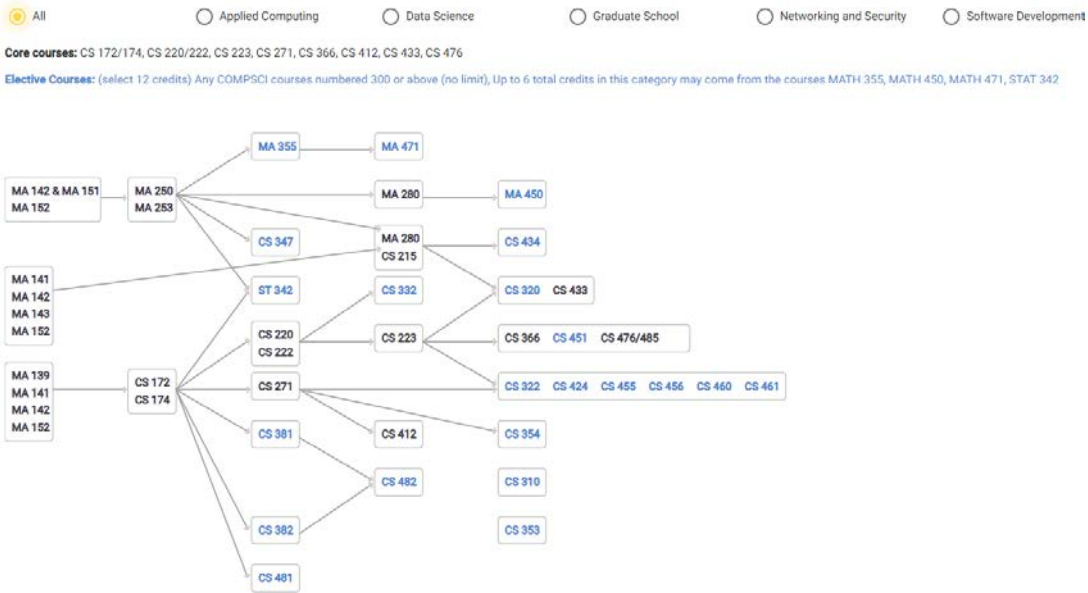
The DSS allows students to view the official academic progress report adjacent to course information (Figure 10) and then plan courses interactively, based on the degree requirements yet to be satisfied (requirements in bold).

Figure 10. Academic Progress Report



There are many advantages inherent in the use of data visualization tools. Figure 12 illustrates the ability to visualize the complete course structure for the computer science comprehensive emphasis. Courses appearing in black are the required courses and their prerequisites, and the courses appearing in blue are the elective courses from which students must select four courses.

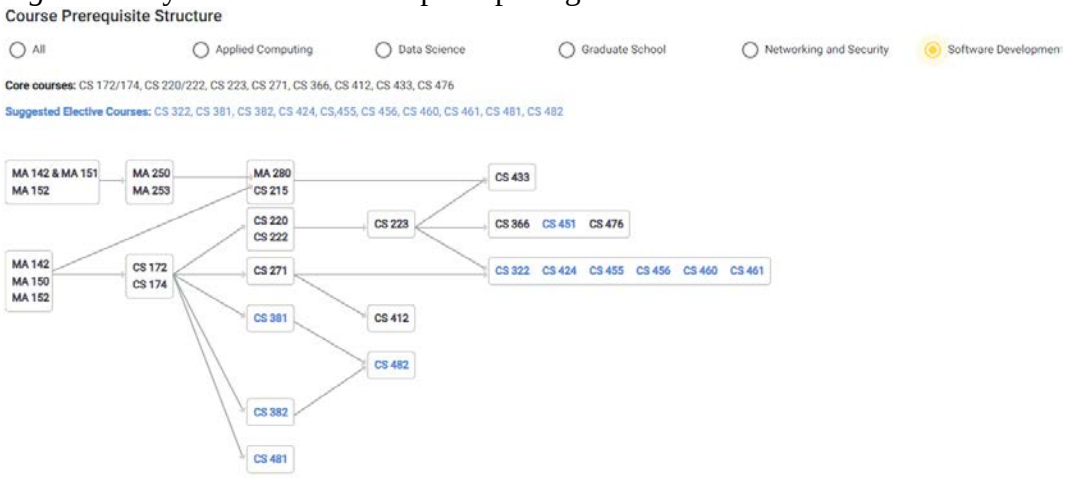
Figure 11. Course Prerequisite Structure for Computer Science Comprehensive Emphasis



There are many ways of choosing the required four courses out of twenty-two possible electives. The DSS system uses a dynamic directed graph to help students select elective courses based on their interests and career goals. The visualization in Figure 12 also helps students select the four elective courses needed for a degree in software engineering.

Students who are interested in pursuing a career in applied computing, data science, network and security, or software engineering may select any of the radio buttons at the top (Figure 11) to view a course structure graph that helps them select electives based on their career choices.

Figure 12. Dynamic Directed Graph Depicting Career-Based Elective Courses



Conclusion

This work describes the basic requirement model for representing degree requirements and presents the design and implementation of a DSS that helps students explore possible major/minor combinations and create semester plans.

The current implementation is based on the UW-Whitewater course catalog of 154 majors, 121 minors, and 3,300 courses. Since requirements vary from one major/minor to another, a typical degree mapping application uses separate files for processing individual major/minor requirements. As such, it is a daunting task to create and maintain such an application and there are no such applications for mapping courses to multiple majors/minors. The data structure we propose in this work is capable of using a single application for processing every major/minor requirement. Hence, this application eliminates the painstaking what-if analysis of static data for exploring possible majors/minors. Furthermore, this application helps students quickly compare major/minor combinations. Although the implementation is based on the UW-Whitewater course catalog, the system can easily be extended to course catalogs at other universities. Many universities use degree requirements that can be represented by the proposed data structure and we are in the process of applying the DDS system at a few other universities.

There is a dearth of data visualization tools for displaying college degree-planning information, mainly due to complexity of degree requirements. The new data structure used in this research is extremely useful for creating data visualization tools. We have already developed a dependency evaluation and visualization tool using a version of the aforementioned data structure. We plan to expand the current DSS to create an interactive degree audit system and degree personalization system that helps students create degree plans that align well with their professional interests.

Future Work

The main purpose of this work is to introduce a DSS system that uses a new data model to reduce the complexity of mapping completed courses to requirements. We are in the process of introducing an interest-aligned degree planning and career path selection system that uses the new data structure and dynamic directed graphs to guide students to select degree paths that align well with their interests, personalities, and aptitudes. The features of the enhanced DSS system are based on Holland's theory which classifies people using six types of traits: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC).

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Estimation in the Primary Mathematics Curricula of Cyprus, Greece and Turkey: A Privileged or Prevented Competence?

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Estimation is an essential competence with a developmental role in the learning of various mathematical topics. Yet, as previous studies highlight, this competence is either excluded or ambivalently included in intended curricula around the world. The current study investigates the estimation-related opportunities in the primary curricula of three Eastern Mediterranean countries (Cyprus, Greece, and Turkey). Our analyses are framed by four forms of estimation (computational, measurement, quantity, number line). As with previous studies in other contexts, computational estimation and measurement estimation are extensively addressed in the curricula of Cyprus and Turkey, yet without any meaningful justification for their inclusion. All three curricula fail to recognise the importance of number line estimation and quantity estimation, the two forms with the most significant developmental implications for the later learning of other mathematical concepts and areas of mathematics. Among the three curricula under scrutiny, the Greek is the one with the fewest and most superficial references to estimation. In closing, we discuss the implications of this study and suggestions for future research.

Keywords: computational estimation, measurement estimation, number line estimation, quantity estimation, intended curricula, Eastern Mediterranean countries

Introduction

This paper forms part of the activities of an international network of researchers investigating opportunities provided by intended curricula for children to develop estimation-related skills. Estimation, a core skill of everyday life and a major determinant of later arithmetical competence (Sasanguie et al., 2013; Schneider, Grabner, & Paetsch 2009), pervades the lives of both adults and children (Booth & Siegler, 2006). In fact, as argued by Sriraman and Knott (2009, p. 206), estimation is one of "the three most important types of mathematical thinking skills" for primary school children to develop, along with reasoning in ratios and problem solving. Nevertheless, as we contend below, this important skill has received little curricular attention since the introduction of the electronic calculator in the 1970s, with the consequence that much significant research has gone unnoticed and,

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internationally, children's opportunities to acquire estimation-related competence may have been compromised.

As discussed extensively in our network's recent publications (i.e., Andrews, Xenofontos, & Sayers, 2021; Sunde et al., 2021), in the context of mathematics, estimation has historically taken three forms; *computational estimation, measurement estimation* and *quantity (or numerosity) estimation* (Sowder, 1992). Today, a fourth form, *number line estimation,* has become a familiar sight in the fields of cognitive psychology, mathematics education and special needs education. All four forms are implicated differently in adults' real world functioning and children's mathematics learning. Drawing on the more extensive accounts of our earlier paper, these four forms of estimation, focusing on their developmental characteristics, are summarised below.

Computational estimation is "the process of simplifying an arithmetic problem using some set of rules or procedures to produce an approximate but satisfactory answer through mental calculation" (LeFevre, Greenham, & Waheed, 1993, p. 95). Other definitions (Dowker, 1992; Siegler & Booth, 2005) equate estimation with approximation as well, which we regard unproblematic. Nonetheless, the definition by LeFevre and her colleagues, which we adopt, explicitly rejects guesswork and highlights the systematic nature of the procedure. Computational estimation is an essential life skill (Ganor-Stern, 2016; Sekeris, Verschaffel, & Luwel, 2019) and, despite teacher scepticism concerning its relevance (Alajmi, 2009), an important facilitator of children's understanding of place value and standard algorithms (Dowker, 2003; Sowder, 1992). It is a strong predictor of general mathematical competence (Seethaler & Fuchs, 2006; Star and Rittle-Johnson, 2009) and correlates positively with measures of mathematics self-concept (Gliner, 1991).

Measurement estimation is defined as measuring without measurement tools involving mental referents to provide a measure of the object under scrutiny (Sowder, 1992). It typically takes three forms (Jones et al., 2012; Joram, Subrahmanyam, & Gelman, 1998):

- *Unit iteration:* iteration of mentally standard units of measure to achieve the desired goal.
- *Reference points*: comparison of the quantity to be estimated against familiar, and therefore meaningful, objects.
- *Decomposition:* splitting the objects of interest into smaller quantities before applying either unit iteration or reference points.

Children of age 9-11 have been found to be poor estimators of lengths, although their estimates improve with age (Desli & Giakoumi, 2017). Middle school children are more accurate estimators when using non-standard rather than standard units (Desli & Giakoumi, 2017). From the perspective of strategies, the most productive strategy seems to be reference points (Desli & Giakumi, 2017; Gooya, Khosroshahi, & Teppo, 2011), not only because children who employ reference points are more accurate than those who do not (Joram et al., 2005) but because the strategy has been linked with mathematics achievement more generally

(Kramer, Bressan, & Grassi, 2018). Moreover, reference points are everyday tools of professional users of mathematics (Jones & Taylor, 2009).

Number line estimation entails "translating a number into a spatial position on a number line" or, less commonly, "translating a spatial position on a number line into a number" (Siegler, Thompson, Opfer, 2009, p. 144). Successful number line estimation draws on an understanding of ordinality (Van't Noordende et al., 2018) and the use of reference points (Sullivan & Barner, 2014). In many respects, despite having limited real-world relevance, its impact on mathematics learning is profound. It is a predictor of mathematical learning difficulties (Andersson & Östergren, 2012; Wong, Ho, & Tang, 2017), particularly developmental dyscalculia (Huber et al., 2015), and mathematical achievement across all ages of compulsory school (Fuchs et al., 2010; Schneider et al., 2018; Simms et al., 2016; Tosto et al., 2017). In particular, integer line estimation competence has been implicated in children's arithmetical development across the years of primary education (Dietrich et al., 2016; Friso-van den Bos et al., 2015; Fuchs et al., 2010; Träff, 2013). In similar vein, estimating the position of fractions on the number line is a strong predictor of algebraic readiness (Booth & Newton, 2012) and equation solving competence (Booth, Newton, & Twiss-Garrity, 2014), while decimal number line estimation competence is a better predictor of algebraic competence than either integer or fraction number line estimation (DeWolf, Bassok, & Holyoak, 2015).

Quantity estimation refers to the ability to discern or produce the number of objects in a set without recourse to counting (Crites, 1992). It is a skill reciprocally dependent on the ability to count (Barth, Starr, & Sullivan, 2009) and, irrespective of age, one that diminishes in accuracy as the numerosity of the set of objects grows (Smets, Sasanguie, Szücs, & Reynvoet, 2015). Quantity estimation has been implicated in later arithmetical competence (Bartelet, Vaessen, Blomert, & Ansari, 2014), although other studies have shown that its influence is inextricably tied up with the influence of number line estimation, which, while correlating with each other, independently predict arithmetical competence (Wong, Ho, & Tang, 2016). Recent years have seen scholars turning attention to Fermi problems, problems involving large numbers and expectations that estimations will be accurate to the nearest power of ten, as a means of facilitating students', across all school years, competence with large numbers (Albarracín & Gorgorió, 2019).

Despite the importance of estimation, its promotion as a whole appears to be educationally problematic. Internationally, estimation is inadequately addressed in textbooks, as found in comparative studies of textbooks' content in Korea and the United States (Hong, Choi, Runnalls, & Hwang, 2018) and Finland, Singapore and Sweden (Sayers, Petersson, Rosenqvist, & Andrews, 2021). The problem has been exacerbated by the lack of estimation-related expectations in many curricula, including those of the four education systems of the United Kingdom (Andrews, Xenofontos, & Sayers, 2021) and the three education systems of Scandinavia (Sunde et al., 2021). Furthermore, in all constituent nations of the United Kingdom (England, Northern Ireland, Scotland, Wales), as well as Denmark, Norway, and Sweden, more emphasis, albeit limited, is placed on computational and measurement estimation than on number line and quantity estimation. Although

the first two forms have explicit real-word implications, free online tools are widely available (i.e., Google Calculator and GPS Fields Area Measure), potentially rendering their related estimation skills redundant. Alternatively, the latter two forms of estimation (number line and quantity) have the most profound developmental implications for the successful learning of other areas of mathematics (Liang, Zhang, Wang, & Liu, 2021; Schneider et al., 2018; Wong, Ho, & Tang, 2016). Simply put, the representation of estimation in current curricula seems to have created a paradox: On the one hand, the two forms of estimation typically privileged in intended curricula – computational and measurement – have many real-life applications that may have been made redundant by the availability of free online tools. On the other hand, the two forms of estimation with the greatest developmental potential – number line and quantity – are effectively absent in the same intended curricula (Andrews, Xenofontos, & Sayers, 2021; Sunde et al., 2021).

In this paper, therefore, we examine the estimation-related expectations of the curricula of the Republic of Cyprus (hereafter Cyprus), Greece, and Turkey. Importantly, in comparison with the earlier studies, what makes this study unique is that it focuses on three Eastern Mediterranean countries with highly centralised educational systems, in which inflexible implementation of prescribed intended curricula has been (Mullis, Martin, Gonzalez, & Chrostowski, 2004; Mullis, Martin, & Foy, 2008) and remains (Mullis et al., 2020) a high priority.

This Study

The notion of curriculum is complex, multifaceted, and includes much more than prescribed policy documents (Andrews, 2011; Hizli Alkan, 2021; Hizli Alkan & Priestley, 2019; Priestley & Xenofontos, 2020; van den Akker, 2003; Xenofontos, 2019). In fact, Priestley, Alvunger, Philippou, and Soini (2021) use the term 'curriculum making' to highlight these complexities and to indicate that the curriculum is not merely a product, but a process that manifests as social practices at different sites of an educational system. Yet, for the purposes of this paper, we focus on a specific aspect of curriculum, the same way several colleagues describe the *intended curriculum*: a set of formal documents specifying what the relevant regional/national education authorities plan (see, for example, Herbel-Eisenmann, 2007; Hume & Coll, 2010; Porter, Polikoff, & Smithson, 2009; Prendergast & Treacy, 2018).

