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Student Engagement and Motivation in Post-Pandemic Higher Education Mathematics: A Concept Paper

By Dr. Manuel Rodriguez
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Abstract- During the past three years, mathematics educators have had to adjust to the online education system and develop new approaches, strategies, and practices to keep students engaged and motivated. Student engagement and motivation have been established in existing research as vital aspects of education. To promote engagement and motivation during the pandemic, mathematics educators have focused on positive working relationships with students, highlighting values such as care and empathy. Mathematics educators have also adopted various technological tools to enhance student engagement and motivation. As institutions have begun to reintroduce face-to-face classes in the post-pandemic era, there is a need to re-examine these approaches, and how they may be sustained or improved. A significant gap that has remained unexplored in the literature is how mathematics educators maintain or enhance student engagement and motivation upon transitioning to face-to-face or hybrid classes in the post- pandemic era.

Keywords: mathematics education, student engagement, student motivation, engagement theory, post-pandemic.

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Keywords: mathematics education, student engagement, student motivation, engagementtheory, post-pandemic.

I. Introduction

Over three years have passed since the onset of the Coronavirus 2019 (COVID 19) pandemic. The sudden onset of the pandemic has caused educational institutions around the world to shut down, with many transferring their classes from face-to-face settings to the onlinemode of delivery in an instant. The United Nations Educational, Scientific and Cultural Organization (UNESCO) reported that educational institutions in 185 nations had declared closure since April of 2020, thereby hindering the education of up to 1,542,412,000 students, which comprised 89.4% of overall enrolled learners around the world (Marinoni et al., 2020).

During these three years, mathematics educators across all levels have had to rapidly adjust to the mandated online education system.

Although online education has existed for years before the COVID 19 pandemic, it was only offered as an alternative mode in most institutions, with face-to-face classes being the mainstream mode of learning. The sudden shift to online education during the COVID 19 pandemic came without the chance for prior planning and without detailed guidelines or standards. As such, instructors and educational leaders had to develop their own online teachingstyles, select from a variety of online learning platforms, and establish their online learning environment, all within a short span of time (Albano et al., 2021). The emergency transition was then accompanied by several learning costs for students, such as poorer attention, reduction in study efforts, and unnatural social situations within the digital environment that served as obstacles to student learning (Gjerde et al., 2021). These early days of the pandemic were undoubtedly a difficult period for students and educators alike.

The transition to the online setting was purported to be relatively manageable for mathematics, as it is an abstract subject matter that does not necessitate a physical environment, laboratory, or equipment (Brunetto et al., 2022). However, a key issue faced by educators across all subjects and all levels, especially during the early days of the pandemic, was the reduction of student engagement and motivation within the online setting (Albano et al., 2021; Brunetto et al., 2022; Koh & Daniel, 2022). Online education presented substantial challenges regarding student engagement and motivation compared to the conventional face-to-face classroom because students were separated from their instructors by the computer screen.

Student engagement, defined as the student's level of involvement and interaction withthe lessons, has been purported to enhance student's active learning, which is essential in mathematics (Koh & Daniel, 2022). Active learning involves more practical and hands-on exercises that allow students to explore and make meaning out of the lessons. Student motivation, defined as the student's drive or desire to learn, has also been cited as a vital element for improving mathematics learning and performance (Nofriyandi & Andrian, 2022). In this concept paper, I discuss current knowledge regarding higher education students' motivation and engagement in mathematics, and highlight the research gap regarding how to maintain or enhance student engagement and motivation within the post-pandemic era. Recommendations for practice, policy, and theory based on the knowledge and information provided are also presented in this paper.

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II. Student Engagement and Motivation

In their Engagement theory, Kearsley and Shneiderman (1998) proposed that student learning is enhanced with meaningful engagement through interactions and worthwhile activities. Based on this theory, instructors can keep students engaged through strategies that involve collaboration, active learning, and projects that can make authentic contributions (Kearsley & Shneiderman, 1998). Various theories for learning motivation exist, such as the self- determination theory, which posits that humans are motivated by intrinsic and extrinsic factors (Gopalan et al., 2017). As such, students may be intrinsically motivated by their own desire to learn or extrinsically motivated by rewards such as obtaining good grades or recognition from educators and peers (Gopalan et al., 2017). Student engagement and student motivation have both been cited as significant factors for improving student success, retention, and program completion (Ní Shé et al., 2023; Nofriyandi & Andrian, 2022). Furthermore, since the emergence of new educational theories and technological advancements, the educational paradigm has leaned more towards student-centric ideals and practices over instructor centered ones, which calls for increased levels of student autonomy and engagement.

As social beings, humans learn best from each other through communication and cooperation (Engel et al., 2023). Students often relied on interactions with their peers and educators for support and motivation. Although all types of interactions were perceived to be meaningful for online learning, students' interactions with their peers appeared to be the strongest factor (Bolliger & Martin, 2020). The value of student-student interactions may be rooted in the sense of community, which is a valuable psychological aspect of online learning (Bolliger & Martin, 2020). However, with the pandemic and subsequent educational shutdown, students were forced to work in isolation away from their peers and educators, making it difficult to collaborate and maintain healthy social connections. A survey of 711 higher education staff and students from 41 different countries showed that loneliness and isolation were the most significant challenges they experienced during the COVID 19 shutdown (Leal Filho et al., 2021). Students especially missed having face-to-face interactions with their peers and educators (Leal Filho et al., 2021; Turan et al., 2022). As a university student in Turkey stated, "[online education] doesn't offer the interaction that face-to-face education does" (Turan et al., 2022, p.11). This lack of interaction may demotivate students from attending online classes or participating in online activities.

Educators deemed the atmosphere and circumstances of online education to be ineffective, leading to a more superficial form of student engagement wherein educators could not always feel the students' presence in classes (Brunetto et al., 2022; Sum & Oancea, 2022). For instance, university mathematics professors from different countries expressed feelings of estrangement during the start of the pandemic as they lectured for two hours without receiving any feedback from students, which was frustrating for them because they were used to the participative styles of teaching that are often used in complex abstract subjects such as mathematics (Brunetto et al., 2022). In previous face-to-face classes, mathematics educators were able to form groups of students to solve a mathematical problem, ask questions when necessary, and discuss the solutions as a class. However, these practices were made difficult in the online setting where student engagement was significantly reduced (Brunetto et al., 2022). Higher education students in a study involving 23 institutions across the United States have indeed reported significantly less participation in online classes than in their previous face-to- face classes (Wester et al., 2021). Educators are thus challenged to implement strategies that enable active interaction and engagement, such as group discussions (Engel et al., 2023). Unlike in the physical classroom, educators and students are separated from each other in the online classroom, thereby limiting opportunities for such strategies (Ahmad et al., 2022).

Mathematics educators, like their counterparts in other subjects, had felt the magnitude ofdistance not just from their students but also from their practice of teaching as they were unable to apply some of their established teaching strategies online (Albano et al., 2021). Students struggled to understand complex mathematical concepts in their online classes without the in- person guidance of their instructors, which led to disengagement and demotivation. Students were also undergoing major adjustments in various aspects of their lives, which may have left them with little energy and motivation for school. Furthermore, the emergency transition to online education has highlighted the social inequity in students, with many less privileged students having issues with lack of digital tools or skills for online education. Some educators expressed their worries that students who had trouble accessing or utilizing online education would be left behind and that this would lead to more pronounced inequity once everyone returns to face-to-face classes (Albano et al., 2021). Educators have thus had to discover or develop new approaches, strategies, or practices to improve student engagement and motivation, and to reach all students during the COVID 19 pandemic (Ahmad et al., 2022; Brunetto et al., 2022; Doño & Mangila, 2022; Hunter et al., 2022; Koh & Daniel, 2022).

Notably, some mathematics educators have indeed managed to establish strategies and practices that elicited better student engagement within the online setting during the pandemic (Brunetto et al., 2022;

Hunter et al., 2022; Koh & Daniel, 2022; Suripah & Susanti, 2022). Careand empathy were particularly vital aspects of mathematics education during this difficult time (Koh & Daniel, 2022). Mathematics educators provided much support to students through various methods, such as flexibility in requirements, online office hours, and prompt feedback (Barrot & Acomular, 2022; Doño & Mangila, 2022; Koh & Daniel, 2022). In fact, one study showed that interactions between educators and their students increased during the pandemic, supposedly because educators allowed more flexible online office hours and students did not have to physically travel to educators' offices (Wester et al., 2021). Prompt feedback and positive reinforcement were also highly valued during the pandemic, as students gained motivation from the appreciation shown by their educators (Doño & Mangila, 2022). These methods allowed educators to ensure that students kept in pace and were comfortable with the classes (Barrot & Acomular, 2022; Koh & Daniel, 2022; Wester et al., 2021). Especially during difficult periods of transition, such supports can make students feel that their instructors sincerely care about their learning and may thus be more engaged in their learning.

Educators also added personal touches to lessons, such as the injection of humor or the use of friendly and conversational tones to relay their care and empathy towards their students (Barnett & Cho, 2023; Barrot & Acomular, 2022; Koh & Daniel, 2022; McWatt, 2021; Menezes & Costa, 2020). As mathematics is often portrayed as a difficult and serious subject, mathematics educators believed that injecting humor is important to make the subject more appealing, improve teacher-student relationships, stimulate mathematical thinking and communication, and foster an overall positive learning environment (Menezes & Costa, 2020). The use of memes and emojis was particularly popular among educators in the online setting as it helped in making students feel more comfortable (Barrot & Acomular, 2022; Sum & Oancea, 2022). Educators also emphasized the value of sending light-hearted and encouraging messages with their students to establish the human connection and make up for the physical distance in online education (Barrot & Acomular, 2022; McWatt, 2021). Some students have expressed their appreciation towards educators who used up a small portion at the begin of each class to get to know their students and establish a personal bond with them (Barnett & Cho, 2023). With the burden of the pandemic beginning to ease in several areas, it is imperative that educators maintain the care, empathy, humor, and support given to their students as another potentially difficult period of transition and adjustment from fully online to face-to-face or hybrid classes isunderway.

III. Use of Technology in Mathematics Education

Mathematics is a subject that requires both creativity and critical thinking skills (Suripah & Susanti, 2022). Students must not only rely on rote memorization of mathematical laws and formulas but also think critically and creatively on how to apply them to solutions for mathematical problems. For this reason, teaching and learning mathematics can be difficult and tedious for many. The use of digital technologies in teaching mathematics, particularly those that offer interactive features, is one way to help students not only grasp the complex abstract concepts of mathematics but also activate their creativity and critical thinking (Ní Shé et al., 2023; Suripah & Susanti, 2022). In this way, students may be more motivated and engaged with the lessons.

Educators who have adjusted well to the online setting have begun to appreciate the advantages of technological advancements. For instance, the use of websites with multimedia features was found to improve student motivation to learn mathematics (Suripah & Susanti, 2022). Multimedia websites offered not only interactive features for better student motivation and engagement but also simplicity and easier accessibility compared to complex learning platforms (Suripah & Susanti, 2022). Some educators also noted that the online classroom allowed for a more balanced dynamic, wherein students who previously did not participate in discussions within the physical classroom felt more at ease and shared their ideas more in the online classroom (Hunter et al., 2022). This comfort brought by online education wherein student status had a much lesser effect on how students behaved brought about each student's individuality. Although Wester et al. (2021) have reported reduced overall student participation in online learning, it is possible that some students may find this setting more comfortable (Hunter et al., 2022). Moving forward, having the option of online education alongside face-to- face classes may be beneficial as an alternative for such students.

Technologies specifically designed for mathematics education, such as GeoGebra, Desmos, and Mathematica were also listed as potential tools for improving student engagement (Albano et al., 2021; Ní Shé et al., 2023; Suripah & Susanti, 2022). GeoGebra provides various resources for mathematics across all levels, with features such as spreadsheets, interactive geometry, and computer algebra systems, among others (Pope, 2023). Similarly, Desmos offers digital classroom activities for all levels, as well as various tools including a graphing calculator, scientific calculator, and geometry tools, among others. Notably, these two applications are free to download, which also makes them a valuable tool for reducing the inequity in online education (Pope, 2023). As a testament to the

usefulness of such technologies, an Italian mathematics educator shared how they utilized the Mathematica software to clearly write out mathematical procedures without using a graphic tablet (Albano et al., 2021). Such tools have been found to be beneficial for their pragmatic efficiencies in expediting computations and their epistemic value in strengthening students' mathematical understanding (Ní Shé et al., 2023). As more and more technologies for mathematics education continue to be developed, educators have more options to be creative with their lessons and explore various technological features whether online or in the physical classroom.

With the plethora of tools and software used in online education, students may be vulnerable to e-learning fatigue or the extent to which students become overloaded from being continuously immersed in technology (Reed, 2022). During the pandemic, students were unable to leave their homes, explore campus environments, or participate in outdoor activities. Instead, they spent most of their time in front of computer screens or tablets, which could then lead to e- learning fatigue. Based on a survey of 50 students from Historically Black Colleges/Universities (HBCU), students experienced various levels of e-learning fatigue during the COVID-19 pandemic, which then led to moderate to extreme stress and anxiety (Reed, 2022). In particular, the use of multiple learning platforms at the same time was purported to lead to digital fatigue in students (Sarangal & Nargotra, 2022). Students may have felt confused and overwhelmed with the constant switching between different online learning platforms, leading to their digital or e- learning fatigue. As useful as these digital tools can be, it is important for educators to find the right balance and consistency to avoid students' feelings of saturation or being overloaded with technology use.

The chat function of online media was further noted as a useful tool for online mathematics education as it allowed educators to not only provide support for their students in a comfortable manner, but also to obtain their feedback regarding the lessons (Barrot & Acomular,2022; Brunetto et al., 2022). The use of social media for online education was cited as a more student-centric way to reach students during the COVID 19 pandemic shutdown (Barrot & Acomular, 2022; Sum & Oancea, 2022). Student engagement was purported to be better in social media platforms compared to other learning systems as students regularly checked their notifications in social media outside of educational purposes (Barrot & Acomular, 2022; Sum & Oancea, 2022). Educators used social media to "go where students are, and not wait for students to come to where they are" (Sum & Oancea, 2022, p. 17). Some social media platforms even offered free data availability for better access to chat functions, which educators found to be useful especially for students with limited resources or poor internet connectivity (Barrot & Acomular, 2022). Other tools that higher education teachers used for improving student engagement in the online setting included online polling and breakout room discussions (Koh & Daniel, 2022). With these strategies and practices, mathematics educators appeared to have found comfort in the online setting for mathematics education. The next question thus arises from the current evidence: How do mathematics educators maintain or enhance student engagement and motivation with or without the help of digital technology upon transitioning to face-to-face or hybrid classes in the post-pandemic era?

IV. Current Research Gap

The post-COVID 19 era is a whole new period that includes a reintroduction of the pre- COVID 19 practices and the lessons learned from the COVID 19 educational shutdown. It is an era brimming with possibilities of new strategies, practices, and educational paradigms that educators may utilize to enhance higher education (Hunter et al., 2022). As institutions have begun to reintroduce face-to-face classes or shift to hybrid classes, there is a need to re-examine the approaches, strategies, and practices that have best served mathematics educators during the pandemic, and how they may be sustained or improved (Albano et al., 2021; Brunetto et al., 2022; Hunter et al., 2022).

Some mathematics educators in previous studies have expressed their desire to continue the strong working relationships and use of educational technologies that they have established in the online classroom during the pandemic as they transition back to the face-to-face or hybrid settings (Brunetto et al., 2022; Hunter et al., 2022; Sum & Oancea, 2022). Others have considered the pandemic as an opportunity to re-evaluate mathematics education and improve upon their practice (Albano et al., 2021). Some have actually found the situation to be liberating, as it gave them room to develop and apply new educational strategies and practices away from tradition (Albano et al., 2021). With the different insights, reflections, and plans of mathematics educators from the COVID 19 educational shutdown, the gap in the literature now lies ahead with how or if mathematics higher education will evolve come the post-pandemic era.

In a multinational survey of mathematics educators, participants highlighted the need for more research on how to teach mathematics in an engaging way (Bakker et al., 2021). More than the cognitive element of mathematics education, the educators expressed the need for educational approaches that can empower students, develop their identities, and allow them to appreciate the value of mathematics in their daily lives (Bakker et al., 2021). As we are entering

the post-pandemic era, these gaps in the literature need to be addressed to promote a smooth transition back to face-to-face or hybrid classes.

V. Recommendations

On account of the existing knowledge and research gaps regarding the role of digital technology on student engagement and motivation in higher education mathematics, I present some theoretical and practical recommendations for the post-pandemic era. The topics of student engagement, student motivation, and the use of technology in mathematics higher education are not necessarily novel. However, there remains to be a dearth in the literature regarding how these topics are interconnected (Ní Shé et al., 2023). Some underexplored factors in the field of mathematics higher education that could be addressed in future studies include assessment, program quality, learner support (Martin & Bolliger, 2022). Furthermore, in light of the current state of the world, it is imperative to examine these topics within the new lens of the post- pandemic era. Future researchers are encouraged to explore how mathematics educators restructure their lessons with the continued use of technology while maintaining the personal and human aspects of teaching as physical classes reopen (Sum & Oancea, 2022). Koh and Daniel (2022) also recommended further meta-syntheses or theoretical analyses of student engagement strategies used during the pandemic that could be relevant in the post-pandemic era.

Future researchers are encouraged to utilize qualitative approaches to elicit the experiences and perceptions of mathematics educators who have begun transitioning to face-to- face and hybrid classes in the post-pandemic era regarding student engagement and motivation. In their systematic review of learner satisfaction, which included student engagement and motivation, in higher education, Martin and Bolliger (2022) highlighted a dearth of qualitative studies. While previous researchers have identified factors for learner satisfaction, such as student engagement and course delivery, there is still a need to understand how mathematics educators utilize these factors to improve student learning.

Practical recommendations based on the existing literature include the adaptation of current best practices to face-to-face and hybrid classes. Although online office hours are no longer necessary due to the eased pandemic restrictions, mathematics educators may continue to keep open lines of communication for students who are still adjusting to the physical setting or still recovering from the effects of the pandemic (Doño & Mangila, 2022; Koh & Daniel, 2022). Mathematics can be a particularly challenging subject matter if students are unable to grasp the logic or concepts behind mathematical laws, formulas, and problems. Maintaining open communication outside of the classroom may help students feel more engaged and motivated as they can easily receive the support they need. Providing immediate feedback has also been cited as an important factor for student engagement during the pandemic (Ahmad et al., 2021; Doño & Mangila, 2022). With the return of face-to-face classes, mathematics educators can capitalize on this strategy in their physical classrooms, and allow students to process and reflect on the lessonsin real time.