In the contexts of Cyprus, Greece, and Turkey, the respective educational systems are highly centralised, leaving limited space for teachers to 'deviate' from prescribed agendas. In all three countries, central authorities formulate the intended curriculum in two specific ways. First, they produce national curriculum documents (including, inter alia, guidelines, an overview of mathematical content, benchmarks for specific ages or grades, and sample tasks and activities). Second, they develop national textbooks aimed at reifying the respective curriculum documents. National textbooks are expected to be followed by all state schools in these three countries. In this paper, following the lead of recent analyses of UK

(Andrews, Xenofontos, & Sayers, 2021) and Scandinavian (Sunde et al., 2021) curricula, our attention is turned to the national curriculum documents, and not textbooks.

Our methodological approach could be labelled as *content analysis*. As pointed out by White and Marsh (2006, p. 23), "multiple, nuanced definitions of content analysis exist that reflect its historical development". Nevertheless, for the purposes of this paper, we follow Krippendorff (2004, p. 18), who defines content analysis as "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use". Table 1 presents the documents included in our analyses. The initial analyses were carried out by Xenofontos (first author), a native speaker of Greek, and Hizli Alkan (second author), a native speaker of Turkish. For each country, the documents were subjected to the same procedure. First, estimation-related keywords and their variants were identified in the documents. Relevant results were copied and pasted into a single text document for each country. In a second round of searches, the occurrences of computation, measurement, number line, and quantity were examined. Third, categorised statements were synthesised into a summary narrative for each form of estimation across the years of each of the three countries' curricula. The section below is based on these country narratives, presented in an alphabetical order. The same analysis approach was recently employed by members of our network in the UK (Andrews, Xenofontos, & Sayers, 2021) and the three Scandinavian countries (Sunde et al., 2021).

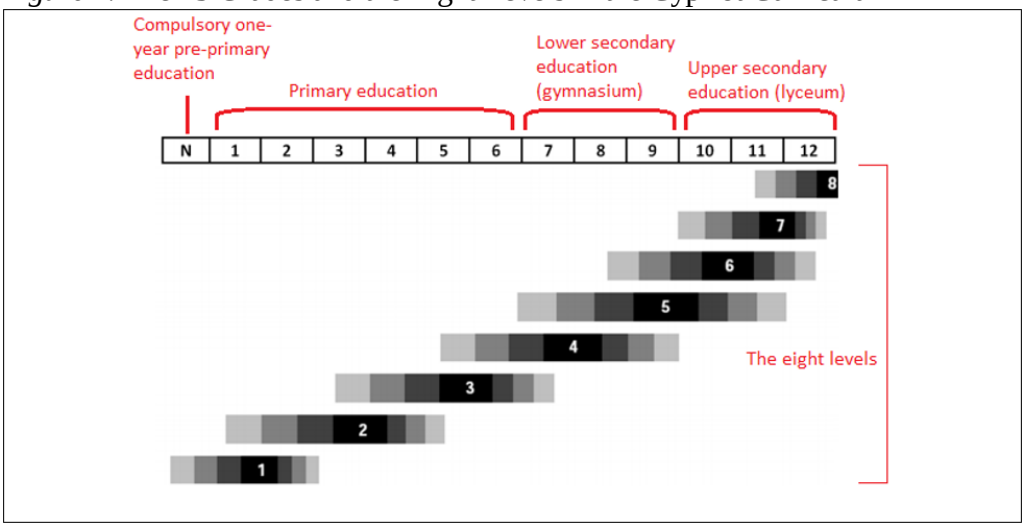
Table 1. Curriculum Documents Analysed

Country	**Documents**	**Keywords (and their variants)**
Cyprus	Ministry of Education and Culture – MoEC (2010b). *The mathematics curriculum* (in Greek). Nicosia: Pedagogical Institute, Ministry of Education and Culture. Refined mathematics curriculum for grades 1-6 (MoEC, 2019) http://www.moec.gov.cy/analytika_programmata/programmata_spoudon.html	• Εκτίμηση (estimation) • Στρογγυλοποίηση (rounding) • Κατά προσέγγιση (approximation) • Νοερός υπολογισμός (mental computation) • Αριθμητική γραμμή / αριθμογραμμή (number line)
Greece	Ministry of National Education and Religious Affairs – MoNERA (2003). *Cross-thematic curriculum: Government paper 303 & 304/13-3-2003* (in Greek). Athens: Ministry of National Education and Religious Affairs.	
Turkey	Ministry of National Education – MoNE (2018). *1-8th grade mathematics education curriculum* (in Turkish). Ankara: Board of Education Publications.	• Tahmin etme (estimation) • Yuvarlama (rounding) • Zihinden işlem (mental computation) • Yaklaşık (approximation) • Sayı doğrusu (number line)

The Cypriot Mathematics Curriculum

In 2010, the Ministry of Education and Culture (recently renamed Ministry of Education, Culture, Sports and Youth) of Cyprus launched a new curriculum for public education, for all subjects across school levels, from pre-primary until the end of upper-secondary (MoEC, 2010a; Xenofontos, 2019; Xenofontos & Papadopoulos, 2015). In the initial document for mathematics (MoEC, 2010b), 13 grades of public education are mentioned: one for pre-primary (age 5), six for primary (ages 6-11), three for lower secondary (gymnasium) (ages 12-14), and three for upper-secondary (lyceum) (ages 15-17). The programme is organised in eight levels with overlaps and no clear boundaries regarding which level corresponds to which grade. This happens to emphasise that each pupil understands "mathematical concepts in different ways and pace" (p. 10) and that not all children in the same grade should be expected to grasp all content to the same extent within a single academic year. For each level, benchmarks labelled as "success indexes" are provided. Figure 1, adapted from MoEC (2010b, p. 10), illustrates the relation between the 13 grades and the eight levels. Readers should keep in mind that figures 1-9 illustrate translated parts of the Cypriot curriculum. The original parts are in Greek.

Figure 1. The 13 Grades and the Eight Levels in the Cypriot Curriculum



Note: the text in red is our addition, for clarification purposes.

Roughly speaking, levels 1 to 4 refer to primary school, although the main emphasis of level 4 lies in the gymnasium. The fact that no clear instructions are provided concerning which success indexes correspond to which grade (due to the overlaps between the eight levels), concerns have been raised by teachers. These prompted the Ministry to refine the curriculum and produce separate documents for each grade. Currently, on the Cypriot Ministry's website, revised success indexes can be found for both primary (since April 2019) and secondary (since September 2019) mathematics. In the latest documents for each grade, there are clear indications about the corresponding success indexes, as well as some sample

classroom activities linked to specific practices, to facilitate the achievement of each index. In terms of content, the curriculum covers the same five areas, from pre-primary until the last year of lyceum: numbers, algebra, geometry, measurements, and statistics/probability.

Estimation in the Primary Curriculum of Cyprus

In both the extended curriculum (MoEC, 2010b) and the individual curriculum documents for each grade on the Ministry's website, references to estimation and other related terms (i.e., approximation and rounding) appear under two thematic areas: numbers and measurements. Cases where estimation is related to geometric concepts (i.e., area, angles) are presented under measurements, not geometry.

Computational Estimation. Computational estimation is one of the two most prevalent types across the primary curriculum. In the extended curriculum document (MoEC, 2010b), relevant examples can be found at all levels corresponding to primary mathematics (levels 1-4). At level 1, for example, pupils should be able to "estimate and calculate the result of mathematical expressions of addition and subtraction up to 20" (p. 19). At level 2, pupils are expected to be able to "estimate the result of a calculation, using strategies of rounding integers to the nearest ten, hundred, or thousand" (p. 31). Similar statements appear for levels 3 and 4. The task in Figure 2 appears under level 3 (p. 55), as an example for teachers in relation to pupils being able to round up numbers in problems.

Figure 2. Task from the Cypriot Curriculum

Based on the information in this table, find different combinations of toys Nikos can buy, if he holds €8.00.

Toys	Price
Ball	€2.59
Pair of tennis rackets	€3.83
Puzzle	€1.51
Stickers	€1.02
Set of toy animals	€4.98
Set of toy cars	€5.47

While level 4 covers the last years of upper-primary, it is mainly concerned with lower secondary school (gymnasium). At this level, it is stated that pupils should "estimate and calculate the result of mathematical expressions with positive rational numbers" (p. 63) and "negative numbers (integers, decimals, and fractions)" (*ibid*). The following is a word problem presented under level 4 as an example for teachers (p. 73): "Marina bought a computer for €563 and a printer for €329, in 12 monthly instalments. Estimate the amount of each instalment, approximately".

Several references to computational estimation can be found in the 2019 revised curriculum documents for each grade. For example, in the grade 3 document (p. 13), the following sample task is provided: "Estimate the sum of 492 + 286: (a) approximately 600, (b) approximately 7 (*sic*), (c) approximately 800". Similarly, in the grade 4 document (p. 10), the task in Figure 3 is presented.

Figure 3. Task from the Cypriot Curriculum

The table below presents the sales of a newspaper for the first three months of its circulation.

Month	Copies sold
September	14957
October	21238
November	9674

a. Calculate (*sic*) how many copies approximately were sold during the three months.
b. Calculate (*sic*) how many less copies approximately were sold in November compared to September.

The next example comes from the grade 5 document (p. 14) and is concerned with rounding, a process that falls under computational estimation (Andrews, Xenofontos, & Sayers, 2021): "Tasos rounded a number to the nearest tenth, and the number 635.7 came up. What could be Tasos' initial number, if it had 3 decimal digits?"

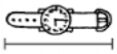
Measurement Estimation. Measurement estimation is extensively presented in the curriculum. In the extended curriculum document (MoEC, 2010b), this type of estimation is included in levels from 1 to 3. Under each level, there are examples of tasks that could be used to satisfy the respective success indexes. For level 1 (p. 109), the focus is on length and mass. Pupils are expected to:

- Estimate and measure the length and the mass of objects with standard measurement units (centimetres – cm and kilograms – kg, respectively).
- Estimate and calculate the perimeter of simple 2D shapes with non-standard and standard units (cm).
- Estimate and calculate the area of simple 2D shapes with non-standard units.

In Figure 4 we see a sample task from MoEC (2010b, p. 118).

Figure 4. Task from the Cypriot Curriculum

Estimate the length of these objects. Check your answer, using your ruler.

	ESTIMATE	MEASURE
Length of my chair's leg 		
Length of a watch 		

At level 2, the success indexes become more specific (MoEC, 2010b, p. 124), as pupils are expected to:

- Use different measurement units to estimate and measure the same objects.
- Estimate and calculate the perimeter and the area of squares, rectangles, and right-angle triangles, using appropriate measurement units.
- Use the right angle (90º), to compare, categorise, and estimate angles.

Specific examples of tasks from the curriculum documents for grades 2, 3, and 4, however, refer to exact measurements, not estimations.

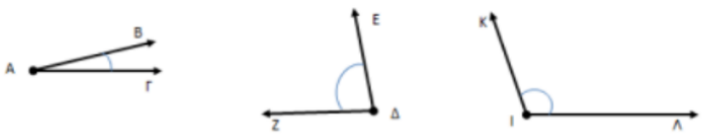
At level 3, the success indexes address angles and time (MoEC, 2010b, p. 143). Pupils should:

- Estimate, measure, and categorise angles (with or without using technology).
- Estimate and calculate time intervals for specific events, to the nearest second.

The example in Figure 5 is from the grade 5 document (p. 43).

Figure 5. Task from the Cypriot Curriculum

Circle your estimation for each of these angles.

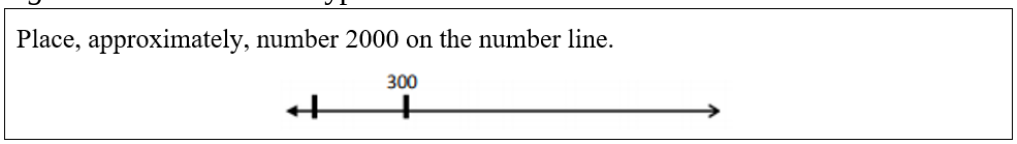


A. 68º	A. 175º	A. 108º
B. 145º	B. 82º	B. 180º
C. 100º	C. 148º	C. 50º
D. 20º	D. 25º	D. 87º

At level 4, there is a single reference to *estimation* (MoEC, 2010b, p. 164), which, however, seems to be erroneous, as the context of that sentence, as well as the sample task presented, alludes to *calculating* areas.

Number Line Estimation. The only reference to number line estimation appears in grade 3 curriculum (p. 3), through a suggested sample task, presented in Figure 6.

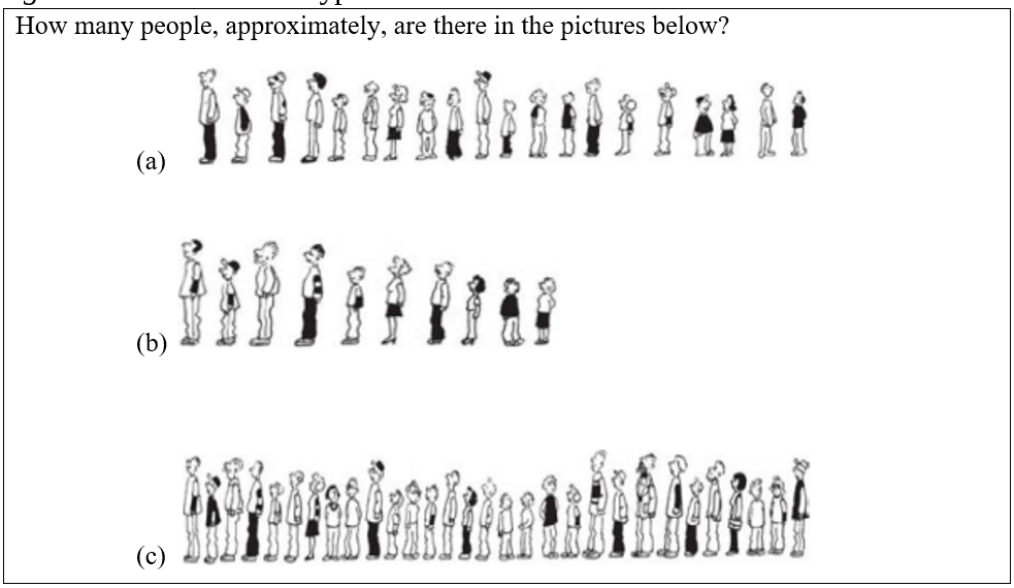
Figure 6. Task from the Cypriot Curriculum



Yet, this task appears as an example for a success index that does not refer to estimation at all (*ibid*): "[Pupils should be able to] represent numbers up to 10000, verbally, pictorially, symbolically, and with the use of materials (i.e., Dienes cubes, abaci, number lines, applets)". In addition, the image as it appears in the document represents an impossible task, as the length of the line segment is not long enough for the number 2000 to be placed on it.

Quantity Estimation. In the extended curriculum, references to quantity estimation are included under levels 1, 2, and 3. For instance, in level 1 (MoEC, 2010b, p. 19), it is stated that pupils should be in a position to "estimate the cardinality of sets (up to 20)". On a subsequent page (p. 23) the example in Figure 7 is presented.

Figure 7. Task from the Cypriot Curriculum



At level 3 (MoEC, 2010b, p. 35), pupils are expected to "[e]stimate the cardinality of sets in activities (*sic*) like:

Estimate and write whether the following quantities are bigger than, smaller than, or equal to 1000.

(a) Pupils of a school
(b) The residents of Lefkosia
(c) All fish in the ocean"

Similar examples are presented in the individual curriculum documents of grades 1 and 2. In grade 4 document (p. 4-5), it is stated that pupils should be able to "use various ways to estimate the cardinality of a set", like "these perceptual strategies: (a) comparison of unknown quantity to a known quantity" (see example in Figure 8), (b) separation of unknown quantity to known quantities" (see example in Figure 9).

Figure 8. Example in the Cypriot Curriculum, Illustrating "Comparison of Unknown Quantity to a Known Quantity"

Figure 9. Example in the Cypriot Curriculum, Illustrating "Separation of Unknown Quantity to Known Quantities"

In grades 3, 5, and 6 curriculum documents, no reference to quantity estimation is made.