The return of physical classes does not necessarily mean the end of online resources. With the advantages of technology use in education discovered during the pandemic (Brunetto etal., 2022; Hunter et al., 2022; Suripah & Susanti, 2022; Turan et al., 2022), mathematics educators may continue to utilize multimedia websites, asynchronous online resources and activities, or chat functions to keep students engaged outside of the physical classroom. When implementing synchronous classes, educators are encouraged to schedule them at the beginning of the day when students are still alert and attentive (Chen et al., 2020). Asynchronous tasks and activities may then be scheduled towards the latter part of the day. With this type of setup, students may be more engaged in each and every online activity given by the educators (Chen et al., 2020).

Educators should also strive to maintain a sense of community with their students regardless of the educational media used (Barnett & Cho, 2023; McWatt, 2021). Higher education students highly valued interpersonal aspects of online learning, such as virtual group discussions, group assignments, and peer interactions (McWatt, 2021). Barnett and Cho (2023) also recommended that educators quickly learn and use students' names and preferred pronouns, and have more personal conversations with their students so as to foster this sense of community. It should be noted, however, that these practical recommendations were made based on findings from studies conducted during the COVID 19 pandemic. As such, these findings may have been influenced by various external factors, including the crisis of the pandemic itself and students' oreducators' reactions to it (Turan et al., 2022). As the post-pandemic era moves forward, there may be more evidence upon which to base best practice recommendations on.

Nonetheless, educators should still strive to maintain their digital competencies in thetransition back to face-to-face classes, as it has proven to be an imperative aspect of students' learning success (Albano et al., 2021; Engel et al., 2023; Turan et al., 2022). As Italian educators in Albano et al.'s (2021) study expressed, educators themselves are lifelong students with the need for continuous learning in their discipline. This includes keeping up to date with the latest digital technologies for mathematics education and the ability

to utilize such technologies to promote student collaboration and self-regulated learning (Engel et al., 2023). It is also vital thateducators are able to teach and support students in using digital technologies that are more sophisticated so as not to discourage them (Ní Shé et al., 2023). With the myriad of educational technologies available in the modern era, it is imperative that educators remain knowledgeable and confident in not only using them but also guiding their students on navigating them.

In terms of policy, it is vital for educators to undergo continuous training on digital technologies for education to maintain their digital competence. The training should not only focus on improving educators' digital skills but also their confidence in utilizing those skills as many educators tend to underestimate their skills or choose not to explore the various digital options and software features for education (Brunetto et al., 2022; Inamorato dos Santos et al., 2023). Educator training should not be limited to knowledge and practices of online education, but also be focused on their beliefs regarding technology (Brunetto et al., 2022). This is especially important for older educators who may not feel comfortable using digital technologies (Inamorato dos Santos et al., 2023). If educators do not change their negative beliefs about digital technology use in education, the knowledge they obtain may be rendered useless and the practices they learned may not be implemented (Brunetto et al., 2022). It is imperative that educators' knowledge, beliefs, and practices regarding digital technologies and online education are targeted as a whole in training. Institutional policymakers are thus encouraged to continue promoting digital transformation in higher education as a way to cultivate educators' digital competencies and confidence (Inamorato dos Santos et al., 2023).

Policymakers are also encouraged to keep the option of online classes open for students who may be more comfortable with this setting. In line with this, Turan et al. (2022) recommended providing in-service training to enhance educators' competencies in terms of online education. These approaches, strategies, and practices discovered and enhanced during thepandemic era are not simply temporary remedies for the pandemic conditions, but can be adapted as improvements for mathematics higher education in the long run.

VI. Conclusions

The transition of mathematics education from face-to-face to online to hybrid settings from pre- to post-pandemic has served as a challenge for educators in terms of keeping their students engaged and motivated to learn (Brunetto et al., 2022; Sum & Oancea, 2022). The physical distance and lack of meaningful interactions in online education led to students' feelings of isolation and demotivation (Leal Filho et al., 2021; Turan et al., 2022). Mathematics educators, who are used to participative styles of teaching due to the complex and abstract manner of their subject, found it extremely difficult to keep their students engaged during this period (Brunetto et al., 2022).

Although educators have made effective use of technological advancements to address this challenge (Albano et al., 2021; Suripah & Susanti, 2022), the gap in the literature remains regarding how to maintain or enhance student engagement and motivation upon transitioning to face-to-face or hybrid classes in the post-pandemic era. Previous authors have noted the need to re-examine mathematics higher education approaches, strategies, and practices before and during the pandemic to arrive at an effective balance for the post-pandemic era (Albano et al., 2021; Brunetto et al., 2022; Hunter et al., 2022). More research is urgently required to obtain best practices for this new transition period.

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Discursive Walls: Mapping *Trans* Coverage through *Folha de S. Paulo* between 1960 and 2017

By Daniela Picchiai & Diogo Azoubel

Abstract- This mapping covers almost 6 thousand trans cover texts published in *Folha de S. Paulo* between 1960 and 2017 and is part of the understanding of the media as a fundamental agent in the sphere of representations, directly influencing the dynamics of contemporary societies. The reflection on the discourse and narratives conveyed in this periodical, in which transvestites and transsexuals gradually migrate from associations to arts and shows (23.19% of occurrences), becoming associated with marginality and criminality (36, 88% of the total), in the fait divers, reveals the discursive flow of the citations towards the ads of prostitution, a fact that invites us to go through this historical narrative to problematize how such contents are configured today.

Keywords: *content analysis; folha de S. Paulo; transvestites and transsexuals.*

GJHSS-G Classification: *LCC: HN700.Z9*

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Daniela Picchiai [α] & Diogo Azoubel [σ]

Abstract- **This mapping covers almost 6 thousand trans cover texts published in *Folha de S. Paulo* between 1960 and 2017 and is part of the understanding of the media as a fundamental agent in the sphere of representations, directly influencing the dynamics of contemporary societies. The reflection on the discourse and narratives conveyed in this periodical, in which transvestites and transsexuals gradually migrate from associations to arts and shows (23.19% of occurrences), becoming associated with marginality and criminality (36, 88% of the total), in the *fait divers*, reveals the discursive flow of the citations towards the ads of prostitution, a fact that invites us to go through this historical narrative to problematize how such contents are configured today.**

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I. Introduction

The subject of this research is the coverage of the trans community done by the Brazilian newspaper Folha de S. Paulo. However, this is just a cut given to broader research in which different means of communication, from independent to mainstream. The research material was extracted from the thesis of author Daniela Picchiai entitled: Said about and said by: the affective rend of trans women in the media discourses. In this sense, the analyzes made are not far from community media (COVER, 2002). In this first stage, we invested in an inductive analysis based on the coverage of articles that referred to transvestites and transsexuals between the years 1960 and 2017.

Regarding the extensive period analyzed, we are propose to share this initial panoramic mapping with Bardin (2016), to subsidize more in-depth research on the configuration of national journalism in this issue. To understand the role of journalism in the construction of subjectivities, we use the method of the monographic procedure through review of authors such as Guattari (1986), Hardt (2000), Lazzarato (2006), Negri (2205) and Lago & Benetti (2010).

Specifically, about the collection of the data, is due over the 2016/2017 biennium, having been concluded in December 2017, in the digital collection (https://acervo.folha.com.br/index.do) of Folha de S. Paulo from the search for the terms transvestite and transsexual from March 1960 to December 2017.

After identifying the news in which such terms occur, during the pre-analysis of the data, materials to which they are referred no more than once or twice were discarded. The established corpus is referred to in *Data table I*, where it is possible to discuss its distribution and predominance by editor and year. There are more than 6 thousand texts in which transvestites and transsexuals appear in the headlines, leads and/or are repeated in the journalistic text.

It should be noted that, while understanding the differences between transvestites and transsexuals based on the person's own recognition and how they identify and present themselves socially, regarding journalistic coverage, both words remain linked in the journalistic narratives analyzed here and, therefore, in this text.

For this reason, and to respond to the constructed research problem: how the approach to transsexuals and transvestites in Brazil is historically configured from the printed editions of the newspaper Folha de S. Paulo circulated between March 1960 and December 2017, the sections that follow were organized hierarchically from two perspectives, the temporal and the editorial, followed by the interpretation of the data, which follows temporally organize.

The objectives concern: a) investigation of the focus given to this universe in what is one of the most traditional national printed journalistic vehicles; b) enumeration of the main characteristics of its coverage within the established time frame and; c) discursive problematizing of the theme through the longitudinal analysis of the articles.

In this direction, the hypothesis refers to the fact that: a) Over the last few decades, what discourse has been established by the mainstream media directed at transvestite and transsexual women. B) it would be possible to affirm that the media reinforces the current sociopolitical logic for a period to reinforce its own interests or it will be possible to identify, even in some news, that journalists try to break with conservative discourses of a time.

As justification for this preliminary investigation, among other points, we allude to the need to discuss the paths of national printed journalism from its practical position, through the texts it produces.

Finally, about the expected results, we believe that the journalistic coverage that addresses transvestites and transsexuals positions these lives as synonymous with marginality and criminality. As limitations of the study, it should be noted that the investigation does not cover the period of the Jair

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Bolsonaro government, which formally began in January 2019, when the issue was extremely tense.

That said, the next section provides a brief approach to how the media field is configured in Brazil, with emphasis on the vehicle that is the focus of this investigation to support the analysis and discussion of the data.