The Greek Mathematics Curriculum

The mathematics curriculum in effect was introduced in 2003 (MoNERA, 2003). During that year, the compulsory curricula for all school subjects, from preschool to upper secondary (lyceum), were reformed and called "cross-thematic", with the aim of combining the teaching of individual school subjects with

knowledge from other subjects (Alahiotis and Karatzia-Stavlioti, 2006). In 2011, following international calls for reinventing curriculum policies and practices (i.e., Priestley & Biesta, 2013), the Greek Ministry designed an alternative curriculum, as part of a reform called the "New School (21st century school)" (MoNERA, 2011). The New School curriculum, which was introduced in some schools in the form of a pilot, was soon abandoned, as it was largely based on the premise that school textbooks should be abolished (Gounari & Grollios, 2012), which is in contrast with the mindsets of many Greek teachers (Xenofontos & Papadopoulos, 2015). Therefore, the only document currently being used is the one produced in 2003, and as such, it was included in the analyses of this paper. For every grade, the curriculum is structured in three columns, corresponding to aims, thematic units (with indicative time to cover each), and sample classroom activities. As far as content is concerned, for grades 1-3 the focus is on three areas: numbers and operations, measurements, and geometry. For grades 4-6, a new content area is added, that of data handling and statistics. For grade 6, two additional areas are included, namely ratios/proportions and equations. Finally, problem solving is presented as a separate content area, relevant to all grades, from 1 to 6.

Estimation in the Primary Curriculum of Greece

Very few references to estimation and other related terms (i.e., rounding, approximation etc) are included in the Greek primary curriculum. Moreover, these few references are not presented in any consistent manner.

Computational Estimation. Computational estimation is briefly presented in grades 5 and 6 only. In both grades, there is a reference to "estimate and check" (MoNERA, 2003, pp. 267 and 272 respectively), but with no further clarifications. In grade 5, pupils should "round natural numbers whenever possible", "check, approximately, the result of an operation", for an "approximating calculation (*sic*) in evaluating the correctness of a result", and be able to perform "mental calculations and approximating estimations (*sic*)" (p. 269). In grade 6, similar statements are repeated, with the addition of rounding "decimal numbers" (p. 273).

Measurement Estimation. In the whole primary curriculum, there is a single reference to measurement estimation, whereby grade 1 pupils should "identify and estimate the duration of time intervals" (MoNERA, 2003, p. 256).

Number Line Estimation. Most references to number line are not directly linked to estimation. Nevertheless, in some cases, estimation can be inferred. For instance, in grade 2 (MoNERA, 2003, p. 258), pupils should "order natural numbers and use numbers, to identify places on a number line". Similarly, in grade 3, pupils should be able to "use numbers to identify the position of a point on a number line" (p. 261). In grade 5, apart from placing "natural numbers on a number line", pupils should "place one or more natural numbers between two others, when this is possible" (p. 269). Also, in the same grade, pupils should "use decimal numbers to identify positions on a number line" (*ibid*). The only direct

reference to number line estimation appears in grade 4, where pupils are expected to "place, approximately, decimal fractions and decimal numbers on a number line" (p. 266).

Quantity Estimation. In the whole primary curriculum, there is a single reference to quantity estimation, in which grade 1 pupils should "quickly recognise quantities with structured form of one, two, and three elements (direct estimation)" (MoNERA, 2003, p. 255).

The Turkish Mathematics Curriculum

The national mathematics curriculum of Turkey was published in 2018 by the Ministry of National Education (MoNE). It is a statutory curriculum covering both primary (grades 1 to 4) and upper-primary levels (grades 5 to 8) (MoNE, 2018). It can be seen as a successor to the major curricular changes between 2005 and 2009, which marked a transition from a behaviourist philosophy of mathematics teaching (e.g., traditional practices focusing on rote memorisation of facts) to constructivist practices (e.g., more focus on conceptual understanding and student-centred pedagogy) (Babadoğan & Olkun, 2006).

The curriculum document outlines generic principles, purposes, perspectives and values of national education in Turkey. Regarding mathematics, there are 13 specific purposes indicated in the curriculum, which include mostly skills (e.g., mathematical literacy skills). For grades 1-4, the curriculum focuses on four content knowledge areas: numbers and operations, geometry, measurement, and data handling. After grade 4, two other areas are introduced: algebra and probability, while geometry and measurement are combined as one content area. Another section in the document is dedicated to generic recommendations about the teaching of mathematics. These points are centred on mathematical reasoning, developing positive attitudes towards mathematics, and using multiple representations. This section is followed by a table outlining each content area/ sub-area and how learning outcomes are distributed through grades, and how much time should be spent in teaching. Although there is some flexibility regarding time allocation and the order of learning outcomes, it is suggested that teachers follow the curriculum (MoNE, 2018).

Estimation in the Primary Curriculum of Turkey

The Turkish curriculum includes several references to computational estimation and measurement estimation on numbers and operations, measurement, geometry and measurement areas. There is only one reference to quantity estimation on numbers and operations area while number line estimation is not explicitly mentioned at all.

Computational Estimation. Computational estimation is referenced extensively across grades 1 to 7. While there are no explicit references in the requirements for

grade 1, we infer from the expectation that pupils in grade 1 "should be given opportunities to improve mental computational skills through employing some strategies such as using number bonds and making a 10 can be used in this level" (MoNE, 2018, p. 27) an implicit expectation of estimation. That being said, there are direct references to estimation throughout grades 2 to 7, which become more specific in grades 3, 4 and 5. Following the same content area, number and operations, it is indicated that "pupils can estimate the sum (not over 100) of two-digit numbers and compare the accuracy by checking their answers" (p. 33). Rounding is introduced in grade 3 and is explicitly cited as one of the estimation strategies. A typical statement about rounding is that "pupils round three-digit numbers to the nearest tens or hundreds" (p. 38). In grade 3, pupils are also expected to estimate the sum of two two-digit numbers; one three-digit and one-digit numbers; and, the multiples of 10 and 100 through mental computations. Teachers were encouraged to "place emphases on the affordances of rounding" (p. 60) which is rather a generic statement. The curriculum document presents a few specific strategies later, especially in grade 5. To name a few, "addition by partitioning; adding compatible numbers first; adding or removing zero when multiplying or dividing by 10 or powers of 10; to multiply by 9, first multiply by 10 and subtract the number that it's being multiplied by 9" (MoNE, 2018, pp. 51-52). The totality implies that the statutory expectations depict at least some starting points for unpacking the processes of computational estimation; reformulation, translation and compensation (Reys, Rybolt, Bestgen, & Wyatt, 1982). That being said, these are only explicitly cited in grade 5 with computations with natural numbers, therefore, there is still scope to state potential applications of these to, for example, fractions, decimals and percentages (in grade 6-7-8).

In grade 4, there is an atypical reference to estimation in the section on data handling, where pupils are expected to read bar charts, comment on and make estimations. Such a statement is ambiguous, being interpretable as referring to any one of the four forms of estimation. However, subsequent scrutiny of the relevant authorised textbook showed that pupils were expected to extract data and calculate estimates from them (MoNE, 2018, p. 271). The connection to real life is relatively strong here, as it is in later statements concerning computation with decimals and fractions, where, for example, pupils are expected to "estimate the results of computations with fractions [This should be limited to real life examples including quarters, one thirds, halves]" (MoNE, 2018, p. 60).

Measurement Estimation. With the exception of grade 7, there are explicit references to measurement estimation throughout grades 1 to 8. In this respect, the use of non-standard units in both the estimation of measurement and the checking answers to calculations is an expectation beginning in grade 1. For example, pupils are expected to "estimate the length of an object with non-standard units and check the accuracy of their estimation to calculations" (MoNE, 2018, p. 30).

Similar statements, which can be found in subsequent grades, address the concepts of area, mass/weight, capacity and volume besides measurement of length. In grade 3, pupils are expected to "estimate an area with non-standard units and check by counting the units" and "estimate the weight of an object and check

the accuracy to measurements" (p.43). Additionally, pupils are expected to "estimate the length of an object that they can directly measure with a most suitable unit and checks its accuracy to calculations" (p.48). Regarding capacity/ volume, pupils are expected to "estimate the capacity of liquid in a cup in litres and millilitres, and measure to check the accuracy" (p.50). There is only one reference to capacity within the commentary on content areas, which states that "pupils compare the capacities of two different cups by using non-standard units" in grade 1 (p.11), with volume being emphasised in grade 6.

The statements about measurement estimation concerning geometrical concepts appear in year 5, when geometry and measurement are combined as a content area. Pupils are expected to "estimate the perimeters of triangles and quadrilaterals and form shapes that have the same perimeter" (p.56). In the same grade, pupils should "estimate the area of a shape in square meters and centimetres" (p.56). Very commonly, the accuracy of the estimation would need to be checked by exact measurements. There is no reference to estimation with respect to time. Measurement of volume is introduced in grade 6, with the curriculum offering a rather enigmatic statement that pupils should "estimate the volume of rectangular prisms" (p. 63).

Number Line Estimation. There are references to the number line, involving both standard and non-standard units, as a model for measurement of length but nothing related to estimation. There are references to the placement of different forms of number - fractions, integers, decimals - on number lines. For example, "pupils compare fractions, order them and place on a number line" (MoNE, 2018, p. 59), as well as a solitary reference to pupils being expected to "plot first degree inequalities on a number line" (p. 73). However, any implication with respect to estimation seems incidental rather than planned.

Quantity Estimation. There is only one reference to quantity estimation in the curriculum. This states that grade 2 pupils should "estimate the quantity of objects within a set and check by counting" (MoNE, 2018, p. 32) in year 2.

Discussion

In the previous pages, we summarised the relevant literature regarding four types of estimation, which differ in terms of both form and function. Subsequently, our analyses focused on identifying estimation-related opportunities, provided in the intended primary curricula of three Eastern Mediterranean countries, Cyprus, Greece, and Turkey. Below, we discuss similarities and differences in the ways, and the extent to which, the three curricula promote the development of estimation skills in young children.

In the curricula of Cyprus and Turkey, there is extensive emphasis on computational estimation. For both countries, several strategies are encouraged, along the lines of previous studies (Alajmi, 2009; Boz & Bulut, 2012; LeFevre, Greenham, & Waheed, 1993; Sekeris, Verschaffel, & Luwel, 2019). Yet, this takes

place in two different ways: the Cypriot curriculum provides specific examples of tasks through which such strategies are implied, while the Turkish explicitly addresses them, but without providing any examples. Nevertheless, in both sets of documents, the role of computational estimation as an essential life skill (Ganor-Stern, 2016; Sekeris, Verschaffel, & Luwel, 2019) remains implicit. The Greek curriculum offers many fewer references to computational estimation, which appear only in the last two grades of primary school. Overall, all three countries address rounding as a computational estimation strategy. The function of this strategy in computational estimation is often misunderstood by children, who tend to abandon it as they get older (Liu, 2009). Nonetheless, in all three curricula, reflecting the curricula of England, Scotland and Wales (Andrews, Xenofontos, & Sayers, 2021), rounding is generally presented as an end in itself rather than a process related to computational estimation.

There are several references to time-related measurement estimation in the curricula of Cyprus and Turkey, while only one such reference appears in the Greek curriculum. Similar to previous studies (Andrews, Xenofontos, & Sayers, 2021), the common threads across the Cypriot and Turkish curricula included estimation concerning the physical properties of objects such as mass or weight, length and area. Both curricula emphasised the use of non-standard units and then checking answers to exact measurements with the use of standard units, which is known to increase the accuracy of students' estimations (Desli & Giakoumi, 2017). The Cypriot curriculum, however, differs by offering sample tasks related to real life and makes explicit references to mental referents unlike the Turkish curriculum, which offers generic statements. This can potentially inhibit teachers' enactment of the curriculum and students' estimation accuracy and development of number sense (Joram et al., 2005). Only the Cypriot curriculum addresses estimation of angles. The lack of emphasis on this area in the Greek and Turkish curricula may exacerbate already existing uncertainty amongst teachers regarding the teaching of estimation (Joram et al., 2005) and their reluctance to include measurement estimation activities that are not included in national exams (Boz-Yaman & Bulut, 2017). This exemplifies how a lack of clarity and emphasis regarding estimation in the intended curricula alongside high stakes examinations may hinder teachers' curriculum making practices.

Considering previous research about estimation (Andrews, Xenofontos, & Sayers, 2021), it is not surprising, albeit disappointing, to see that number line estimation was not explicitly present in the three curricula. There were a few implicit references, especially in the Greek curriculum, however, these stayed as inferences and were not directly related to estimation. This is an important finding as number line estimation has been shown to predict both mathematical learning difficulties (Andersson & Östergren, 2012) and mathematical achievement in a broad sense (Simms et al., 2016; Tosto et al., 2017). It is also known that number line estimation linked with spatial skills (Olkun, Sari, & Smith, 2019) can be a strong underpinning factor of numerical reasoning (LeFevre, Greenham, & Waheed, 1993).

Quantity estimation, associated with children's ability to count (Barth, Starr, A., & Sullivan, 2009) and a strong predictor of their future arithmetical competence

(Bartelet, Vaessen, Blomert, & Ansari, 2014; Wong, Ho, & Tang, 2016) receives limited attention in all three countries' curricula. Specifically, the three countries focus exclusively on younger grades. The Greek and Turkish documents include a single reference each, while in the Cypriot curriculum there are some more elaborate references, with emphasis on real-life examples and two perceptual strategies for children.

Concluding Thoughts

In conclusion, it appears that the curricula of the three Eastern Mediterranean countries under scrutiny provide limited opportunities for children to develop estimation skills. Specifically, they fail to recognise the importance of number line estimation and quantity estimation, the two types with the greatest developmental implications for the later learning of other mathematical concepts and areas of mathematics (Liang, Zhang, Wang, & Liu, 2021; Schneider et al., 2018; Wong, Ho, & Tang, 2016). This is, in a sense, not surprising. On the contrary, it confirms similar findings by previous studies in other European countries and regions, such as the four constituent nations of the United Kingdom (Andrews, Xenofontos, & Sayers, 2021) and the three Scandinavian countries (Sunde et al., 2021). Put together these findings indicate that pupils around the world may leave school either to continue their studies in higher education or to enter the workforce with poorly developed skills regarding estimation. Although the educational systems of Cyprus, Greece, and Turkey are highly centralised, with teachers having limited discretionary space to 'deviate' from prescribed agendas (Priestley & Xenofontos, 2020) research suggest that teachers often find space to mediate their practice in different ways (Hizli Alkan, 2021; Xenofontos, 2019). Thus, future research could examine how teachers in these three countries construe and reify estimation in their fulfilment of the 'contract' between them and the state. In other words, the ways in which teachers' curriculum making practices are manifested in their unique contexts is worthy of investigation.

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The Constructivist Principle of Learning by Being in Physics Teaching

By Mihail Calalb[*]

A detailed characteristic of teaching and learning approaches used within the new concept of Learning by Being (LBB) is given. The evolution of educational paradigms from Learning by Doing (LBD) and Learning by Understanding (LBU) toward LBB is analyzed. The basic idea of LBB is students' ownership on cognitive goals, or the assumption of learning objectives, in other words – intrinsic motivation of students. Along with LBB, the author proposes the term of guided self-scaffolding. Both terms tend to accentuate high level of student's intrinsic motivation. The article examines the school physics lab as an example of constructivist learning environment and analyzes several didactic approaches as inquiry-based learning, problem-based learning, project-based learning, case studies, and just in time teaching from constructivist point of view. The author enumerates the basic principles for the organization of school physics lab in a constructivist manner: provision of opportunities for students' own thinking, giving students a certain freedom degree in identifying solution through verbalization of the problem, necessity for teacher to know a priori concepts of students, students' effort as a mandatory condition to achieve students' interest. The concept of "big scientific ideas" is in the core of this organization. The author emphasizes that conceptual understanding in school physics lab, which is inseparable from learning by being, is achieved through the overlapping of several learning and teaching approaches which form the core of LBB concept.

Keywords: *constructivist pedagogy, educational paradigms, learning by being, ownership of cognitive goals, school physics lab*

Introduction

The results of recent researches show that wrong understanding of physics concepts remains high not only among school students but also among teachers, when up to 30% of them have naïve, non-scientific ideas about terms and notions with which they operate in class (Parinda Phanphech et al. 2019, Cahyadi 2007). This fact is not necessarily reflected in problem solving skills of the students or in the application of modern teaching methods. Thus, there is a discrepancy between understanding of notions and problem-solving skills of students (Bao and Koenig 2019). It means that we can have students accustomed to project-based or problem-based learning strategies, or to inquiry-based learning methods, but who do not have correct conceptual understanding of notions. This happens when excessive emphasis is placed on constructivist, active learning approaches, because conceptual understanding does not appear as a result of the repetitive

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practice of solving simple problems or carrying out laboratory work only following teacher's instructions. Thus, the so-called "active" learning, the false Brownian movement of students in the classroom, still does not ensure understanding (Calalb 2017).