II. The Media Field in Brazil

The media emerge as important agents in the field of representations, directly influencing the dynamics of society's functioning. The means of communication are powerful producers and mediators of discourse, they maintain and reproduce social conventions about masculinity, femininity, sexual desire, ethnicity, class, generation, etc. The media acts, therefore, as a co-author of the discourse that produces ways of life that, in turn, reproduce the hegemonic normative logic. Alzira Alves de Abreu recalls numerous studies use the press as a source of information, but that "there is a lack of analyzes on the influence it exerted on the course of events" (ABREU, 2017, p. 220).

In Brazil, the media is commanded by large communication groups that concentrate the production of the maximum part of the information consumed by Brazilians, which in concrete terms is equivalent to saying that five families control half of the 50 vehicles with the highest audience. To get an idea of the impact of this, a survey carried out by the Media Ownership Monitor (MOM)[1], Brazil is in 102nd place on a list of 180 countries in the 2018 Global Press Freedom Index. According to this research, in addition to the high concentration of audience, the Brazilian media reality is excessively dependent on sponsors, whether public institutions, private companies, or even religious institutions; as well as high geographic concentration, that is, most of the command of information and media networks is in the Southeast region and Brasília.

Thus, we can conclude that editorial decisions, agenda priorities, and representations of images and everyday life present in the media, in short, all the discourse produced, is mostly marked by the interests of its maintainers, a fact that culminates in the construction and reproduction of a specific discursive logic, compatible with the socio-political context in which it operates. Such logic and discourses produced do not escape standardization when applied to gender issues. Everything that does not fit the established pattern parameterized by market logic and capital tends to be marginalized.

It is important to note that in 2016, the pornography site RedTube carried out research without revealing specific numbers but stating that Brazilians look for 89% more pornographic content from transsexuals when compared to other countries in the world that access the site. In this same survey, the pornography website says that the term "Shemale", used to search for videos with trans people, is the fourth most searched topic by Brazilians, the search for trans pornographic content increases when the search adds up regional vocabularies such: transvestite and Brazilian shemale. It is worth noting that in the world ranking, the same search term occupies the ninth place.

Currently, Brazil is one of the most intolerant countries with transvestites and transsexuals in the world, being the first in the list of deaths and murders of these people, according to the survey carried out by Transgender Europe (TGEu), between October 1, 2017, and September 30, 2018.

According to the same data, between 2017 and 2018, 369 homicides of transsexuals, transvestites, and non-binary individuals were recorded. These numbers grow every year, the life expectancy of these people drops to 35 years old while the national average is 75 years old. We believe that the normative logic produced in the media discourse strengthens these data and solidifies the configuration of harsh reality by creating statements that undermine these subjects, as detailed below.

III. The Folha de São Paulo

The Folha de S. Paulo was founded in 1921 and belongs to the Frias's family – one of those who control more than half of the vehicles with the highest audience in the country –, which also owns the newspaper Agora São Paulo, the classifieds Alô Negócios and the advertising agency Folha Press news, in addition to UOL, one of the most accessed portals in Brazil, and the Data Folha research institute.

The Folha de S. Paulo was chosen for being the largest in digital circulation and the third in printed format in Brazil, according to data audited by the Instituto Verificador de Circulação (IVC). Its audience in the first decades of circulation was concentrated in the State of São Paulo. With the digitization of content, readers spread throughout the national territory and even outside the country. Even so, more than 70% of Folha de S. Paulo consumers belong to the upper class and upper middle class according to the newspaper's survey.

IV. Data and Analysis

To facilitate the perception of how journalistic texts about transvestites and transsexuals are distributed in Folha de S. Paulo, we created *Data table I*. In it, we display horizontally the number of texts found by time-lapse (the distribution of years does not follow a regularity, as seen ahead) and, vertically, the editorship.

[1] MOM was created and implemented by Reporters Without Borders (RSF), an international organization whose aim is to defend human rights, in particular freedom of the press and the right to inform and be informed anywhere in the world.

As follows, there is a prevalence of journalistic texts in the Cities, Classifieds, and Culture sections, with 452, 295, and 283 occurrences, which add up, respectively, 36.88%, 24.18%, and 23.19% of the total. The remaining 15.57% include the occurrences of other sections, which shows an imbalance in the guidelines arranged in Interior, North and Northeast, Health and Sports, and leads to the partial confirmation of the established hypothesis.

In addition to the variation in discursive approaches to the words transvestite and transsexual seen over the years, the summit of articles that address these words takes place between 1985, and 1987, totaling 100 texts (about 8% of the total); followed by the intervals 1960-1965, 1974-1975, and 1998-1999, with 90 texts each (about 7% of the total each).

Another important point concerns the silencing of these terms in the newspaper in the years 1966, 1974, 1975, 1981, and 1982, reflections of the Military Dictatorship. In the years 1988, 1989, and 1990, references to transvestites and transsexuals appear without relevance, that is, they do not appear in the headlines and news or do not have the force of meaning.

In this way, we believe that such periods can be referred to as a kind of opportune space to re-signify the terms, which justifies the gaps in *Data table I* and leads us to the need to investigate this theme in a future opportunity.

Data table I – Distribution of texts by editorial and years

Editorial / Year	City	Culture	Interior	North and Northeast	Health	Classified	Sports	Fashion	TOTAL
1960 - 1965	10	80	0	0	0	0	0	0	**90**
1966	0	0	0	0	0	0	0	0	**0**
1967 - 1973	40	30	0	0	0	0	0	0	**70**
1974 - 1975	0	0	0	0	0	0	0	0	**0**
1976 - 1980	55	35	0	0	0	0	0	0	**90**
1981 - 1982	0	0	0	0	0	0	0	0	**0**
1983 - 1984	10	70	0	0	0	0	0	0	**80**
1985 - 1987	95	5	0	0	0	0	0	0	**100**
1988 - 1990	0	0	0	0	0	0	0	0	**0**
1991 - 1992	0	10	70	0	0	0	0	0	**80**
1993 - 1995	0	10	0	70	0	0	0	0	**80**
1996 - 1997	52	3	0	0	10	15	0	0	**80**
1998 - 1999	35	0	0	0	0	55	0	0	**90**
2000 - 2004	40	0	0	0	0	40	0	0	**80**
2005 - 2007	35	0	0	0	0	45	0	0	**80**
2008 - 2009	20	0	0	0	0	40	20	0	**80**
2010 - 2011	10	10	0	0	0	40	0	0	**60**
2012 - 2014	30	15	0	0	10	30	0	0	**85**
2015 - 2017	20	15	0	0	0	30	0	10	**75**
TOTAL	**452**	**283**	**70**	**70**	**20**	**295**	**20**	**10**	**1220**

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V. Temporal Perspective – Political and Social Changes

Over the decades, we noticed, by the position of these individuals, a change in their regime of visibility. From the 1960s onwards, the word transvestite appears in the newspaper, more specifically in the culture editorial, and, in that period (1960-1965), it represented 88% of occurrences.

It is important to note that the culture editor was created in 1958, a period marked by the end of the post-war general scarcity, the arrival of television in Brazil, and the expansion of the Brazilian press. At that time, significant changes took place in several newspapers, such as the inclusion of photos on the front pages and a considerable increase in content organized in various sections. In this sense, the newspaper underwent an expansion of formats and content produced and the culture section was an important department that disseminated the cultural and counter-cultural movements that were significant at the time.

That said, we believe that its origin is based on the idea that the first section, Cities, would remain with the husband and the second, Culture, with the woman, which reinforces a binary way of thinking, that is, it divides and normalizes the production of discourses, a fact that naturalizes so-called "feminine" and "masculine" contents and which, once again, confirms the hypotheses we have established.

If before the dictatorial period, in the early 1960s, transvestites gained existence in the art, and culture section – associated with performance, dance, and theater shows -, during the Dictatorship the discourse was modified, and these individuals were relegated to the police pages.

Between 1965 and 1967 these words, transvestite, and transsexual, disappeared from the media and, when they reappeared, in the late 1960s and early 1970s, they were aligned (and mostly remain) with the discourse of the Cities editorials, which made the coverage of cases of violence, urbanism, environment, public administration, and behavior.

During this period, the discourse changed, transvestites and transsexuals began to be associated with some type of violence, public hygiene policies, precarious lives, and being positioned on the margins of collective life, a phenomenon that intensified from the middle to the end of the 1970s. This fact helps to partially confirm the hypothesis established in this study, according to which the discourses produced about these lives significantly impact the process of segregation of the trans universe in the face of the advance of conservative discourses.

Already in the early 1980s, a decade marked by the so-called democratic transition, there is a change in editorial due to the visibility of the Roberta Close[2]. Even so, the discourse of marginalization and precariousness reveals even greater strength when it expands, in subsequent years, to newspapers in the interior of the State and to those in the North and Northeast regions. Associated with marginality, transvestites, and transsexuals are present in Folha de S. Paulo to this day. This is, by the way, the highest occurrence found: 37% of the total specified in *Data table I*, that is, 452 texts identified between 1960 and 2017 are in Cities Editorials.

Effect of social polarization, in which what is different belongs to the other, we believe we can confirm the established hypothesis from the fact that the produced speeches follow the sociopolitical logic in force in the period of its transmission, with effect in the creative expression of these subjects that lose space for its criminalization. This issue, by the way, needs to be deepened at a future opportunity, especially to better support the understanding of such a transition.

VI. Editorial Perspective –Transgender and Transvestite by Editorial Section

From the survey of the sections in which they are inserted – Classifieds, Cities, Sports, Culture, Interior, Fashion, North and Northeast, and Health –, it is possible to perceive the transition movements and media significance of both words. Thus, we found that in the established time-lapse, transvestites and transsexuals, somehow, are inserted in the pages of the journal in dichotomous logics from those linked to the predominant themes in each of the editorials.

In the Cities section, for example, unlike the police stories that take up several pages, the journalistic texts are smaller and refer to Roberta Close as a transvestite. Although the news belonged to the Culture section, in the early 1980s, criticism was present in the reference to the model and actress, always as an ambiguous, carnival-like person, never as a woman.

In other words, by publishing most of the news in this section, as well as in the classifieds, Folha de S. Paulo becomes responsible for the social marginalization of these people, as well as for the rapid association that transvestites and transsexuals are linked to violence and social disorder.

About the Classifieds and following the macro analysis of Folha de S. Paulo's discourse, transvestites and transsexuals are inserted with prostitution advertisements from the second half of the 1990s, more specifically from 1996 onwards, with a summit between 1998 and 1999 (more than 18% of the 295 texts identified). Until then, prostitution was only associated with marginality and violence. This logic is modified by the configuration and advancement of the Internet, which impacts the remodeling of the business model, even today.

During this period, transvestites and transsexuals appear, for the first time, talking about themselves and by themselves, although, initially, the advertisements were placed in the middle of advertisements for houses, vehicles, careers, and businesses, among others.

Returning to *Data table I*, the logic of prostitution advertisements in classifieds remains the same from 1990 to 2017, with variation only in the number of occurrences, which oscillates between 30 and 40 texts per designated period from the year 2000 onwards. In the spotlight, prostitution in the classifieds shares space with news about transvestites and transsexuals in sport based on the repercussions of the Ronaldinho case (Ronaldo Nazário), in which the soccer player would not have paid for a night with the transvestite Andréa Albertini in 2008.

Complementarily, it is relevant to realize that after a decade (1998-2008) without transvestites and transsexuals being mentioned in the editorials related to art and culture, in 2010, from the approach of the work and debates produced by the Brazilian cartoonist Laerte Coutinho.

Although Laerte is not a journalist, she uses her art to break with conservative discourses, according to the hypothesis established in this research. Laerte's critical presence, as a representative not only of the readership but also of the publication's producer, creates a microbalance in the discourse between the marginalized, the stereotyped, and the subjects who intend to live a life that breaks with these patterns. Likewise, a few years later, more specifically between 2016 and 2017, transvestites began to be related to

[2] Brazilian model and actress who was born intersexual (by genetic tests it was proved that Roberta has mixed biological characteristics).

fashion, with the production of fashion shows in which they were highlighted.

It is important to emphasize that this mapping considers the content addressed in the articles, that is, the meanings indicated by the journalistic texts. As the journal does not have a specific section for fashion, this necessary displacement of the occurrences identified in the Cities and Culture sections culminates in the opening of a new block that does not strictly follow the sections presented by Folha de S. Paulo and, therefore, is highlighted with an asterisk in *Data table I*.

Such content, in general, juxtaposes coverage based on publicizing the fashion shows, with São Paulo Fashion Week (SPFW) being the most prominent set. Notably, these articles bring little verbal text, many visual texts with an emphasis on photos, in addition to headlines that translate an idea of representativeness and rupture with figures, images, and performances that are considered hegemonic.

Finally, regarding the health guidelines, from the mid-1990s onwards, HIV is directly associated with transvestites and transsexuals in the journal. If, on the one hand, the articles address guidelines and prevention with educational booklets and AIDS support and prevention groups, such as GAPA; on the other hand, they indicate the interest of the College of Medicine of the University of São Paulo (FMUSP) and public health researchers in measuring the number of seropositive people and in the sexual behavior of these individuals, despite the difficulty of finding subjects who agree to participate in such surveys in the period.

In addition to sexual behavior and the use of condoms, drug use, and exchange of syringes and needles are also themes associated with LGBTQIA+ as factors for the spread of HIV. Other topics covered are queues at hospitals and gender reassignment surgeries. It is important to emphasize that this term is present in all ten texts identified in the editorial in this period (50% of the total) and, although imprecise, is commonly referred to by people today.

When observing the articles, we noticed that, as is the norm in most of those related to medicine and health, what is disclosed is the medical discourse establishing standards of normality when defining diagnoses based on classification systems. This transition process, which is primarily linked to the health of transvestites and transsexuals, is generally included in the Cities section.

In the subsequent decade, the health of transvestites and transsexuals curiously does not appear in Folha de S. Paulo. It is from 2012, and on the debates on hormones, that it returns to its printed pages. One text in particular draws attention for addressing the hormonal balance of people who biologically and identitarily recognize themselves as women. In it, transvestites are cited as representing the negative effects of hormone use, as undesirable, an example of what it means to be an "artificial" woman.

Although present in the ten other texts in that section and relevant in the process of transitioning the bodies of transvestites and transsexuals, this research did not identify any narrative that addresses specifically hormonal issues in such lives. The discourse that prevails is that of their association with marginality, prostitution, and violence – which suggests that this group is not perceived by the publication as a significant part of its audience.

VII. Understanding the Outputs

In the 1980s, the place of transvestites and transsexuals is stressed in Health with the creation of the concept of "high-risk group" which, although belatedly, is immediately linked to these subjects via media discourses produced on the issue. The rationale for its creation is to track people living with the virus and prevent new infections, being socially directly associated with LGBTQ+ (lesbian, gay, bisexual, transvestite, and transgender people and more), especially gay men, and popularly referred to as the "gay punishment", which expresses a social degradation of the subjects in question.

This discursive context makes society avoid not only those infected by the virus, but also "high-risk groups", in which gays were primarily protagonists and, subsequently, transvestites and transsexuals also occupied this place of social exclusion. that these people were made invisible during the long years of the dictatorship, and as a result, HIV and transvestites, and transsexuals were the subjects of newspapers from the 1990s onwards, ten years after the disease boom.

Despite this time-lapse, the result is the engendering of a growing process of discrimination and violence against these subjects. This fact reinforces the importance of realizing that journalistically constructed discourses do not associate cases of violence with prejudice against HIV, but with fights, robberies, prostitution, etc.

It was in the 90s that advertisements for prostitution of transvestites and transsexuals in the classifieds appeared more intensely. As we know, advertisements are a source of income for the newspaper. In this way, its editors create increasingly elaborate strategies so that readers are reached and influenced by ads and for advertisers to be attracted and invest, whether in their printed or digital editions. This strategic elaboration is not limited to the purchase and sale of a product or service but encompasses the intentional appropriation of universes and modes of expression previously given in the social sphere.

As much as the advertisements analyzed the transvestites and transsexuals are produced by them, advertising, in this case, has a modulation action

between the parties. Therefore, prostitution is not just a job, a source of livelihood, but a mode of production of femininity, of a feminine ideal, based on socially established principles. We note that becoming feminine is marked by the production of subjectivity, whether by using clothing and markers said to be feminine, by using hormones, or even by performing plastic surgery and/or applying silicone.

Specifically, in the case of Ronaldinho x Andréa Albertini, in 2008, although famous for the visibility of the soccer player, the approach to the issue in the news follows the logic of marginalization of these lives. In the discourse produced by the journal, the expression of inequality is reinforced by highlighting Andréa's vocabulary semantics, by the angles of the published photos, and even by the strength of the figure of the player in question in Brazil in the face of his opposing narrative.

Dichotomously, when transvestites and transsexuals take to the catwalk, between 2014 and 2017, the spotlight of much of the media is focused on SPFW which, being one of the biggest fashion events in the world, was the stage for stylists such as Vitorino Campos and Ronaldo Fraga to present their collections giving visibility to these subjects. In a way, such stylists help to reframe the political and social importance of that space. Ronaldo Fraga, for example, took advantage of the Week's visibility to break with the prevailing norms and with the hegemony of biological, white, and thin women.

The theme of fashion is complex and involves several dimensions – economic, social, political, historical, etc. –, being common to any of them the fact that fashion adapts to society and, at the same time, produces cultural content that also promote changes in perspectives. Thus, the parades led by transvestites and transsexuals displace these people from a place directly associated with marginality. We think, therefore, that making marginalized bodies visible enables new social flows and the manifestation of life power, as well as organizing them according to their productivity. After all, as Guattari explains in Molecular Revolutions:

> Marginality is the place where one can read the breaking points in social structures and the efforts of a new problem in the field of the collective desiring economy. It is about analyzing marginality, not as a psychopathological manifestation, but as the liveliest part, the most mobile of human collectivities in their attempts to find answers to changes in social and material structures (GUATTARI, 1986, p. 46).

In this sense, fashion, when trying to break with the discursive logic built around transvestites and transsexuals, on the one hand always represents a possibility of opening up the society to new assemblages, which were previously crystallized in a hegemonic thought. On the other hand, the tone of manifestation presented in the fashion shows, in an event organized by notable brands, refers to the inclusion of transvestites and transsexuals in the logic of capital. It is no wonder that the bodies chosen by Ronaldo Fraga are in line with the fashion standard, that is, tall, thin, and mostly white. Recalling Hardt's words in The World Society of Control:

> El império acepta siempre las diferencias raciales y étnicas que encuentra, y sabe utilizarlas; permanece a la sombra, observa esos conflitos e interviene cuando es necessario un ajuste. Cualquier tentativa de seguir siendo outro en el cara-a-cara del Imperio es vana. El império se nutre de la alteridade, relativizándola y gestionándola (HARDT, 2000, p. 157)[3].