In this article, we will start from the basic idea that there is no understanding without reflection, which in its turn, can be encouraged by creating in classroom the premises for conversation, discussion, and analysis (Von Glasersfeld 2001). As a result, the logic chain Conversation - Reflection - Understanding should be present in any physics lesson. Considering this, the Section I of this article analyzes the basic principles for embedding constructivist didactics into physics class.

As the formulation of teaching principles is not yet teaching, we will analyse the evolution of educational paradigms from well-known one of *Learning by Doing* to the recent concept proposed by the author – *Learning by Being*. This evolution reflects the main problem educational systems from various countries face. Namely, low motivation and interest showed by the majority of school students for learning (OECD 2017). In this way, the higher is students' involvement degree into class activities, the more successful is that strategy. More and more researchers and teachers realise that school does not belong to entertainment industry and student centered education hides actually the central role of the teacher. For example, the Section II of this article presents three-step ladder of paradigms. We analyse each paradigm from the perspective of student's role in the learning process and propose an integrated approach named *Learning by being*. In addition, based on the results of the *Visible Teaching Learning* (VTL) theory, the impact factors on academic achievement of students are analysed for the case of several constructivist strategies (Hattie 2009). In this context, in *Learning by being* we put the accent on student's *ownership of cognitive goals* or *assumption of cognitive goals.*

Section "Student's Role Within LBB", from the perspective of main principles of learning by being such as student's personal learning effort or metacognition, analyzes the student's place within several teaching approaches, which have a high impact factor proven by VTL. Section "Teacher's Role Within LBB" examines such approaches like: a) guided self-scaffolding; b) structuring of new information; c) recurrent application of previously learned knowledge; d) problem solving; and e) seeking help. All these approaches are inherent to Learning by being and strongly correlate with VTL principles. Along with the term of *learning by being*, the author also proposes for the first time the term of *guided self-scaffolding*. Both terms tend to accentuate high level of student's intrinsic motivation. Last section presents the main obtained results and draws several major conclusions from the perspective of the new approach of *Learning by being*.

School Physics Lab as Constructivist Learning Environment

The need for constructivism in physics class is fully justified because it comes from the fight against students' boredom and their low motivation for sustained cognitive effort. This led to the replacement (mostly in science education research

at this moment) of conventional teaching, which has formed absolutely all illustrious physicists, with a series of modern methods in which the student "reconstructs" existing knowledge and builds his/her own (scientific or less scientific) vision of the world. The good part here is the student's personal learning effort, which ultimately leads to the formation of sustainable lifelong learning skills – the school's goal in the era of technological and information boom. With a good organization of the lesson in constructivist style, when the student is in his/her zone of proximal development, the cognitive success is ensured (Anamezie 2018, Akanwa and Ovute 2014).

Let us start with several principles of constructivist didactics that we will take into account within school physics laboratories. First, create opportunities for students to manifest their own thinking. Do not start the lesson with the issuance of undeniable truths. Second, namely the students formulate the problem and it is their duty to identify the solution through conversation, when they verbalize the problem, the phenomenon, the notions, the quantities, and the possible relations between them. Third, in order to build correct conceptual understanding, it is mandatory to know what are the a priori representations and conceptions of the students. In addition, it is not a given that, after the lesson, the students will assume the teacher's conception. Fourth, along with subject knowledge, the teacher has an arsenal of teaching methods and techniques suitable to different situations, all aimed at awakening and forming the students' interest. Fifth, when evaluating student's work avoid giving such marks as "wrong" or "insufficient", if you know that the student has made an effort.

These principles can be easily followed within any constructivist teaching method. The only requirement is that students should be accustomed to them, because the sporadic, facade application of modern methods confuses students, having a negative impact on their academic achievement and conceptual understanding. In addition, before adopting a method, as in any conventional class, we will define the learning objectives in terms what the student should be able to do (explain, calculate, elaborate ... etc.). Further we will briefly characterize some methods that allow the implementation of constructivist approach within school physics lab.

a. *Inquiry-based learning* or reflexive learning, known as IBSE (inquiry-based science education). Recommended for beginning teachers. The organization of student – teacher interaction and the guidance of the research action of the students is the essence of IBSE. For example, in order to make students learn and understand as many notions as possible during a lesson, it is advisable to embed a peer instruction moment (Crouch and Mazur 2001).

b. *Problem-based learning*, PBL. An authentic, open-ended issue is debated within PBL class. PBL requires teachers who are experienced in organizing peer instruction, or in any other method of cooperative learning. Among all methods, PBL is most valuable because: i) PBL suits to the existent curriculum (while other methods require reconceptualization of the curriculum); ii) PBL forms students with sustainable lifelong learning skills; iii) The student's scientific conceptual understanding of the world is the result of the student's personal cognitive effort within PBL; and iv) PBL prepares students for cooperation and teamwork.

c. *Project-based learning* where students cooperate within teams, but each team member has his/her individual responsibility for the entire project, but learning objectives are mandatory for all students. As the project suits well with the concept of "big scientific ideas", we have to restructure the curriculum into such ideas, so that a project corresponds to one big scientific idea (Harlen 2010). For example, within the 6^{th} grade physics course during the whole academic year the students will develop ten small projects, each project containing about three new notions:

- Mass, volume and density.
- Motion and rest.
- Force, weight, gravitational acceleration.
- Atoms and molecules.
- Gas, liquid and solid bodies.
- Temperature, thermal equilibrium.
- Thermal expansion/contraction.
- Nature of electricity, electrical charges.
- Conductors and insulators.
- Magnets, magnetic poles.

d. *Case studies* are less common in physics lessons because it is time consuming for teacher to prepare the necessary information, but 11^{th} and 12^{th} grades students could apply case studies, when they examine a problem in a global context. For example, in the 12^{th} grade physics course, the study of the external photoelectric effect can be done in the context of renewable energy or in the context of the analysis of the multiple applications of photoelectric emission.

e. *Just-in-time learning* suits to online teaching because it allows the distribution of tasks and the evaluation of individual responses of students. In its essence, the method *Just-in-time learning* is an online translation of frontal teaching method, when students have to keep up with the lesson and daily tasks. From teacher it requires flexibility and experience in order to adjust the delivery of the course according to the answers received from the students.

We emphasize that the methods presented here are learning and not teaching ones. It does not imply that teacher does not remain the central figure in class. In the same time, teacher and students strictly share their distinctive parts of responsibility. It means that the learning objectives are not optional and the learning effort is mandatory, because without effort there is no ascent. That is why ludic education has a smaller impact factor on students' academic achievement than conventional-frontal teaching (Hattie 2009).

In conclusion, although constructivist methods are different, there are some common moments: a) reflective learning in physics laboratory; b) enhanced (in comparison with conventional teaching) student-student communication (IBSE, peer instruction, PBL) and student-teacher communication (IBSE, scaffolding); and c) intuitive structuring of information. Thus, the distinctive features of school physics lab organized in a constructivist manner are:

- Unlike the common custom, in a constructivist class the teacher organizes laboratory at the beginning of new chapter because at this stage, the cognitive goals are formulated as a research problem and students better understand the notions and connections between new terms within their research projects.
- One laboratory corresponds to one research project and to one big scientific idea.
- In order to achieve deep conceptual understanding, students study no more than three physical concepts within one physics lab.
- First comes understanding of the notions and connections between them, then - formulas and problem solving. Avoid sterile formulas during the laboratory measurements. Juggling with simple formulas does not bring understanding of physical meaning.
- The students estimate and analyze the possible results before measurements. Estimating results develops both the understanding of physical meaning and the mathematical skills of students.
- The students discuss and debate the obtained results at group and class level. Without the moment of analysis and reflection, the laboratory work is useless.
- Laboratory ends with a homework task, which should look like a small challenge and not time consuming. Homework is mandatory, but in order to avoid frustration and maintain interest, it should be accessible to all students.

Thus, a successful organized physics laboratory in a constructivist style will necessarily access a series of intelligences (bodily - kinesthezic, spatial, logical - mathematical, linguistic, intra- and inter-personal), none of them being superior to the others (Aina 2018). For example, interpersonal intelligence is about communication, and communication, in its turn, ensures the mutual feedback. Without feedback the student only guess the teacher's objectives, and the teacher does not know the initial conceptions of the student, nor what the student understood from his/her discourse (Hattie 2009). It is about visible teaching and learning, VTL.

In order to structure the information in an intuitive way, there are several related approaches: reference signals, concept or cognitive maps, graphic organizers (Шаталов 1979, Iofciu et al. 2010, Placing 2006). These approaches allow students to have an overview on a body of knowledge, structure the knowledge, help them in understanding new notions, facilitate conceptual learning, and eliminate students' boredom and fatigue. In addition, as a way of learning, students may be involved in the creation of these intuitive teaching aids.

The Ladder of Educational Paradigms

There is no modern paradigm, which does not declare itself as a constructivist one. It is fashionable to put the accent on student's active role within teaching –

learning process. For example, let us examine the first step of the ladder of educational paradigms – one of the well–known strategy of Learning by doing, LBD, which tries to find solutions for more noticeable presence of students in class. A LBD approach is ludic education. According to the VTL theory, ludic education has an impact factor on students' academic achievement equal to 35% (Hattie 2009). Another LBD approach is problem-based learning with lower impact factor – 26%. If we relate to benchmark level of 40%, which corresponds to the case when an experienced teacher applies conventional frontal teaching during two years, these approaches have a negative impact factor, because doing is far away from understanding.

The next step on the ladder of educational paradigms is the one of Learning by understanding, LBU. The transition from the linear paradigm of doing to the one of understanding requires a higher degree of students' involvement. Thus, it is about understanding through involvement. Thus, LBU requires a more advanced level of communication. Good communication requires and atmosphere of empathy. A good example of LBU is IBSE, which has an impact factor two times higher than ludic education – 77% (Bao and Koenig 2019). Thereby the LBU approach has a double effect compared with LBD.

Further, the third step in the evolution of educational paradigms is *Learning by being*, LBB, when the student not only knows the learning objectives, but also assumes them. Thus, LBB is about the *ownership of cognitive goals*. LBB has several distinctive components such as: independent research with an impact factor on students' academic achievement equal to 83%, knowledge of success criteria – 113%, revealing similarities and patterns – 132%. Since LBB integrates these highly efficient strategies (two – three times higher than conventional teaching), due to the synergy effect the impact factor for *learning by being* is much higher than the given numbers. Thus, simultaneous or parallel application of such didactical strategies, all of them being based on deep intrinsic motivation, would give strong cumulative effect.

Student's Role within LBB

In this section, we will examine the requirements for what students should be able to do in order to apply efficiently LBB approach.

Knowledge of Learning Objectives and Assumption of Learning

According to VTL this strategy has an impact factor on academic achievement of students equal to 113% (see Table 1). It is a common thing that each class starts with clear definition of the learning objectives: what students need to know, understand, and be able to do. However, we have to emphasize that in LBB each student must not only know the learning objectives, but also assume them. In order to achieve this highest level of intrinsic motivation, the learning objectives must be challenging and exciting for students, according to their current level of knowledge. Thus, the teacher should act at the edge of their zone of proximal development.

Here we recall well-known didactical principle of learning with effort, because only the effort develops, and any ascension requires effort. For a better assimilation of cognitive goals of the lesson, we can group the learning objectives according to the concept of big scientific ideas. Thus, in order to obtain a more advanced involvement degree of students, we may prepare a series of questions such as: a) What do you think should follow after previous subject? b) What will be the aims of today's lesson? c) What do we already know and would it help us to reach today's goals? d) What should we do in order to achieve our goals?(Killian 2014). As we can see from the structure of these questions, we actually prepare students for inquiry-based learning. Such type of learning will be a successful one if the impulse for research comes intrinsically from students.

Table 1. Key Features of Several High-Impact Teaching Approaches Used Within LBB

Teaching approach	**Didactical principle**	**Didactical tools or means**	**Impact factor**
Assumption of learning objectives	Learning effort	• Structuring of learning goals • Inquiry-based learning	113%
Active Involvement	Practice	• Series of practical tasks with different complexity degrees	77%
Knowledge of understanding degree	Scientific character of teaching	• Offline digital evaluation system • Peer instruction	129%
Structuring new material	Intuitiveness of teaching	• Support signals • Interactive white board	114%
Fostering metacognition	Consciousness of learning	• Analysis of learning strategies • Self-assessment	61%

Active Involvement

When the teacher comes with a new subject, the first question of students is "What use is it?" In order to remove this refractory attitude, the teacher should prepare series of practical examples that directly give an explicit answer. Active involvement suits to another well-known didactical principle of practice and training. It contributes to a deeper understanding especially when it has a permanent recurrent character. For this purpose, the practical examples and the tasks proposed later to the students will be of a certain degree of complexity, so that the students can break them down into stages. Thus, we not only say and show, but also challenge the students for a creative fulfilment of tasks. In addition, we could say that the teacher may apply within each lesson the rules for a good presentation. For example: firstly we tell the students what we are going to talk about; then we present the content by underlining the main moments; then we invite the students to draw conclusions; finally the students analyse if and how the objectives of the lesson were achieved.

Knowledge of Understanding Degree

Feedback is the essence of *visible teaching and learning*. In order to be useful, it has to be mutual and simultaneous. For this purpose, the teacher divides the lesson into several sequences, so that a sequence will answer a question related to a new notion. We examine a new notion only if the previous one is understood. An offline digital assessment system will ensure the participation of all students in this ad-hoc formative evaluation, i.e., the total inclusion of students in questioning. This strategy of sequential teaching corresponds to an important didactical principle that the student must leave the classroom with the learned lesson, which means – with the scientific understanding of new concepts and inclusion of these notions in his/her active vocabulary. A good example in this sense could be peer instruction strategy (Crouch and Mazur 2001).

Anchoring New Material into the Student's Conscious and Subconscious

LBB is more concerned with deep understanding than superficial knowledge. Only "unforgettable" knowledge has a visible impact on a student's personality and lifelong learning skills. Storing a certain amount of information is impossible without structuring, which could be in the form of diagrams, tables, maps, etc. generically called landmarks, support signals, or cognitive maps (Шаталов 1979, Iofciu et al. 2010, Placing 2006). This approach corresponds to the didactic principle of intuitiveness. For example, logical connections between new concepts or terms can be easily presented nowadays using interactive whiteboard tools. The diagrams built by the teacher will contain only landmarks (expressions, symbols, images, video files), which will help to form logical connections and anchor new matter in the student's conscious and subconscious. Research shows that it does not matter who drew the support signals – the teacher or the student (Lavery 2010). However, it is advisable to involve students in the development of cognitive maps. See, for example, the experience of the e-Twinning program (Istrate et al. 2018).

Fostering Metacognition

Metacognition assumes that the students: a) analyze what strategies they will use in order to accomplish the task; b) argue why they have selected a certain strategy; c) estimate the possible result; d) analyze the obtained result; e) decide if it is necessary to change the strategy for carrying out the task. Thus, awareness and understanding by students themselves of their way of thinking in the case of learning is more than applying a learning strategy, taken from the teacher. In this way, the metacognition is equivalent to the didactical principle of consciousness of learning and closely relates to the assumption of learning objectives by the students (Kirschner et al. 2006). Like in sport when the athlete not only knows what the coach wants from him/her, but also assumes these tasks as his/her own goals and he/she has all physical, technical, tactical and emotional means to achieve the goal set initially by the coach.

Teacher's Role within LBB

Just as there is no efficient teaching without active involvement of the student, in the same way there is no successful learning without teacher guidance. Thus, the student – teacher interaction acts as a harmonic oscillator, with features determined by those of its constituents. Considering this, we examine in this section the role of the teacher in a series of learning approaches used within LBB. The impact factors of these learning approaches on students' academic achievement and the related didactical tools are given in the Table 2.

Table 2. Key Features of Several High-Impact Learning Approaches used within LBB

Learning approach	Didactical principle	Didactical tools or means	Impact factor
Guided self-scaffolding	Learning through effort	• IBSE • Problem – based learning	75%
Structuring of information	Consciousness	• Highlighting • Revealing the logical links	85%
Recurrent use of previous knowledge	Consistency and systemic character of learning	• Retrieval • Integration • Practice	93%
Problem solving	Active character of learning	• Analysis • Formulation of patterns	92%
Help seeking	Commitment	• Offering and asking feedback	72%

Guided Self-Scaffolding

The student's mind is far to be *tabula rasa*. Students already understand the world – in their own way, often having naive or quasi – scientific representations. In this context, we have to remind that the task of the school system is to form citizens with scientific understanding of the world. Any learning act has several stages: a) understanding; b) sublimation to the essence; c) coding; d) transferring the knowledge into the category of deep one. Without the last two stages, knowledge remains into the phase of the superficial one, volatizing rapidly and having no noticeable impact on personality development. Research shows that students had better encode new information when they connected it with their previously existing knowledge and understanding (Killian 2019). In this sense, for the effective application of this strategy based on previous knowledge, the teacher will teach the students to ask themselves the following questions about how and what they learned: a) Did it *confirm* what I already knew? b) Did it *complete* what I already knew? c) Did it *cancel* what I think I knew? d) Did it *challenge* me for deeper research? Thus, it is about activating a scheme through which new knowledge is connected with previous one. Learning with this scheme can be easily performed even in primary classes, when pupils are taught to summarize the text they read. In fact, this process lays the foundations for the formation of critical and analytical thinking, which will facilitate learning through research in middle school and in high school. In addition, this set of simple questions contributes not

only to the student's understanding and assumption of cognitive objectives, but also to the formulation of their own learning objectives. Thus, the student knows which learning vector he is going to and is able to anticipate what he will learn in the near future. In this sense, we could say that the strategy of basing on previous knowledge facilitates the anticipation by the students of their future learning finalities, because the students are aware about their learning and fully assume the learning process. This is why the reliance on previous knowledge has such a big impact – 92% on the student's academic success. If in the international literature there is a talk about the scaffolding process (in the context of inquiry-based learning), then here we could introduce the term of *self-scaffolding*, which would emphasize the student's personal effort in inquiry-based learning.

Structuring of Information

It is another approach that is going to be learnt, which fully requests student's effort and involvement. The process involves the introduction by the students themselves of the titles, subtitles, bulleted lists, underlining, etc. In addition, here we could add the analysis of information coming from different sources. This is what good students do at university when they prepare for exams, but for school students, at least in middle school, it is a little bit unusual. Thus, structuring of information relates with the formation of analytical and critical thinking skills. For this reason, the permanent application in the classroom of this strategy of information structuring has a significant impact of 85% on academic success (see Table 2). We have to note that structuring is a mandatory step before understanding and memorization (Van der Graaf et al. 2019). The procedure of structuring information is similar in some extent to diagonal reading, useful in the case of a large amount of information, when the reader is forced to separate the necessary from useless. Thus, we consider if the student is get used with permanent structuring of new information, he/she is immunized against surrounding informational buzz, which has a deviant action on the motivation to learn, because it induces a false impression of knowing the subject.

Recurrent Application of Previously Learned Knowledge

Here we talk about information retrieval by applying it to understanding and studying a new situation; in other words, the practical application at a deeper level. The benefits are multiple. For example: a) learning new material in a practical way that involves the formation of sustainable knowledge about things, phenomena, and procedures; b) passing the previous knowledge from the category of operative memory into deep understanding, which also implies a certain degree of mastery in the application of research skills. We have to emphasize that this strategy is one of learning (not of teaching) where the student uses his/her research skills, formed during previous grades. This strategy is not about practice or repetition when the goal is to "strengthen the material", but it is about the student's conquest of a new fortress of knowledge with the same available weapons (skills). Therefore, recurrent application is a learning strategy that integrates previous knowledge into

future ones. It is effective when students do not use textbooks or course notes, when they are alone with their skills and knowledge. It means that new knowledge is built on a stable foundation.

Problem Solving

Problem solving is an approach which has 92% impact on the students' academic success. In order to solve a problem the student must be able to:

- Understand the problem (this is proved if the student can reformulate the problem, emphasize the essential and detach auxiliary details).
- Create a plan for solving the problem (by arguing a strategy and choosing it from a number of possibilities).
- Solve the problem by following the outlined plan.
- Analyze the obtained solutions, relating them to the initial statement and data.
- Formulate a pattern or procedure for solving such type of problems.

All these verbs refer only to student. The teacher is the facilitator, site manager. We have to underline that namely permanent application, starting from primary school or even kindergarten, forms problem-solving skills, and prepares students for wide application of inquiry in middle and high school. The above-enumerated steps of this strategy require a certain degree of automatism, which can be achieved by practicing in a learning environment that promotes learning, such as, for example, the general atmosphere of empathy in the classroom, which leaves room for personal effort.

Seeking Help

Seeking help is a learning approach, which proves that the student has already taken over the learning objectives proposed by teacher and is oriented toward achieving them. It also reminds us that communication skills are a part of lifelong learning skills (Calalb 2018). Diminishing student – teacher communication factor, as seemingly unimportant compared to the immediate learning objectives, decreases the rate of academic success. Moreover, if the student seeks help it denotes that he/she already is engaged in the lesson and there is no longer the question of demotivation, low interest or commitment to personal effort. The student who seeks help both from colleagues and from teacher is a recoverable one because he/she already is in the process of independent learning. Based on this reason, seeking help from the student part has almost double impact compared with the case of frontal teaching by an experienced teacher (72% versus 40%), which confirms once again that the most important thing in the classroom is the student's personal effort. Indeed, research shows that content knowledge level of the teacher does not have such a high impact on the students' success – about 17-19%.

Conclusions

Conceptual understanding in physics school lab is achieved through several constructivist approaches: inquiry-based learning, problem- and project-based learning, case studies or just-in-time teaching. The concept of big scientific ideas is in the base of most of these approaches. The concept of *Learning by being* is developed and is demonstrated that LBB develops and enriches the ones of *Learning by understanding* and *Learning by doing* with the student's attitude, intrinsic motivation and ownership of cognitive goals. In this sense, *Learning by being* goes beyond metacognition. According to the LBB approach, for a successful learning process we should target the assumption of learning objectives by students. Within LBB, as in *Learning by understanding*, the tools of feedback and practice are highly requested, because feedback-based strategies, such as knowledge by the teacher of understanding degree and assumption by the students of cognitive goals, have high impact on students' academic achievement. Parallel use or the overlapping of several teaching and learning techniques gives a synergistic effect. Learning by being is achieved in the frame of an environment that encourages learning effort through the atmosphere of empathy.

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Townships' High School Learners' Views on the Implementation of the Right to Education: A Social Justice Perspective

By Lucia Munongi[*]

The Universal Declaration of Human Rights asserts that education is a fundamental human right for everyone. Education promotes equality, but this can only be possible in the absence of social injustices within school systems. Social justice in education entails challenging any inequalities that may exist in the education system. This study focused on examining South African township high school learners' definition of their right to education and views on its implementation. Using a qualitative approach, 45 high school learners (26 female and 19 male) who were purposively sampled from two township public high schools participated in semi-structured, in-depth individual interviews. The study was grounded in the social constructivism paradigm and data were analysed thematically. The findings of this study showed several shortfalls in the implementation of the right to education in the two schools. Despite a few positive developments, learners generally felt dissatisfied with the implementation of their right to education. Based on these findings, this study recommends the need to monitor activities in public schools to ensure that the right to education is fully implemented, to promote social justice in schools.

Keywords: public school, right to education, social justice, the Constitution of South Africa, the Universal Declaration of Human Rights, township

Introduction

Several scholars have alluded to the fact that education is a right through which one can achieve other fundamental rights (Lahiri, 2019; Thapliyal, Vally, & Spreen, 2013) and as such it has the power to promote social justice through improving the lives of the socially disadvantaged. Thus, every child should be accorded this right in practice. This means that the kind of education the children are given should be equal, of good quality, and should enable them to gain knowledge that improves their futures and allows them to compete and participate equally, fully and productively as citizens (Berger, 2003). In South Africa, this right is enshrined in the Constitution of South Africa (hereafter the Constitution). This study aims to report findings on how township high school learners defined the right to education and their views on how this right was being implemented in their schools.

In South Africa, efforts have been made to ensure the right to education in order to close the equality gap created by the apartheid regime. This has seen the new government introducing no-fee schools (Patrinos, 2000) to cater for poor Black communities where people cannot afford school fees, allocating finances to

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formerly disadvantaged schools, providing stationery and introducing the National School Nutrition Programme in poorer public schools, to improve learners' ability to learn (Arendse, 2011; Harber & Muthukrishna, 2000). Corporal punishment, which degrades learners' dignity, and racial discrimination in admission to formerly white-only schools were also banned (South African Schools Act, 1996; 4 to make sure that qualified teachers are available (Wolhuter, 2006). The curriculum has also been revised to remove aspects of segregation that gave Black people an inferior type of education and prepared them only for the labour force (Mestry, 2017). These efforts can be regarded as positive measures towards the progressive achievement of the right to education. However, the provision of proper resources continues to be hindered by financial constraints (Independent Online, 2010), and in some cases, the policies remain only on paper.

Recent research on the right to education in South Africa has focused on legal aspects and legislation (Lafleur & Srivastava, 2019; Selvakumaran, Hee, & Yusoff, 2020). Only recently, studies that focus on COVID-19's impact on the education of learners have begun to expose the social injustices that exist in education (Pătrăuș, 2021). Although some research has focused on whether the present South African education system adequately fulfils the learners' constitutional right to education (Chürr, 2015), in the South African context, there seems to be a gap in such research done from the perspective of learners themselves, who are the holders of this right. There seems to be a tendency of speaking on behalf of children about matters that affect them, without directly consulting them to get their original views. It is from this perspective that this study aims to find out how township high school learners define the right to education and their views on the implementation of this right in their schools, through direct inquiry of the children themselves. This provides an understanding of how learners define their right to education and view its implementation from their own perspective, rather than that of policymakers who may have biased perspectives on this issue.

I argue that since learners are the recipients of the right to education, their views and experiences of the implementation of that right in their various school matters, as they help to evaluate the extent to which social justice is prevailing, as far as the implementation of the right to education is concerned. It is also important to know learners' views on this matter as their views can be the basis for any change, improvement, intervention, or continuity of existing systems. The type of education given to learners should be in line with the requirements of the available international and local human rights policies and legislation. It must ensure no discrimination based on differences between the learners, such as their background, race, gender, socio-economic background, or cultural status. All learners, therefore, need to be afforded quality education without any discrimination to ensure that any social, economic, or cultural disparities that learners may bring into the school system are challenged. In doing so, the following research questions were addressed:

1. What does the right to education mean for township high school learners?
2. How do township high school learners perceive the implementation of their right to education in their schools?

The article starts with a review of existing literature to identify the existing gap, followed by a discussion on the role of education in promoting social justice. The study is then positioned within the social justice framework, and the methodology, findings, and discussion sections are presented before making conclusions. The following section highlights the literature reviewed.

Literature Review

In South Africa, the right to education is a fundamental right that is enshrined in the Constitution. According to the Constitution (Republic of South Africa, 1996, p. 1257) section 29(l) *(a),* "Everyone has the right to a basic education", and subsection (e) states that this right should take into account "the need to redress the results of past racially discriminatory laws and practices". Although the Constitution does not define what basic education is, it guarantees this right for everyone. Chürr (2015) differentiates the right to basic education from the right to education by saying the latter is broader than the first. This is because basic education may be restrictive and can allude to just one's basic learning needs and the basic learning content such as literacy, numeracy, knowledge, skills, values and attitudes. Furthermore, Chürr (2015) points out that the right to education is a universal entitlement to education, which bestows upon the state a responsibility to ensure basic education is provided for everyone. Thus, the right to education should be interpreted in the broader sense as an instrument that can facilitate the development of better life, not merely giving learners basic skills.

While the right to basic education may not focus on quality, the right to education entails quality too. Thus, the Education for All, goal 6 aimed to improve the quality of education by 2015 (Narayan, 2015). Quality education is defined by Slade (2017) as education that provides resources and promotes a healthy lifestyle, takes place in a physically and emotionally safe learning environment, and connects the learner to the community at large. Personalised learning, qualified and caring teachers, and a challenging curriculum which prepares learners for employment and global participation are also key elements of quality education (Slade, 2017). Sustainable Development Goal 4 of the United Nations focuses on quality education, which aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations Sustainable Development Summit, 2015, p. 1). Although quality can be contextual, quality education should add value to the lives of learners (Concern Worldwide US, 2019) so that they can break free from the vicious cycle of poverty that most black people in South Africa find themselves entrapped in.

The right to education does not only entail children going to school but also includes key factors like the provision of resources that are critical for achieving

the goals of education, as this is the essence of the right to education under international law (General Comment No 13 para 6(1), 1999). Resources such as classrooms, bathrooms, stationery, textbooks, libraries, science laboratories, and modern technology need to be available in the best state that facilitates effective learning if the right to education is to be fulfilled. Some scholars have argued that the lack of these provisions hampers the transfer and fulfilment of the right to basic education (Odeku & Nevondwe, 2014). Human resources also need to be available in the form of qualified, competent, and dedicated teachers as well as support staff. Furthermore, the school environment needs to be conducive to proper learning, allowing learners to fully enjoy their right to education (Che Ahmad & Amirul, 2018). Thus, security, violence, and discipline issues need to be addressed as part of defining the right to education and as processes that enable the right to education to be effectively implemented. If the education policies and systems do not pay attention to these aspects, it can be argued that they are failing to promote the right to education for learners.

Instruments on the Right to Education

The right to education is enshrined in several international and national legal instruments of human rights. These instruments advocate for various elements of the right to education. For example, the Universal Declaration of Human Rights (UDHR), Article 26 (1948), the United Nations Convention on the Right of the Child (CRC) Article 28 (1989), and the African Charter on the Rights and Welfare of the Child (ACRWC), Article 11(3), (1990), all advocate the right to education for everyone including adults. To enable everyone to get this right, these instruments further stipulate that primary education should be made compulsory and freely available for all. However, it is acknowledged that in some developing countries, according this right in totality may be difficult due to various challenges. Thus, the CRC (1989), Article 28 acknowledges that the "state recognises the right of the child to education with a view of achieving this right progressively and on the basis of equal opportunity". This clause calls for governments to develop progress targets and to fund the public education system so that the disadvantaged are equally catered for. Equal opportunity refers to every person participating freely and equally (Westen, 1985). It, therefore, makes sense that one of the primary goals for the National Development Plan 2030 is to improve the quality of education and promote equal opportunities for Black African children (National Planning Commission, 2012).

The idea that every child has a right to education is further enshrined in the African Charter on Human and People's Rights (ACHPR, 1981), Article 17, which mentions that "States to the present Charter shall take all appropriate measures with a view to achieving the full realisation of this right." Full realization implies that the right to education may not only focus on providing entry to school, but the provision of resources, safe school environments, and modern technology. Thus, the right to education can only be fully realised under these conditions where there is equality in the provision of resources for teaching and learning.

Further advocating the right to education, Articles 28 and 29 of the CRC (1989) say "States Parties shall promote and encourage…the elimination of ignorance and illiteracy throughout the world and facilitating access to scientific and technical knowledge and modern teaching methods." This implies that schools need to be equipped with functional facilities that promote the acquisition of scientific and technological knowledge such as science laboratories, libraries, and internet facilities. Given the advent of the fourth industrial revolution and the impact that Covid-19 has had on the transformation in learning and teaching strategies, the provision of technological facilities for learning can no longer be treated as a luxury, but as a basic necessity. Access to such facilities can also enable learners to compete equally on a global platform.

South Africa also ratified the UNESCO Convention Against Discrimination in Education (1960) which compels the state to develop local policies and legislation establishing the right to education for everyone. This has seen the development of domestic policies like the Constitution of South Africa and the South African Schools Act (SASA). These instruments echo the same sentiments of the right to education for everyone and endorse the role of the state to ensure the full realisation of the right to education on an equal basis (Republic of South Africa, 1996). Furthermore, various instruments such as the CRC and the Constitution of South Africa also spell out the aims of education, to improve the lives of people, promote social justice and democratic societies, and redress the inequalities created by past discriminatory laws (CRC, 1989; Republic of South Africa, 1996). Thus, the right to education is well documented locally, regionally, and internationally.