In this way, with otherness nourishing the order of capital, the lives of transvestites and transsexuals, marked by a series of crossings, are gradually inserted into this logic. It is in this guise that current flows of capital explore subjectivities, creativity, knowledge, and relationships, and everything becomes marketable. For, "the Empire can only be conceived as a universal republic, a network of powers and counter-powers structured in an unlimited and inclusive architecture" (HARDT; NEGRI, 2005, p. 185).

Finally, thinking that the current logic works broadly and captures the ruptures, from the simplest to the most complex, we realize that the use of the bodies of transvestites and transsexuals in fashion shows takes the discourses of inclusion and representativeness, freezes and segments these people; captures several and different processes and flows, reorganizes them and presents them in an already existing functioning and according to a single possible logic.

VIII. Final Considerations

In this initial reflection, we begin to unravel the implications of transvestite and transsexual lives in the media field by approaching journalistic narratives published in Folha de S. Paulo between the years 1960 and 2017, in which they gradually migrated from associations linked to the arts and spectacles, passing to be associated with marginality and criminality as a series of sociocultural changes occur, as in the case of the change from the periphery as a living space for workers to strongholds dominated by drug traffickers, noted with the expansion of the world of crime in these spaces from the 1990s onwards. in the production referring to people who recognize themselves as transvestites and transsexuals, in which 37% of the articles are published in the Cities section (*Data table I*).

[3] In our free translation: "The Empire always accepts the racial and ethnic differences it encounters and knows how to use them; stays in the shadows, watches for these conflicts, and intervenes when an adjustment is needed. Any attempt to remain face-to-face with the Empire is futile. The empire is nourished by otherness, relativizing and managing it".

Added to this, almost 25% of the newspaper's citations refer to advertisements for prostitution, a profession doubly marginalized in the country, since it has no State supervision and, at the same time, is more deeply discriminated against in the trans universe. The phenomenon is specifically noticed from 1996 onwards, with a peak between 1998 and 1999 (more than 18% of the 295 texts identified), registering the following development of the Internet, which would alter the journalism market as a whole and cause a change in the model of an ongoing business to the present day. Even so, in 2016 and 2017, 30% of references to terms are associated with classifieds, which is an impact that deserves further investigation. In the same direction, almost 62% of the articles locate these people in an established place, but outside the social body.

Although during the Military Dictatorship, its silencing is perceptible, the culture section, linked to the field of arts, expresses an attempt by the newspaper to break with this order through the dissemination of plays and theatrical shows, performances, and cartoons, among others, created, produced, and performed by these people. Transsexuals such as the cartoonist Laerte, in 2010, who represents not only the universe of the readership but also that of the newspaper producer, exert influence on the discourse between the marginalized, the stereotyped, and the subjects who intend to live a life that breaks with these standards. Likewise, a few years later, more specifically between 2016 and 2017, transvestites began to be related to fashion, with the production of fashion shows in which they were highlighted.

These findings linked to the history of representation of journalistic narratives in Folha de S. Paulo suggest an advance towards human rights and freedom of security and expression of the LGBTQ+ groups observed in this study. Paradoxically, they are contextualized in a nation that kills the most trans people in the world. We also remind you that this initial analysis of the data, even though it covers almost 6,000 texts spread over almost 60 years, does not include an attempt to understand the impact of the current federal government, which began in January 2019, in which these and other related terms are highly stressed. and whose analysis will demand future investigations to investigate its impact.

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Online Education in China during the Covid-19 Pandemic in Light of Constructivism Learning Theory

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Abstract- During the Corona Virus Disease 2019 Pandemic, all the schools in China were suspended under the requirement from the Ministry of Education of China, and then the online education were spreading all over China. This research is aimed to analyze the utility of online education in China during this time-sensitive situation in light of constructivism learning theory, try to find out the pros and cons of online education and then estimate the development of online education in the future.

Keywords: *covid-19 pandemic, online education, constructivism learning theory.*

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Online Education in China during the Covid-19 Pandemic in Light of Constructivism Learning Theory

Bingyao Zhang [α] & Wei Chen [σ]

摘要- **在新冠肺炎爆发期间， 在中国教育教育部的号召下中国国内所有学校暂缓到校上课，在线教育席卷全国。本研究旨在分析在此特殊时期，在构建主义学习理论为基础的在线教育在中国的运用情况。试图通过分析在线教育的利弊来预测在线教育未来的发展方向。**

关键词：新冠肺炎、在线教育、构建主义学习理论

Abstract- **During the Corona Virus Disease 2019 Pandemic, all the schools in China were suspended under the requirement from the Ministry of Education of China, and then the online education were spreading all over China. This research is aimed to analyze the utility of online education in China during this time-sensitive situation in light of constructivism learning theory, try to find out the pros and cons of online education and then estimate the development of online education in the future.**

Keywords: covid-19 pandemic, online education, constructivism learning theory.

I. Introduction: Background Information

The outbreak of Corona Virus Disease 2019 (COVID-19) made China lockdown in 2020. In order to avoid the spreading of the virus, the Ministry of Education in China has postponed the opening day of 2020 spring semester for school in China from the late January. And the time when schools will open again remains unknown. During this extraordinary period, the ministry advocated the policy that "although school is suspended, teaching and studying should not be." In accordance with this requirement, schools from kindergartens to universities and even after school organizations have shifted the classroom from offline to online. Many schools have organized excellent teachers to record course videos and then distributed them to students. Some top universities, such as the Peking University and Tsinghua University have provided free high-quality courses for those who want to learn the courses on well-known domestic sharing platforms. The nationwide “new online semester” began in February 2020 with teachers using the record lecture videos and webcast to teach and students using digital devices to learn.

Within a few weeks, the Chinese government transformed printed textbooks and recorded videos for various subjects that could be accessed through the internet or television. Despite initial reluctance, many parents in China began to appreciate the new possibilities of online learning. During the pandemic, Alibaba's learning software, DingTalk, was downloaded by a staggering 1.1 billion users in China.

Recently, according to an online article (How do you rate online course？[1]), the "Guiding Opinions on Online Teaching Organization and Management of General Colleges and Universities during the Pandemic Prevention and Control Period" issued by the Ministry of Education, it has been clearly mentioned that the implementation plan of online teaching during pandemic prevention and control should be formulated immediately under the following four principles:

1. To improve teaching efficiency and ensure teaching quality.
2. To complete teaching tasks.
3. To ensure that online learning is of substantially equivalent quality to offline classroom teaching.
4. To formulate policies for mutual recognition and transformation of online course learning credits to ensure that students' academics are not affected by the pandemic.

This research is aimed to analyze the utility of online education in China during this sensitive period, and try to find out the pros and cons of the online education. As online education is gaining overwhelming popularity in the world and all over China at the beginning of 2020, this research will analyze its future development based on the comparison of the pros and cons of online education.

II. Online Education

The research of online education is from the perspective of constructivism learning theory. Constructivism learning theory advocates that knowledge is not acquired by teachers, but achieved through the process of learning in certain social and cultural background. Constructivism advocates learner-centered learning under the guidance of teachers. "Sense construction": this is the ultimate goal of the entire learning process. In the Online education, teachers use modern information-based teaching methods to help students actively explore and complete the construction of meaning, and help students to achieve a deeper understanding of the nature and laws of things reflected in the current learning content as well

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as the internal connections between the things and other things.

a) The definition of online education

Online education is a new type of education method which combines network, multimedia, and multiple interactive methods for systematic teaching and interaction. It consists of computers and basic network facilities, teachers, teaching platforms, teaching content, and learners. It has a wide audience and supports fragmented learning.

According to the American 2000: an Education Strategy published by the United States Department of Education (1991)[4], online education 1, refers to the process of providing education and related services through the Internet. 2, Online education provides learners with a new way to learn, enhances the feasibility of learning anytime and anywhere, thereby providing the possibility of lifelong learning; online education changes the role of the teacher and the relationship between teaching and learning. Therefor the essence of education is also changed; 3, online education can help to achieve certain educational goals, but it cannot completely replace traditional classroom teaching, nor will it replace school education.

Online education is different from the traditional school teaching model. Online education breaks through the limitation of time and space. What's more, it takes the advantages of the Internet flexibility, allowing users to take control of the learning progress autonomously, as well as arranging time to meet the users' personalized needs. Through sharing online teaching videos, online education can meet the growing needs of users for high-quality education and allow users to enjoy better and fairer education [2].

b) The development of online education in China

The online teaching can be traced back to the beginning of this century. One of the Massive Open Online Courses (MOOCs) professors Wang said in an article that the Ministry of Education of China started the construction of quality courses around 2004. Then the Ministry of Education have selected nearly 5,000 national-level courses, and tens of thousands of provincial and school-level excellent courses among those quality courses in 2010.

Li wei jian and other scholars[2] mentioned in their article that, in recent years, with the continuous improving of network technology, China's online education has grown rapidly, and the number of people who take the online education has shown an increasing growing trend. In 2014, the number of online education users in China was only 50 million, and it has reached approximately 140 million by 2018. According to Ai Media Consulting data, the number of online education users in China is expected to reach 296 million in 2020.