Although Nevondwe and Odeku (2013) argue that the right to education in South Africa was being adequately provided given that the government had introduced policies and legislations that are in line with the constitutional obligations, evidence from some public schools show otherwise, as what is promised on paper is not what is happening on the ground. In terms of policy implementation, Amnesty International South Africa (2020) notes that the government continued to miss set targets of improving learning facilities, hence failing to comply with their constitutional and international human rights commitments in terms of the right to education. This right cannot be achieved in a school where learners are unsafe to learn and have inadequate infrastructure and facilities. Unfortunately, this is the case for many schools in South Africa which continue to have unhygienic and poorly maintained facilities, unsafe school environments, and overcrowded classrooms which lack basic materials such as furniture and textbooks (Amnesty International South Africa, 2020). Thus, the notion of progressive achievement of the right to education needs to be revisited and the pace of progress examined, given that some of these domestic policies and legislations are over two decades old in South Africa.

Social Justice in Education and the Role of Education

Simply put, social justice in education refers to a commitment to challenging social, cultural, and economic inequalities imposed on individuals arising from any differential distribution of power, resources, and privilege (MILLS, 2019). Similarly, education has the power to level such inequalities. However, one of the challenges that continue to exist in the education system is the lack of social justice (Donohue & Bornman, 2014). The Preamble of the Constitution of South Africa pledges to "heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights" (Republic of South Africa, 1996, p. 1). According to van der Berg (2017), education is one such right that has the power to take the centre stage in bringing about social transformation and promoting social justice. This is so because the right to education is seen as a multiplier that is instrumental in providing access to other opportunities, hence achieving other rights (Thapliyal Vally, & Spreen, 2013). Thus, denying children the right to education means denying them other rights that can be achieved through being educated. All formal education intends to facilitate success through the attainment of the learners' educational aspirations (Scott, 2018). This success can be economic, social, or political and as such may lead to one's inclusion and equal participation in these sectors, which is the essence of social justice.

Divisions of the past referred to in the Preamble of the Constitution were created by the racial system of the apartheid government which separated people according to race. This saw Blacks being oppressed in every sector and denied them their rights (Thompson, 1996). Compared to their White counterparts, Blacks did not receive good quality education and many of them did not even have access to education (Lowenberg, 1997). Thus, the multiplier effect of this right did not apply to Blacks as they were not educated enough to improve their lives economically, socially, and politically or to participate in these sectors fully and equally. Hence, social justice was denied to them. Social justice in education implies that education is used as a tool to bring justice and equality among all people despite their differences (Gebremedhin & Joshi, 2016). This means the kind of education offered to all must be the same in quality and value. This can be achieved through providing quality teaching, learning resources, and infrastructure, and creating a safe and conducive school environment for teaching and learning. The constitutional pledges can only be achieved through according the right to education in totality to facilitate social justice and promote other fundamental human rights.

One of the roles of education is to help people transform their future (Walker, Pearce, Boe, & Lawson, 2019). Accessing the right to education means the child can gain knowledge that can help them to be employable in high-end jobs. This can result in the formerly disadvantaged and poor being able to improve their lives and compete equally with their White counterparts who have always been privileged. To achieve this, there is a need to create social justice by removing discriminatory practices that may exist in the education system. In this way, everyone is assured of equal access to quality education. Thus, education is a

powerful tool through which issues of social injustice can be addressed and equality is achieved. The government must therefore play its part in providing the needed equality for the poor and disadvantaged, to make sure that they have equal and quality resources needed to equally compete in the education sector.

Unfortunately, in South Africa, the dream of achieving social justice in education is an illusion for some, as the education system continues to be in crisis as it falls short of the required equality in terms of allocation of resources and services between formerly white and black schools (van der Berg, 2017). These inequalities are reflected in the findings of Legal Resources Centre (2013, p. 1), which indicated that only half of schools in South Africa have water and sanitation while 93% lack proper libraries and another 95% do not have science laboratories. Given this situation, it can be argued that the constitutional promises of according the right to education, healing the divisions of the past, and promoting social justice remain unfulfilled. Unless there is social justice in education, the real meaning and purpose of education may never be realised by some learners, and some learners may never fully enjoy their right to education.

Theoretical Framework – The Social Justice Theory

Social justice is based on the principles of equal distribution of resources, rules and procedures that preserve individual and group basic rights, and the treatment of human beings with dignity and respect (Jost & Kay, 2010). This calls for no discrimination based on any criteria like one's background, race, gender, religion, socio-economic status, and (dis)ability. This is because social justice strives for a socially just world, anchored in the premise of human rights and equality and how these rights – such as the right to education – are exhibited in the daily lives of people. Having close ties with the conflict theory, social justice aims to redress wrongs of the past and continued conflicts due to inequalities in society, as propounded by Karl Marx (Marx & Engels, 1848). To achieve social justice, there is a need for redistribution of resources, usually in favour of the disadvantaged groups to create equality with the advantaged ones (Walters, 2020). The area of education in South Africa is one such sector that has been affected by past wrongs of apartheid laws and exhibits inequalities, hence the calls for redistribution of resources. This can be done peacefully through government policies. Given that this study focuses on the implementation of the right to education and issues of equality in education, this theory is a good fit to explain findings on how learners view the implementation of this right in their schools. Although social justice as a theory has been criticised for lacking a proper definition (Novak, 2000), it still remains a valuable lens to use when interpreting issues of injustice in society. The right to education, being one of those rights that gives access to other rights, yet still being marred by injustices, can therefore best be interpreted within the social justice framework.

Methodology

A qualitative research method was used in this study as it is suitable in addressing questions pertaining to participants' meaning, perspective, and experiences from the participant's viewpoint (Hammarberg, Kirkman, & de Lacey, 2016). The study was grounded in the social constructivism paradigm which argues that knowledge is constructed through interaction with others (Gergen, 1985). This was a good fit for this study as the study aimed to explore how learners construct the meaning of their right to education. Furthermore, the aim was to see how they add to the existing knowledge of this right (Galbin, 2014). Since learners actively engage in their own learning experiences by collaborating with others (Glaserfeld, 1995), this paradigm helped to further explore how learners reshaped their understanding of the right to education through their personal experiences of the implementation of that right in their own school environments. Specifically, semi-structured interviews were used because of their flexibility and ability to get open-ended responses from participants for more in-depth information (DeJonckheere & Vaughn, 2019). The interviews were in-depth as the study sought views of high school learners on the meaning and implementation of their right to education in their respective schools; it aimed to get an understanding of how the participants experienced the implementation of their right to education from their own perspective (Hammarberg, Kirkman, & de Lacey, 2016).

Participants

Data were gathered from a small sample of 45 high school learners, as the aim was not to generalise the findings but to get a deep understanding of how the participants experienced the phenomenon under study (Denzin, 1983). All learners were from township public schools. The term township, in South Africa, refers to the underdeveloped urban areas which are racially segregated and were meant for non-Whites during apartheid (Pettman, 1913). Both schools were in Johannesburg south district in South Africa and were about 15 km apart. In a South African context, public schools are state controlled and receive funding and supplies from the government for their daily functioning. The poorest schools receive a higher grant than the wealthier ones depending on the quintile in which they fall. Some of the public schools are fee-paying while others are no-fee schools and are categorised into the quintiles 1 to 5 as assigned by the state (Grant, 2013). The public schools selected for this study were no-fee schools falling into quintile 2, which is considered to be a poor quintile as they are only one level above the poorest. The participants were aged between 13 and 17 years (26 females and 19 males) from grade eight to 12, and an average of eight participants from each grade participated.

Data Collection

The data were collected through semi-structured interviews using an interview guide that was designed by the researcher. The questions were guided by the literature reviewed, the research questions of this study, the topics that needed to be addressed during the interviews, as well as expert opinion. All participants were uniformly asked four open-ended questions, and several follow up questions were used to probe further or to seek clarity of issues raised. All interviews were audio-recorded with the participants' permission and were later transcribed verbatim for data analysis. The researcher collected data until the point of data saturation when no new ideas were coming up from the participants (Fusch & Ness, 2015). This was also done to maintain the validity of the content as well as to capture the most critical and common views from the participants.

Data Analysis

The data were analysed qualitatively using a thematic data analysis approach. This process was guided by Braun and Clark's (2006) six steps of thematic data analysis. Firstly, the researcher reread the interview transcripts several times to become familiar with the data. In the process, codes were assigned to data that had similar meanings or ideas that were constantly repeated, using descriptive words or short phrases. Expert opinion was also sought on the codes assigned to ensure consistency (Linneberg & Korsgaard, 2019). Codes that showed similar patterns were then combined to form themes and those that made sense on their own also formed themes (Braun & Clark, 2006). To ensure that the themes were sensible, they were reviewed by comparing them against the transcribed data and were further refined for accuracy. The themes that emerged were then defined and assigned a name that would be easily understood by the readers (Linneberg & Korsgaard, 2019). Finally, the themes were used to write up the findings, and some extracts from the interviews were used verbatim as supporting evidence for the themes. This process yielded three themes which are presented below in the findings section.

Findings

From the data analysis, three themes emerged which were interpreted and presented to address the research questions of this study. Pseudonyms and codes were used to protect the identities of participants and their schools. For example, Blue(A) mean Blue from school A. The themes were: meaning of the right to education, non-implementation of the right to education, and implementation of the right to education. Several sub-themes also emerged under theme two, which are presented below.

Meaning of the Right to Education

Participants were asked what the right to education meant to them, and it was apparent from the responses that, generally, there was a good understanding of the meaning of the right. Several key issues were raised which characterised the right to education. A common view amongst participants was that education was a means to achieve success and a better future. For example, Blue(A) said: "I feel that education, like, allows you to have a better future…because most people that don't have education end up…on the streets as beggars…or with low-income jobs..." Some felt that it meant being allowed to go to school and having teachers teaching them and giving them knowledge. Asa(B) posited: "I understand that I am allowed to go to school and to do my responsibilities and that I respect the teachers and that the teachers will teach me..." Lesego(B) added: "I think it means, every child has a right to go to school, have the knowledge and be successful in life. They say without education there is no success." The element of non-discrimination was also voiced by some learners as they emphasised that every child should get an education despite their differences. This is evident from Mac(A)'s words: "…as a child, institutions need funds for you to go there, so you have a right no matter if you are poor, rich every child has a right to get an education because it will empower them for the future." Also, Thandi(B) opined: "So, they always say education is the key to success, so that's why they say every child has a right to go to school and to know everything they wanna know and no one must be discriminated."

Non-implementation of the Right to Education

When asked about their views on whether the right to education was being implemented in their schools, issues related to partial implementation were particularly prominent in the interview data. Several reasons for this were given and these are presented as sub-themes.

Unconducive School Learning Environment

Over half of those interviewed expressed dissatisfaction with their school environments, which they expressed as not suitable for advancing their right to education and achieving their goals. Anna(A) said: "Very, very dirty and some of us are very sick? You find dust, and with people like us, we are affected and you cannot learn in classes with so much dust." Yaya(B) concurred: "The school is also dirty. Our classes have to be cleaned, especially the toilets, sus, they are a disgrace… then you get infections and stuff like that." Lala(A) expressed concern over the noise and lawlessness in the school: "Others disturb, and others they talk. If the others have bunked the class, they will stand at the door and talk. And the teacher will be in class and he chase them away. The school is also corrupt. Children are misbehaving. They are smoking weed, everything." Taka(A) added: "There are learners who smoke. If you go that way, you will see them and some

learners have asthma, so these smoking learners come into class smelling of weed, cannabis…and this affects you especially if you have asthma and you can't learn. There are also teachers that smoke, they smoke very close to the classrooms." JJ(B) pointed: "There are those that gamble because when we are learning, this gambler starts a gambling game at the corner and then other learners go there to gamble. The teacher is disrupted and then fails to teach us. If they can expel those people that smoke maybe the school might be alright. Because those are the people who disrupt."

Lack of Teacher Commitment

Only a small number of participants indicated that they were happy with their teachers, while the majority was not happy with most of the teachers they had, citing several reasons such as lack of care, passion and commitment. Pitso(B) mentioned that: "…I think they just provide teachers to go and teach just to get money, you know, maybe to just go and teach and they don't care about other things." Pat(A) also opined that: "If our teachers would sacrifice their time and stay with us to make us understand some of the things we usually don't understand, things would be good", and Koko(B) also stated that: "I feel like some teachers are just doing it because they had no choice, especially teachers at this school, they don't have passion." Sasha(A) supported this: "He always comes in the class when he feels like coming into your class…he is always drunk and smelling weird." Babido(B) mentioned that: "Another thing is that teachers like staying in their staffroom and drinking tea and talking whatever they wanna talk. We are left with no class and no teacher, so we basically stay outside and doing whatever during lesson time."

Poor Teacher-learner Relationships

In their accounts of the events happening in their schools, the findings of this study further revealed that the relationship between teachers and learners was generally not conducive to proper teaching and learning that advances the right to education. Connie(A) said: "I think the teachers should stop bullying school children, the bullying is going on, in this school, there is too much bullying like I don't feel comfortable in this school." Katlego(B) mentioned that: "Some of the children don't have discipline in some other classes. They tell the teachers to get off. There are many children that were suspended for disrespecting the teachers, and some were even, like, chased out of the classes because of the behaviour they do. I think children don't have a good relationship with teachers, but some are good." Tik(A) commented: "Some of them [learners] are fighting with teachers during period time and we are getting affected, you get the whole class failing. In term 1, only one person managed to pass term 1 in the class of over 40 learners." Some learners further pointed out specific teachers whom they felt did not have a good relationship with learners. Lorna(A) said: "Sir, he is sometimes late for the class. It's because they are not respecting him in the classroom. They are always

laughing at him. They don't listen to him while he is talking, they are playing in class. So, they don't learn nothing."

Unavailability of Resources

The majority of the participants agreed that they had almost all the books they needed but lacked essential resources like the library, computer and science laboratories, and Wi-Fi. The single most striking observation to emerge from the data was that in one of the schools, despite all these resources being available in the school, they were not accessible to learners. This is evident in the words of Kala(B): "…we do have a library, but it's at the corner that side, but then we don't go there because it is a teacher's office. It's always locked." Gina(B) concurred with Kala: "Open this lab please, this computer lab. We don't use these computers. Have more things to work to like library center, science lab and, because some of the science lab is locked, we cannot read there." Kelee(A) also expressed that: "There is a Wi-Fi here, but it's locked, no one is being given access to it, no one is using it, only them [teachers]. So, we have our smartphone, why can't we use them because nowadays technology is being talked about and we are using technology a lot." To access library facilities, several participants revealed that they had to walk long distances to go to community libraries in other areas as they did not have any in their nearby community. Jay(A) said: "Yea, it's [the library] in Park but it's too far. I walk there more than 30 minutes and I come here from school 3 o'clock then I get there 4 o'clock. Then I have to study and then the library closes at 5 o'clock." The issue of overcrowded classrooms due to lack of teachers was elaborated by Mpho (B): "…in my class, we are 60 and we have been fighting to be divided into two…our educators cannot provide for us all, like give us attention…the principal said it's beyond her hands…they [government] have to find new teachers."

Implementation of the Right to Education

While there were several negative views about the implementation of the right to education, some participants expressed the belief that some positive developments were taking place to fulfil this right in the sampled schools. For example, they appreciated the no school fees policy which they said was enabling everyone to have an education. Jabu(B) said: 'We don't pay school fees. It's good because some children cannot afford…but everyone can come to school." Furthermore, many participants agreed that the stationary they were being given was helpful although some would have wanted more to last them a year. Mary(B) said: "The government plays its role, I mean like at our school, we get stationery. Every year, we get two exam pads, pens, and pencils. Yea, and a maths set. Oxford, for free you just get. But I wish they could give us more pens and writing books because we write a lot." Some also appreciated the supply of textbooks but also highlighted some shortfalls in this area. This is clear from what Janny(A) said: "Yes we do have books. But some of them no, like IsiZulu, we are short with short stories.

Other books are also torn apart." Participants further alluded to the fact that the feeding schemes in their schools were a positive aspect that helped them to learn comfortably without hunger. Jack(A) said: "There is a feeding scheme and everyone who wants can have. Because some learners are poor and cannot afford food…It is for free and yes, it's nice."

Discussion

This study aimed to explore township high school learners' views on the meaning and implementation of the right to education in their respective schools. It is interesting to note that all participants had a good understanding of this right compared to findings of other studies on participation rights (Lundy, 2007; Middel, Post, López López, & Grietens, 2021), where children were found to have a lack of knowledge about their right to participation. The way participants defined the right to education aligned with that given in the constitution (Republic of South Africa, 1996), that everyone has the right to basic education, and concurs with Mestry (2017) who states that education is a fundamental right that extends equally to all learners. This spells out the non-discriminatory aspect in acquiring this right which many participants in this study echoed. Furthermore, participants defined the right to education as a means to facilitate a better future which concurs with sub-section (e) of the constitution, which notes that this right should aim to redress the results of past racially discriminatory laws and practices. These laws and practices disadvantaged Black people from improving their lives by providing them with an inferior education which only made them suitable for menial and low paying jobs, perpetuating poverty among the Black populace (Mestry, 2017). The definitions further support the purpose of social justice, which is to improve the lives of the socially disadvantaged through promoting equality and poverty alleviation (van der Westhuizen & Swart, 2015). This kind of justice can only be achieved if all learners are given quality education and training regardless of their differences, which du Plessis (2013) argued enables learners to gain lifelong learning and the ability to be productive and provide meaningful participation in society.

School Learning Environment

The findings of this study highlighted an unconducive learning environment as infringing on their right to education. This finding corroborates the ideas of Chonghui (2020) who argues that unfavourable learning environments impede learners' learning abilities and can be a precursor to learner misbehaviour, due to low motivation and lack of interest in learning. Joshi, Pandit, and Kuma (2005) found that in Nepal, 89% of government schools had poor environmental conditions which resulted in health problems for the learners. Kiley (2016) also found that in America, safety and orderly learning environments were key factors for student achievement. Some scholars further argue that factors such as poor sanitation

prohibit the delivery and realisation of the right to basic education (Odeku & Nevondwe, 2014). It can thus be suggested that the lack of a conducive learning environment in the sampled schools was a hindrance in the provision of the right to education in totality, as it affects the delivery of quality education and impacts overall outcomes. Despite the new government in South Africa introducing policies meant to redress these inequalities and promote social justice, I argue that a lot still needs to be done in terms of implementing the policies.

Teacher Commitment

Another important finding of this study was the lack of teacher commitment in delivering the child's right to education. The role of the teacher in determining the effectiveness of teaching and learning cannot be undermined. Alsalamah and Callinan (2020) note that contentment with the teacher contributes to the transfer of skills and knowledge delivered through teaching. Effective teaching is what brings about success in education and improvement in life, hence achieving social justice. Thus, commitment to student learning calls for teacher diligence, to assist learners despite their academic difficulties or social backgrounds (Yildiz & Celik, 2017). In this way, no child is left behind and social justice can be achieved in providing all learners with quality education. The lack of commitment of some of the teachers in this study can be argued to be contributing to a lack of social justice in education.

Teacher-learner Relationship

A good learner-teacher relationship is very essential to foster positive learning environments in the classroom and improve learner engagement and achievement. Mabunda and Mulovhedzi (2020) found that the relationship between teachers and learners plays a significant role in the academic performance of learners and that positive relationships between teachers and learners facilitate the positive academic performance of learners. This study reported poor teacher-learner relationships due to bullying and students' ill-discipline and lack of respect for teachers. This supports findings of the Talis Report (2019), which shows that one out of three principles reported that bullying and student intimidation happened at least weekly. This may result in learner dropout and poor academic performance, and as such, teachers should strive to make learners feel comfortable at school to reduce such risks (Federico, Bartolucci, & De Carlo, 2019). Wolhuter and van der Walt (2020) further state that learner indiscipline remains a serious problem in schools, as evidenced by numerous reports of learners who hit or threaten teachers (Dhlamini, 2018; Daniel, 2018). The negative relationships aired in this study could therefore result in poor implementation of the right to education due to dissatisfaction of the concerned parties. Attention needs to be given to the prevailing conditions which result in the right to education being just a policy in theory, rather than in practice.

Teaching and Learning Resources

The fact that the sampled schools lacked libraries and computer and science laboratories is unbelievable given that these are essential resources for teaching and learning and are pertinent in advancing the right to education. This supports the findings of the Amnesty International South Africa report (2020) which indicated that according to the DoBE 2018 statistics, 20,071 out of 23,471 public schools did not have laboratories, while 18,019 had no library and 16,897 had no internet. Adequate infrastructure and learning facilities are some of the essentials that entail the right to quality education. Amnesty International South Africa (2020) further argues that lack of these conditions perpetuates social injustice, hence, disadvantages many learners in poor public schools. Given this situation, it can be argued that the constitutional promises of according the right to education, healing the divisions of the past and promoting social justice remain unfulfilled. While physical resources and infrastructure are by themselves insufficient to guarantee the right to education, they are unquestionably imperative for this given their direct effect on the quality and viability of education and the human dignity of learners. Provision of resources and infrastructure must, therefore, be prioritised if education is to achieve social justice and assist in poverty reduction (Veriava 2016). Given the prevailing situation as evidenced by the findings of this study, it is evident that the war to promote the right to education based on the principles of social justice is far from being won.

Advancement of the Right to Education

To promote social justice in terms of access to resources, the government exempts certain schools from charging school fees, provides some resources such as textbooks, stationary and feeding schemes. Although the idea of no-fee schools was most welcomed by participants, Harber and Mncube (2011) argue that public schools in richer communities charge high fees to maintain excellent facilities and employ more teachers while schools in poorer communities cannot afford that. This has possibly created another form of social injustice and inequality among public schools where the relatively opulent schools will be better resourced than the poorer ones which solely depend on state funding for survival. This results in children from poorer communities not fully enjoying their right to education due to a lack of essential facilities.

While the supply of stationary to learners could be viewed as a positive development, the shortages mentioned by participants can be argued as government failure to fully cater for the educational needs of poor learners, hence, maintaining the social justice gap. This phenomenon is also common in other provinces such as Limpopo where there have been reports of book and stationary shortages (Samuels, 2021). However, given that many children in South Africa go to school hungry (Spreen & Vally, 2006), the feeding schemes mentioned in the sampled schools assist in closing this gap in social justice by making sure that the learners do not learn on empty stomachs. Despite several reports of food poisoning from school

feeding schemes in various schools across South Africa (Shange, 2017), the National School Nutrition Programme is a crucial social protection instrument in South Africa that caters for over 9 million children every school day and has proved to contribute to better education access and learning outcomes among other things (Devereux et al., 2018). Thus, credit should be given to efforts by the government and various non-governmental organisations who are responsible for this crucial programme.

Conclusion

This article aimed to explore South African township high school learners' definitions and views of the implementation of the right to education in their schools. The findings of the study are novel in that they highlight the persistent lack of delivery of quality education within the poor Black communities which can be argued to be a non-fulfilment of the right to education. This area calls for urgent government attention if social justice is to be achieved in education. Based on the findings of this study, I concur with van der Berg (2017) who argues that the persistent lack of proper learning and teaching facilities in poor Black communities shows that the government may be infringing the right to education, human dignity and equality as given in the constitution (Republic of South Africa, 1996). Using semi-structured interviews, this study found that learners' definitions of the right to education aligned with the parameters of the Constitution as well as those of the social justice framework. Furthermore, the learners indicated various factors that they attributed to hindering them in from the right to education such as non-conducive learning school environments, poor teacher-learner relationships, lack of teacher commitment and lack of resources. The positive development in terms of no-fee schools, textbook and stationary supplies and feeding schemes were noted but still need some improvement. This study shows that as much as the state is trying to level the inequalities in education, more still needs to be done to close the social justice gap that was created during apartheid. This study recommends urgent attention to matters that have been raised here such as the provision of proper facilities such as libraries, science laboratories, clean toilets and clean and conducive school environments to facilitate the provision of quality education. The issue of the non-commitment of teachers needs to be further investigated and addressed.

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The Evaluation and the Accreditation Process of Greek HEIs with an Emphasis on Primary Education Departments

By Gregory T. Papanikos[*]

This paper examines the quality evaluations of the Greek Universities highlighting those which offer a full-fledged study program of primary education. There are eight principles-criteria according to which each university is evaluated. For each principle, scores may range from 1 (noncompliance with the principle) to 4 (fully compliance). I present and compare results of the Greek university evaluations completed by the Hellenic Quality Assurance and Accreditation Agency (HQA). Surprisingly, no university has been graded as non-compliant in any of the eight principles-criteria. These evaluations are performed by an alleged "external" and "independent" committee. For all practical purposes, they are, nevertheless, based on subjective and biased opinions of academics affiliated with international universities with links to Greece and its universities. Independent and evidence-based evaluations paint a different picture. Universities which get perfect scores in the quality evaluation processes perform badly in the pertinent international ranking systems. As a case study, their primary education departments have lower research performance with high variability between faculty members and departments. Given that one criterion of evaluating quality is research, then not all Greek universities can be evaluated as highly performing research institutions, either in absolute or relevant terms. This criterion of quality is not satisfied by the primary education departments of Greek universities. According to this evidence, using the HQA as an agency to assess and accredit quality is useless. It should be abolished. A new system should be based on objective criteria such as independent teaching evaluations and research performance. These do not require any committee to evaluate performance and can be constructed on evidence-based policy. The latter relies solely on rigorously established objective facts.

Keywords: higher education, quality assurance, HQA, teaching quality, Greece

Introduction

Quality assurance and excellence in higher education of both teaching and researching is a critical issue in Europe and North America. Specialized accreditation organizations provide the service of organizing the evaluation process and accredit universities and study programs. In Europe, the *European Association for Quality Assurance in Higher Education* (ENQA) (https://enqa.eu/) and in USA the *Council for Higher Education Accreditation* (CHEA) (https://www.chea.org/) and the *Accreditation Board for Engineering and Technology* (ABET) (https://www.abet.org/) are well known examples of organizations which

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provide evaluations, quality assurances and accreditation of university study programs.

The literature on the subject of quality and excellence in education is huge. The concept of excellence in higher education institutions (HEIs) is discussed in a working paper published by ENQA (2014). New challenges coming from colleges that offer non-accredited courses are discussed by Ransom, Knepler, and Zapata-Gietl (2018); mainly massive open online courses (MOOCs). On the effectiveness of online courses see Bettinger, Loeb, and Taylor (2017) and McPherson and Bacow (2015). Similar to this research is the pilot project by Oberhelman and Dunn (2019). The COVID-19 pandemic has also "forced" HEIs to turn into online options/courses (see Pinchbeck and Heaney [2022], Ismaili and Ibrahimi [2021], Güvercin, Kesici, and Akbaşlı [forthcoming], and Samoylenko, Zharko, and Glotova [2022] for more on distance education). School quality and postsecondary attainment are discussed by Deming, Hastings, Kane, and Staiger (2014). Furthermore, ATINER publishes a quarterly periodical--*The Athens Journal of Education*—which has published a number of papers dealing with quality in education; among many others see Alduais (2019), Altin (2019), Bales (2015), Bosmans, Young, and McLoughlin (2019), Budgen and West (2018), Curtis (2015), Haukland (2020) and Wawrzinek, Ellert, and Germelmann (2017). See also Al Ghawiel (2020) that examines quality in Libyan Universities. Furthermore, OECD has produced a number of reports on education which includes quality. Finally, Papanikos (2022) links education to democracy, which is another criterion of quality, i.e., preparing citizens to serve the politeia. Special reports on Greece include the following studies:

1. Education for a Bright Future in Greece (OECD, 2018).
2. Education Policy in Greece: A Preliminary Assessment (OECD, 2017).
3. Equity and Quality in Education: Supporting Disadvantaged Students and Schools: Greece (OECD, 2012).
4. Education Policy Advice for Greece (OECD, 2011).
5. Country Background Report: Attracting, Developing and Retaining Effective Teachers: Greece (OECD, 2014).

In Greece the quality assurance of university study programs is provided by the *Hellenic Quality Assurance and Accreditation Agency* (HQA) (https://www.adip.gr/en). This is an independent organization funded by the Greek Government and its operations are under the supervision of the Ministry of Education. It was established in 2006 with a mission to promote high quality in Greek Higher Education Institutes (HEIs). It is affiliated as a full member with the ENQA. HQA is governed by a president and council of 10 HEIs professors and members representing non-academic research institutes, chambers and students. As part of its mission, HQA evaluates all Greek universities and their programs; makes assessments and provides accreditations. In addition, in 2013 an independent *Authority for Quality Assurance in Primary and Secondary Education* (http://www.adippde.gr/) was established with a mission to evaluate the quality of the Greek educational system of primary and secondary levels. It supports the Greek

Ministry of Education in designing its policies. In the 2015-2016 school year there were 642,797 elementary students organized in 4,384 schools and 65,229 teachers. It is a herculean task to evaluate all of these schools.

The purpose of this paper is to compare HQA's evaluations of the Greek universities with those that do not offer a primary education study program with those that do offer a program. Furthermore, additional indicators are used to evaluate and compare all Greek universities and the faculty research record who teach in Greek primary education departments. Including this introduction, the paper is organized into six sections. The next section presents overall data of Greek university student population. In this research a distinction is made between active and non-active students which is a thorny issue in the Greek system of HEIs. The third section of the paper discusses the principles (criteria) used to evaluate the education quality of Greek universities. The fourth section of the paper shows the international ranking of the Greek universities and the fifth the research scores of the primary education departments. The last section concludes with a discussion on teacher quality.

The Greek University Student Population

All students take entrance exams to get into a Greek university. All Greek universities are public.[4] Some private for-profit universities do exist offering courses at a college level, but for all practical purposes their programs are of lower quality primarily because they attract students who did not make it into the public university due to failing their entrance exams. Studying at a Greek public university is relatively cost-free. Students pay no fees and get their textbooks for free. Those students who come from poor families get full tuition (meals and housing). Public transportation can be used at a lower cost; often there are student discount prices to attend various cultural events such as cinema, theater, sports events etc. In some cases (e.g., exhibitions), entrance is free for university students. Thus, for students who come from poor families, studying at a Greek university may not be a big financial burden. Nevertheless, many students do work during their study years to complement their income. Most of them work in the informal economy which includes private tutoring. For good students of the primary education departments this is a good source of revenue with great time flexibility because they tutor during off-school hours. However, this is not without any serious repercussions for the quality of the programs offered by the Greek universities.

Table 1 reports university student populations as well as some important ratios. It also shows the year of establishment of the university in column (1). The oldest university is the University of Athens established in 1837; about ten years after the Greek liberation from the Ottoman yoke. The newest university in the list is the University of Western Macedonia which was established in 2004. The average age of all Greek universities is 82 years.

[4]The issue of public vs private (and non-accredited) has been well researched in the literature; see among many others Fethke and Policano (2013) and the review of this work by Ehrenberg (2014).

Columns (2), (3) and (5) provide data on (a) the total number of active students (b) the total number of registered students and (c) the total number of students who graduated during the academic year 2010-2011 respectively. The distinction between active and registered students is very critical. Active students are those whom are in a year of study which does not exceed the N+2 years of the required N years of their study program. For example, the civil engineering program is five years. Students who do it in less than seven years are active students. All those who exceed seven years (the N+2 rule) are non-active students. The sums of active and non-active students make up the number of registered students. Column (4) and (6) report the percentage of active students to the total population of students and the percentage of students who graduated to the total number of registered students respectively.

Table 1. Number of Students in Greek Universities, 2010-2011

		Year (1)	Active Students (2)	Registered Students (3)	RA (2)/(3) (4)	Grad (5)	RG (5)/(3) (6)
1	Agricultural University of Athens	1920	3,033	4,731	64.1%	277	5.9%
2	Athens School of Fine Arts	1837	919	1,445	63.6%	122	8.4%
3	Athens University of Business and Economics	1920	9,108	17,427	52.3%	1,293	7.4%
4	Democritus University of Thrace	1973	15,208	20,900	72.8%	2,158	10.3%
5	Harokopio University	1929	1,148	1,379	83.2%	145	10.5%
6	Ionian University	1984	2,556	3,558	71.8%	301	8.5%
7	National Technological University of Athens	1836	10,897	18,530	58.8%	1,581	8.5%
8	Panteion University	1927	12,849	20,129	63.8%	3,152	15.7%
9	Technical University of Crete	1977	2,620	3,358	78.0%	224	6.7%
10	University of Athens	1837	45,129	104,160	43.3%	6,851	6.6%
11	University of Crete	1973	10,928	14,480	75.5%	1,370	9.5%
12	University of Ioannina	1964	11,783	16,245	72.5%	1,638	10.1%
13	University of Peloponnese	2002	3,247	3,521	92.2%	288	8.2%
14	University of Piraeus	1938	9,628	19,760	48.7%	1,463	7.4%
15	University of Thessaloniki	1925	6,851	67,236	10.2%	7,617	11.3%
16	University of Thessaly	1984	7,510	9,183	81.8%	1,362	14.8%
17	University of Western Macedonia	2004	2,801	3,122	89.7%	296	9.5%
	Total		156,215	329,164	47.5%	30,138	9.2%
	Average	82	9,189	19,363	66.02%	1,773	9.37%
	Maximum		45,129	104,160	92.20%	7,617	15.70%
	Minimum		919	1,379	10.20%	122	5.90%

Notes: Active students are defined as the number of students who have not exceeded the (N+2) years of study. N: is the total number of years required to graduate. Registered students include all active students plus the students who have exceeded the (N+2) years of study.
Source: Various publications and individual universities.