In recent years, with the prosperity of online education, the education mode becomes diverse. The forms of Online Education mode applied in China can be classified as the synchronous online teaching mode, asynchronous online teaching mode, collaborative learning mode based on learning community, precision teaching mode based on academic analysis tools, online flipped classroom teaching mode, autonomous learning mode based on subject tools, exercises based on questionnaire survey tools teaching mode, subject-inquiry teaching mode based on learning resource websites, scaffolding teaching mode based on cognitive tools, and interactive teaching mode based on the Internet.

Over the past three years has been marked by significant growth and innovation in the development of online education in China. One major development in the online education landscape in China has been the proliferation of MOOCs. These online courses that are open to anyone, free of charge, and can be accessed by learners from anywhere in the world. MOOCs have been embraced by both learners and educators in China, with top universities and educational institutions offering a wide range of courses and degree programs.

Another important trend in the development of online education in China has been the rise of online learning platforms, such as Tencent Classroom and DingTalk. These platforms provide a comprehensive suite of online learning tools, including virtual classrooms, live streaming lectures, and interactive learning materials, enabling learners to access high-quality education from anywhere with an internet connection.

In addition, online education in China has seen the emergence of new technologies and pedagogical approaches, such as adaptive learning and artificial intelligence. These technologies have the potential to personalize the learning experience for individual learners, providing targeted feedback and support based on their individual learning needs and preferences.

c) Constructivism Learning Theory

Constructivism is a learning theory that emphasizes the active construction of knowledge and understanding by learners. It posits that learners are not passive recipients of knowledge but actively engage in constructing their own understanding of the world around them through a process of meaning-making and sense-making.

Constructivism emphasizes the role of social interaction in learning, arguing that learning is a collaborative process where learners engage in dialogue, negotiation, and cooperation to construct meaning and understanding. In addition, constructivism stresses the importance of the learner's active participation in the learning process, encouraging learners to take ownership of their learning and engage in self-directed learning.

Constructivism has important implications for teaching and learning. It suggests that effective teaching should focus on creating learning environments that support active participation, collaboration, and reflection. Teachers should act as facilitators, guiding learners through the process of constructing meaning and providing opportunities for learners to engage in self-directed learning.

III. The Pros of Online Education: How they Fulfilled Constructivism Learning Theory

As a developing teaching method with great promising, online education attracts numerous educators and learners with its advantages, which can be explicit as follows:

a) Convenience

The internet brings convenience for online education to establish connections between people in anytime and anywhere. Also, it makes the transfer speed of knowledge faster as well. With the continuous improving of online education facilities and the maturity of technology, the speed of online education is gaining rapid growth while also provides easily access to all people. The fragmentation and multi-dimensional features make it possible for online education to achieve a full range of interconnections between learners and knowledge. Online education in China offers learners greater flexibility in terms of time and place, which allows them to take more control of their own learning. This aligns with the Constructivist theory that learners should be active participants in their own learning.

b) Sharing Feature

In traditional education, most educational resources are placed under the school environment which is not accessible to others. However, Peng huan bu and Song wei hu[6] indicated that in online education, most of the high-quality offline education resources can be spread globally through Internet technology, which facilitates access for learners. In traditional education, the teaching content is difficult to complete or update in time, while in online education the internet and learning platform can absorb large amounts of knowledge and information in a short time and achieve global education with its huge storage, which enable the quick update of the online education content and global sharing. The connection of resources can monitor the information in real time and reflect the latest knowledge achievements, and then incorporate these knowledge achievements into the teaching content. Therefore, educational resources are no longer simply used but shared online in real time, which make it easier for students to explore and complete the construction of meaning and achieve knowledge.

The sharing feature of online education is fulfilled the principles of Constructivism learning theory. Constructivism emphasizes the importance of collaboration and social interaction in learning, and the sharing feature of online education provides learners with opportunities to engage in these types of activities.

In online education, learners can share their knowledge, experiences, and perspectives with others through various online platforms. This allows them to learn from one another, and to build a deeper understanding of the subject matter they are studying. This aligns with the Constructivist idea that learners should be active participants in their own learning, and that learning should be contextual and situated in real-world experiences.

The sharing feature of online education also allows learners to engage in collaborative learning, where they work together to solve problems and complete projects. This aligns with the Constructivist idea that learning should be social and collaborative, and that learners should be active participants in the learning process.

Moreover, the sharing feature of online education also enables learners to receive feedback from others, which can help them improve their learning and deepen their understanding of the subject matter. This aligns with the Constructivist idea that learning should be an iterative process, where learners continuously refine and develop their understanding of the world around them.

c) Pluralism

In the traditional one-to-many class teaching system, teachers can only teach for some students' needs, but fail to find a way that cater to each learner. Choosing to study in traditional school education is a very important but difficult decision. Peng huan bu and Song wei hu brought out that because of time and space constraints, learners have neither the right nor the options to choose which lesson to learn or what teacher will teach. However, online education can break this boundary. There are no classroom management problems caused by one-to-many teaching system. Online education can provide learners with personalized learning solutions through system testing, data analysis, and troubleshooting. A learner's status is hardly interfered directly with other learners, as each student learn by himself/herself on the personal learning device. Choosing which lesson to learn and what teacher will teach is no longer a problem for students, so they can attain diversified learning opportunities. This kind of learning mode is the learner-centered learning.

The pluralism feature of online education is fulfilled the principles of constructivism learning theory. Constructivism emphasizes the importance of diverse experiences and perspectives in learning, and the

pluralism feature of online education provides learners with access to a wide range of resources, perspectives, and knowledge.

In online education, learners can access resources from a variety of sources, including different cultures, disciplines, and experts. This allows them to explore diverse perspectives and approaches to learning, and to develop a deeper understanding of the subject matter they are studying. This aligns with the Constructivist idea that learning should be contextual and situated in real-world experiences, and that diverse experiences and perspectives should be incorporated into the learning process.

The pluralism feature of online education also encourages learners to engage in critical thinking and reflection, as they consider different perspectives and evaluate the credibility and reliability of different sources of information. This aligns with the Constructivist idea that learning should be an active process, where learners engage in problem-solving and critical thinking to construct their own understanding of the world around them.

What's more, the pluralism feature of online education also enables learners to develop cultural competence and empathy, as they engage with different cultures, languages, and ways of thinking. This aligns with the Constructivist idea that learning should be holistic and should develop learners' social and emotional skills, as well as their cognitive skills.

d) Efficiency

All the advantages brought by the Internet will eventually integrate into the efficiency advantages of online education. Online education can transform the original "inefficient" learning into online "efficient" learning. Compared with traditional school education, online education is different in content, time and space. In terms of content, the omnipotent characteristic of the Internet has enabled any Internet resources such as text, sound, pictures, and videos to be used in teaching content, which is extremely attractive to learners of all ages. In terms of time, it is entirely based on the learner's convenience, which is more conducive for the learner to arrange their own learning time. In terms of space, learners do not need to go to a special learning place to take the lessons, they can have the class wherever they want without leaving their home, but just through a computer, a mobile phone, or a pad to achieve efficient learning [8].

Constructivism believes that when students want to understand a complex problem, providing many examples or detailed solutions to them is not the best way. Students need some examples that contain a lot of topic-related information, then they have to filter this information until they construct their own knowledge system. The online education resources provided to students are always real, but not outdated textbooks. Through the Internet, students can directly contact experts, databases, and the latest reports. The problem-solving methods proposed by students can be evaluated online. This evaluation method can prompt students to make their own efforts to obtain satisfactory answer, rather than simply completing the task. With all the pros of the online education mentioned above, and in light of Constructivism learning theory, online education can promote the improvement of students' problem-solving ability and thinking level.

IV. The Cons of Online Education: How they Weakened Constructivism Learning Theory

a) Network, software and hardware restrict the implementation of online education

During the COVID-19 pandemic, a rapidly growing market demand has driven the online education to the "fast lane." The data shows that since the Ministry of Education proposed "online education", the Central Video Joint Learning and Ersi Online School has launched free live courses, with an average of more than 2 million real-time class attendees per class. More than 20 provinces, autonomous regions, and municipalities in China have joined the Ding Talk "Class at Home" plan, which covers more than 20,000 primary and secondary schools. It demonstrates that about 12 million students will be taught by webcast on Ding Talk. More than 80 online education companies have "donated lessons" to provide free courses for elementary and middle school students across the country[9].

However, in actual operation, these "online educations" have also exposed some problems, which leads to heated public discussion.

First of all, the online teaching mode is obviously not as effective for many teachers and students as the offline mode. Unlike offline classes, teachers can only teach on the screen, and they cannot take effective interaction with students[10]. The students' actions can hardly be reported to the teachers in time, and that's why it is difficult for the teacher to grasp the progress of the teaching. This problem weaks teachers' ability to help students to construct knowledge[11].

Secondly, network environment is the foundation for the online education, especially for live teaching, which bears with higher requirement on the environment. It can be said that the quality of the network directly determines the basis of online education. However, due to the different levels of economic development around China, the basic conditions of the network are far from equal with each other. It is difficult to apply online education to underdeveloped regions. Hu pan (2020) reported that in the first few days of the large-scale opening of online education, due to the surge in the number of online users, many regions have encountered "stuck" and

"freezes" during class, and some platform servers were also "failed". Especially for online live broadcast platforms, the occurrence of "stuck" remains frequent in the current network environment. The "stuck" is prone to cause discontinuities of teachers' teaching, which will affect the continuity of the entire classroom. On stable platforms, the occurrence of 'stuck' will not affect teaching process, while on unstable platforms, it often causes interruption of teaching, as well as weakens students' learning willingness. Constructivism learning theory emphasizes the interaction between people, while the "stuckness" of the internet cause trouble for students and teachers to interact.