The total university student population was 329,164 students. Less than half of them (47.5% or 156,215 students) were active. This is the result of the two largest universities of Greece with the highest number of non-active students. One explanation might be the cost-free studying at the university. Some students have no incentive to either finish their study program as early as possible or even withdraw from the program.[5] This imposes an important burden on universities'

[5]There are many reasons why this may occur. Firstly, students are working full time and they hope to return one day to finish their studies. Many of them never do. Secondly, students keep their student status to put off their obligation to serve in the military. Thirdly, few retain their student

resources and therefore the quality of the programs offered. Students are able to retain their student status because they do not pay any registration fee. One solution would have been students to pay a fee if not finishing within the normal period of time (N+2 years). Older universities tend to have lower percentages of active-to-registered students because they have "accumulated" non-active students who do not drop out of the programs no matter how many years have lapsed from the first-year registration. In the University of Athens --the oldest Greek university — this ratio is 43.3%. The average Greek university has 9,189 active students with a maximum of 45,129 (University of Athens) and a minimum of 919 students (Athens School of Fine Arts). The average annual graduation rate is 1,773 students and the total is 30,138 students.

The Accreditation Criteria and the Scorecard of Greek Universities

The Greek public universities are evaluated for quality provision of educational services by the HQA. According to their standards, there are eight principles which are referred in Table 2.

A brief presentation of each principle follows based on HQA's (2016) report and various guidelines.

Institution Policy for Quality Assurance

Implementation Through.

- Compliance with the laws and regulations that govern the Institution.
- Review, redesign and redefinition of quality assurance objectives whether they are fully in line with the institutional strategy.

This Policy Mainly Supports.

- The organization of the internal quality assurance system.
- The Institution's leadership, departments and other organizational units, individual staff members and students to take on their responsibilities in quality assurance.
- The integrity of academic principles and ethics, guarding against discriminations, and encouragement of external stakeholders to be involved in quality assurance.
- The continuous improvement of learning and teaching, research and innovation.
- The quality assurance of the programs and their alignment with the relevant HQA Standards.
- The effective organization of services and the development and maintenance of infrastructure.
- The allocation and effective management of the necessary resources for

status because they are involved in student politics and aspire to a political career. No evidence could be found, but, I believe, the first reason should be the dominant explanation.

the operation of the Institution.

- The development and rational allocation of human resources.

Table 2. Principles (Criteria) of Evaluation

Principle	Description
1	Institution Policy for Quality Assurance
2	Provision & Management of the Necessary Resources
3	Establishing Goals for Quality Assurance
4	Structure, Organization and Operation of the Internal Quality Assurance System (IQAS)
5	Self-Assessment
6	Collection of Quality Data: Measuring, Analysis and Improvement
7	Public Information
8	External Evaluation and Accreditation of the Internal Quality Assurance System (IQAS)

Source: HQA (2016).

Provision & Management of the Necessary Resources

- Funding
- Infrastructure
- Working environment
- Human resources

Establishing Goals for Quality Assurance

Some Examples.

- Average annual graduation rate of the Institution's Undergraduate Programs.
- Learning environment through the introduction of digital applications.
- Ratio of scientific publications of faculty and graduate students.
- External research funding.

Structure, Organization and Operation of the Internal Quality Assurance System (IQAS)

- The system of evaluation includes the assessment of effectiveness (results oriented) and efficiency (cost oriented).

Self-Assessment

The data considered in the context of the self-assessment of a program may, for example, include:

- Students' performance.
- Feedback from students/teaching staff.
- Assessment of learning outcomes.
- Graduation rates.
- Feedback from the evaluation of the facilities/learning environment.

- Report of any remedial or precautionary actions undertaken.
- Suggestions for improvement.

Collection of Quality Data: Measuring, Analysis and Improvement

The Quality Assurance Unit (QAU) of the University should establish and operate an information system to manage the data required for the implementation of the Internal Quality Assurance System.

Public Information

The QAU publishes data on:

- IQAS structure, organization and operation.
- Pertinent to the institutional quality policy and objectives.
- Relevant to the Institution's internal and external evaluation. In the context of the self-assessment process.
- Adequate information regarding the teaching activities.
- Program's profile.
- The overall institutional activity is publicly available.

For all the QAU makes recommendations for improvement.

External Evaluation and Accreditation of the Internal Quality Assurance System (IQAS)

External quality assurance (aiming at accreditation) may act as a mean of verification of the effectiveness of the Institution's internal quality assurance. As a catalyst for improvement, universities engage in periodic external quality assurance which is conducted by taking into consideration the legal structure of Greek public universities. Quality assurance, in this case accreditation, is an on-going process that does not end with the external feedback or report or its follow-up process within a university. Universities warrant that the progress made since the last external quality assurance activity is taken into consideration when preparing for the next one.

For each principle, a score is marked when the university is fully compliant with a given principle (criterion), substantially compliant, partially compliant and non-compliant. We give the score of 1-4 in the order of importance as shown in Table 3 in order to quantify our results in a compact and comparative form.

The evaluation committee provides a grade for each of the eight principles and for each university. Table 4 reports the score for each principle. The universities marked with an asterisk have a fully-fledged and independent department of primary education.

The maximum score is 32 points (100%). Two universities were evaluated as "top" with 32 points or 100% (University of Patra and University of Thrace). They received perfect marks in all eight criteria. Both of them have a primary education

department. The School of Pedagogical and Technological Education, which is not a university, got the lowest total mark of 21 points (65%). The stunning finding is that there is not a single university which got a non-compliant in any of the eight criteria. As I explain in my introduction, this is the result of cronyism and politics which very much affect the operation of Greek HEIs.

Table 3. Principles of Evaluating Universities

Evaluation of Each Principle	**Score**
Fully compliant	4
Substantially compliant	3
Partially compliant	2
Non-compliant	1

Table 4. *Greek University Scores in Terms of the Eight Principles*

Principle **University**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
Athens*	3	4	4	3	4	4	4	4	30
Thessaloniki*	4	4	3	4	4	3	4	3	29
Aegean*	4	4	4	4	3	3	4	3	29
Patra*	4	4	4	4	4	4	4	4	32
Ioannina*	4	3	3	4	3	3	2	2	24
Crete*	4	4	4	4	4	3	4	4	31
Thrace*	4	4	4	4	4	4	4	4	32
Athens School of Fine Arts	4	3	4	3	3	2	2	4	25
School of Pedagogical and Technological Education	2	3	3	2	3	2	3	3	21
Athens Economics and Business	4	4	4	4	4	4	3	4	31
Macedonia	3	3	4	4	3	3	4	4	28
Peloponnese	3	3	2	4	4	3	3	4	26
TEI of Crete	3	4	3	3	3	3	4	4	27
Harokopio Athens	4	4	4	4	4	4	3	4	31
Piraeus	4	3	4	4	3	3	3	4	28
Average	3.60	3.60	3.60	3.67	3.53	3.20	3.40	3.67	26.5
Maximum	4	4	4	4	4	4	4	4	32
Minimum	2	3	2	2	3	2	2	2	21

*Universities with a Primary Education Department.

The average score in all criteria was above 3; seven criteria were marked on average above 3.5 and one 3.2. These "excellent" marks must be the result of the fact that the committee members are university professors themselves. Most of them are expatriate Greeks with professional and academic relations with domestic Greek universities. This inflated performance undermines the whole process of quality assurance and makes it literally useless. A need arises for a new approach to evaluate the Greek universities.

In the following two sections of this paper, I use two different criteria of evaluating the Greek universities: (a) the international ranking of the universities and (b) the research performance of their faculty using the primary education departments as a case study.

International Rankings of Greek Universities

Table 5 uses an international comparison of universities made available by a well-known–famous or infamous–private company which reports data based on various criteria. Even though I report their scores, I disagree with their approach. Each university should be evaluated according to its mission. This is not the same across all HEIs.

I will demonstrate this with an example. As ATINER's President, I organized a roundtable discussion on university quality.[6] Six academics from different countries and HEIs with different missions were presenting and discussing their case. One professor from a well-known old Scottish university was emphasizing the importance of a university's research outputs and their university's score on research which was ranked as one of the top in the world (top 1% in the list). It seemed to me that everybody agreed that this should be the strategic scope of a university, i.e., doing good research.

Table 5. University Rankings, 2019

	Rank[7]	**G**	**S**	**S/S**	**I**	**F/M**
Crete*	351-400	1	14,890	27.8	4%	61:39
Athens*	501-600	2	54,364	27.5	11%	62:38
Aegean*	601-800	3	12,352	38.7	1%	57 : 43
Thessaloniki*	601-800	4	46,597	26.3	5%	58:42
Athens University of Economics and Business	601-800	5	9,839	46.9	4%	47 : 53
Ioannina*	601-800	6	22,492	44.3	3%	56 : 44
Patra*	801-1000	7	26,098	29.9	4%	49 : 51
Thrace*	1001+	8	29,386	46.9	3%	54 : 46
Thessaly*	NL	NL	NL	NL	NL	NL
Athens School of Fine Arts	NL	NL	NL	NL	NL	NL
School of Pedagogical and Technological Education	NL	NL	NL	NL	NL	NL
Macedonia	NL	NL	NL	NL	NL	NL
Peloponnese	NL	NL	NL	NL	NL	NL
TEI of Crete	NL	NL	NL	NL	NL	NL
Harokopio Athens	NL	NL	NL	NL	NL	NL
Piraeus	NL	NL	NL	NL	NL	NL

G: Ranking number among Greek Universities; NL: Not listed in the rank (below the 10% top universities); S: Number of Students; S/S: Number of Students per Staff; I: International Students; F/M: Female/Male ratio of students.

Then the question is posed: if good research is produced by the top 10% of the over 14,000 universities which exist in the world, what do the other universities do? The last speaker was the president of a small German university which had in its mission to link teaching at the university with available jobs in the private market and industry. They taught their students those subjects in which the society and the economy were lacking. Their mission was enshrined in their constitution: find good jobs for their graduates. According to this criterion, or rather principle,

[6]See https://www.atiner.gr/events/2July2018ECO.pdf.
[7]See https://www.timeshighereducation.com/.

this small university was number one in the world because 100% of its graduates found jobs before their graduation date. I do not think any of the 14,000 universities in the world can surpass this achievement. According to the ranking methodology of the well-known private company of assessing the quality of the universities, this institution is one of the worst universities in the world.

With this note in mind, Table 5 presents the ranking of the Greek universities in this list. The top Greek university ranks in the top 400 universities in the world (University of Crete) with 14,890 students, with a relatively low students/staff ratio (27.8 students per staff), relatively high international student rate (4%) and a very high ratio of female-to-male students (61%). Only seven Greek universities make it to the 10% list of the top universities and all of them have a department of primary education with the exception of the Athens University of Business and Economics which is a specialized university and does not offer study programs other than business and economics. Only one university out of the eight which do not make it to the top of the list has a primary education department.

It seems that the universities with primary education departments are doing very well. The next section looks at these departments' record in research performance.

The Research Scorecard of the Greek Primary Education University Departments

With the exception of the University of Thessaly, HQA has organized and produced an external evaluation of all other Primary Education Departments (HQA, 2015; 2016; 2018a-b; 2019a-c). These reports are available and freely accessible on the website of HAQ (see the list in the reference sector at the end of this paper). There is also an accreditation process which will follow the external evaluations. The purpose of the external evaluations is to provide recommendations which would help the department to improve. These recommendations are given at the end of each report.

I found all of them vague and therefore useless. Since this section evaluates the research profile of the primary education department in Athens, one of the recommendations of the University of Athens' Department of Primary Education is to, "Reconsider the profile of the primary education teacher to meet the changing societal needs in the 21st century multicultural classroom". This is instead of saying that the research profile is not acceptable, and before they get accreditation, they must increase their research stats to national average or the average of the top three departments. This is a recommendation that does stand the test of compliance or not. Quality assurance and evaluation requires "hard evidence" and this is provided by the various international indices of research production and recognition

One such index to measure research performance is the *h-index* which is calculated as the number of publications which have at least h citations. For example, a score of 20 means that 20 publications had at least 20 citations each. This is to avoid a relatively well-cited paper which will bias the research performance of a researcher. This index is not without its shortcomings, but this is used quite

frequently to evaluate academic research at (a) the individual researcher level (b) the departmental level and (c) the university level.

Table 6 reports my calculations of the total and the average h-index for the faculty members of the nine Greek universities which have a primary education department. This has been estimated by adding up the h-scores of all individual full-time faculty members of each department.

The results are rather surprising. First, the Department of the University of Patra has the highest score in terms of the *h-index* which is two-and-a-half times higher than the average *h-index* of all Greek departments of primary education. Not shown in the table, four professors from the University of Patra have an excellent (top) research index of more than 20 in the *h-index*. Second, the University of Crete, which ranked top in the previous list, its Primary Education department ranks at the bottom of the list of Table 6 with very disappointing research stats (less than one). Third, all departments have faculty members with no research recognition; at least according to the *h-index*. In general, the average *h-index* is very low. With the exception of the University of Patra, all departments have an average *h-index* of 5 or lower.

Table 6. Evaluating Research Performance (The h-index) of the Faculty Members of the Primary Education Departments of Greek Universities

University	**Number of Faculty Members**	**Total h-index**	**Average h-index**	**Standard Deviation**	**Min**	**Max**
Athens	24	76	3.17	3.60	0	12
Thessaloniki	27	70	2.59	2.74	0	12
Patra	25	212	8.48	7.61	0	29
Ioannina	20	61	3.05	4.71	0	15
Aegean	20	64	3.2	2.93	0	9
Thessaly	16	81	5.06	6.12	0	21
Crete	19	16	0.84	1.30	0	4
Thrace	20	67	3.35	4.75	0	16
Western Macedonia	18	20	1.11	1.71	0	6
Total	**189**	**667**				
Average		**74.11**	**3.43**			
Standard Deviation		**56.69**	**2.27**			

Conclusions

The system of the Greek University Evaluation of Quality demands its own evaluation. For all its practical purposes the HQA is useless in wasting public funds which could be used otherwise. According to HQA's evaluations and in all eight criteria, all Greek universities were fulfilling the standards set by the HQA. Not even in a single principle (criterion) got a non-compliance grade. This is hardly believable and one may safely conclude that these evaluations are biased and subjective.

Quality assurance or whatever this might be called can be measured using "hard data" which now can be easily obtained from various sources and free of any cost. One such independent and objective index is the *h-index*. This index measures research performance and was applied to the Greek departments of primary education. The results show a completely different picture from the ones provided by the "external" evaluations of HQA agency.

This leaves teaching quality unaccounted for. There are methods of evaluating teachers' performance and university's teaching quality. I have already mentioned the differences in missions of various universities. Good teaching gives results. Students are able to compete in the marketplace and find jobs. Such indices of evaluating teaching quality which are based on hard data are not available. I hinted above that the employability of graduates might be considered as "hard evidence" of teaching quality. Are HEIs' faculty members teachers or researchers? Mannes (2020) examined teachers and researchers of English as a Foreign Language (EFL) in an Israeli college context. Most teachers who participated in the research emphasized the practical dimension of their teaching, i.e., train good teachers to teach EFL.

There are many studies which discuss the evaluation of teacher quality at all levels of education; see for example Hanushek and Rivkin (2006). The Departments of Primary Education have an advantage in measuring the teaching quality of their students who will become teachers in primary schools. Bruns, Harbaugh Macdonald, and Schneider (2019) review this literature on teacher quality at the primary education level and Marsha, Dickeb, and Pfeifferb (2019) of secondary student evaluation of university teachers. This is a promising area of research which can be used to evaluate university teaching.

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