The Global Times reported that "Some live steaming platforms were unable to handle large numbers of users at the same time and crashed. Guangdong-based platform Seewo apologized for its temporary crash on its Weibo on Monday as many live steam platforms including Seewo failed to offer stable services after 200 million users logged on, and the platform has never had such a large number of visitors."[11]

b) Online education is a challenge for the teachers

According to Constructivism learning theory, teachers should guide students to construct knowledge, however teachers' abilities to teach online are various, and the lack of capacity to handle the information technology restricts teachers' opportunity to guide students. The online education requires teachers to use the software on mobile phone or on computer to record videos or webcast and interact with students properly, which brings a great challenge and burden for many teachers. The new way to teach pops up too sudden for teachers to learn how to use the software and get accustomed to it. Teachers need additional expertise to conduct online education in the communication between teachers and students, as the use of teaching tools, and the evaluation of student learning effects in online teaching are different from traditional classrooms. Teachers need to be trained to grasp the online pedagogy, curriculum design, and how to evaluate students' learning conditions (Online teaching emergency manual). Teachers who are just about to design an online course generally based on the rough production outlines or fuzzy fragmented scripts. Although this is not a zero-based "improvisation", they are not fully prepared. Teachers with poor expression skills are prone to encounter varying degrees of pauses during recording.

Another challenge for teachers is that they cannot observe the students, so they fail to get the immediate response from the students. This fails to allow teachers to identify whether the students grasp and understand the knowledge in the learning process.

What's more, for some subjects, especially in medical, biological and physiological subjects, there are many sensitive words which are restricted to be shown online. It is inevitable to talk about some words about organs or others in those classes; however, some courseware was blocked and even some teachers are restricted to log in.

c) Online education is a burden for students and parents

Constructivists believe that the key to success is the cooperation between all those who effectively participate in the educational environment. Unfortunately, the chances are less than 50% for students to meet a suitable teacher on an unfamiliar education platform. Many live broadcast platforms do not have a corresponding teacher management committee to monitor teachers' teaching quality, which is the main reason for the unsatisfaction on the teaching quality. And in some webcast classes, too frequent close-up switching of picture has also caused many problems such as too large teaching pictures with reduced clarity, or students may not understand the relationship between the displayed content and the rest of the screen. "A poll on Weibo on whether students would like to have the online courses showed about 386,000 respondents said "no", with only 99,000 respondents saying "yes". Those who said "no" said they had to do more homework than traditional schooling and were easily distracted by noise. Besides, online courses are bad for their eyesight and not fair for students in villages who have limited access to the internet", reported by the Global Times[10].

In online education, some parents are the participate sometimes, especially for those lower grade students' parents. Online courses also bring a huge burden to the parents. For most of the primary school students' parents, they have to join various chat groups of different subjects, as the teachers assign homework in the parents' chatting group. In case of the students playing games or surfing on the internet instead of listening to the class, these parents have to accompany their children to take the online courses. What's more, the parents have to be tutors with the students' homework, mark the assignments and send them back to teachers. All of those have exhausted the parents, and also affected their participation to help their children to grasp knowledge.

V. The Development of Online Education in the Future: How it Can Develop the Potential of Constructivism Learning Theory

During the pandemic, the advantages and disadvantages of online education triggered public discussion and thinking about the future development of this industry.

a) Online education will be accepted by more people

According to Peng Huan bu and Song Wei hu[7], with the development of the STEAM education concept and a learning society, the emergence of mobile learning and the idea of learning is ubiquitous and has promoted the development of lifelong learning and the construction of a learning society. It has brought a whole new form of education that everyone can learn at anywhere and anytime. Online education provides technical support for lifelong learning, and the concept of lifelong learning continues to drive the online education forward and vice versa.

The purpose of education has shifted from focusing on the knowledge itself to the knowledge structure to satisfy the diverse needs and services of the learners. It is imperative that the focus of online education be developed. In the K12 education stage, due to the learners' irreversible growth, online education will attain huge popularity among the young people. Online education is undoubtedly the best choice for migrant workers who are lack of education and want to change their lives through education. General wage earners are more willing to choose online learning methods which fit their uncertain time, space and individual needs. Online education should also include home education, such as education for the elderly and infants. Driven by Internet technology, actions such as deep vertical development and the creation of sophisticated mature products have shown that the future of online education should continue to develop vertically[6]. Vertical development mainly refers to the deepening of educational content, that is, the diversified content cultivation according to different user requirements in a certain field or scenario. The vertical service model is aimed at learners at different levels and prepares the most suitable content and services for them in accordance with their various foundations and needs, thereby cultivating their user habits.

b) Convergence and collaborative development of online education

Online education is not the simple supplement to traditional education and Internet technology. It is the updating and deepening of traditional education methods through Internet technology, so that these two methods can develop in synergy. Peng Huan bu and Song Wei hu[7] talked that affected by the "synergy" 1+1> 2, online education should also be deeply integrated with other industries and developed in synergy. Online education should speed up the integration with the media so that it can provide personalized recommendations just like media headlines. Online education should also seek cooperation with enterprises to demonstrate their unique advantages. These two methods will cooperate with each other to achieve common development and resources sharing. Online education also needs to be combined with traditional education. The advantage of traditional education is that teachers and students can interact at any time, while the pros of online education are the big data, personalized learning resource, and fragmentation. Online education and traditional education can achieve complementary advantages and coordinated development and then deriving a composite field industry. In recent years, cross-border integration has achieved all-round development. The cross-border development, cross-cultural integration, and cross-disciplinary integration of online education companies have promoted social synergy in the education industry. In the future, online education will have a new social scene, cross-border cooperation with multiple fields and perspectives, and establish a sound cooperative relationship of profound integration and coordinated development[7].

c) Interactive and intelligent development trends of online education

Constructivism believes that teaching is not the transfer of knowledge, but the processing and transformation of knowledge. Teachers are not the presenters of knowledge, they should attach importance to students' own understanding of various phenomena, and guide students to enrich or adjust their own understanding. This requires exploring certain issues together with students, and communicating with each other in the process to understand each other's ideas. Individualization in online education can never be achieved in isolation. Education requires talents with teamwork and creativity. Individual learners, distributed in different time and space, bear with same learning needs can always form a common learning field through interaction, and eventually a learning community. This is a virtual learning team[7]. The interactivity of online education is essential for individuals. In addition, technologies such as chatbots have shown that potential "human" interactions in online education is beneficial for learning enhancement. At present, the immersive learning model attracts the public with its strong interactivity and interest learning methods. It can allow learners to learn directly or through a game, and let learners interact as much as possible, thereby improving learning efficiency. Artificial intelligence, such as voice interaction technology, enables people to communicate directly to software. It has transformed original machine learning to today's deep learning, which can simulate large-scale neural networks. In addition, the combination of virtual reality, augmented reality and real environment is continuously empowering online education[7] . What online education will achieve in the future is interactivity and intelligence. When sufficient data is available, intelligent recommendation, intelligent guidance, and intelligent assistance will come by naturally.

VI. Conclusion

Online education is a new and independent industry generated under the rapid development of the Internet. In the future, online education under Internet thinking will inevitably be turned into a popular learning model around the world. At present, online education is still at the stage of continuous development, as the personalized network models have not been established, the artificial intelligence technology has not yet been perfected, the education system has not yet fully matured, and education resources are still uneven. But in the future, the changes and innovations brought by online education will continue to alter the meaning of education.

Online education provides a powerful fulcrum for the constructivist learning concept. Its interactivity, autonomy, and the characteristics of spanning time and space create conditions for students' subjective development. However online education is not a panacea, its vitality lies in the need for teachers and students to closely unite the virtual world with the real world, and the integration of independent spirit and cooperative spirit.

Although online education during the pandemic exposed some problems, it should be noted that online education is not a short-term emergency plan, and the development of online education will not stagnate due to these problems. In fact, before the outbreak, the market potential of online education has already been widely witnessed. According to CNNIC data, in 2020, the scale of online education users in China reached 342 million, a decrease of 81.25 million from March 2020, accounting for 34.6% of the overall internet population. The scale of mobile online education users was 341 million, a decrease of 79.5 million from March 2020, accounting for 34.6% of the mobile internet population. In the second half of the year, with the positive progress in epidemic prevention and control, primary, secondary, and high schools have resumed normal teaching order, and the scale of online education users has further declined. However, compared with before the epidemic (June 2019), it still increased by 109 million, and the industry development trend is good[12].

In the first half of 2021, due to the stricter policies in the K12 market and the impact of the epidemic on the higher education market, such as study abroad programs, the overall market has cooled slightly, and the scale of online education users was 325 million, a year-on-year decrease of 55.67 million. However, overall, with the update of related technologies such as VR, AI, 5G, and the Internet of Things, and the gradual fragmentation of online education users' time, China's online penetration rate will gradually increase[12].

Ai Media Consulting analysts believe that with the upgrading of consumption, the launch of the two-child policy, and the increasing awareness of parental education in the post-80s generation, the demand for high-quality education has become more urgent. On the other hand, in recent years, with the increasing investment on Internet infrastructure in China, the capacity of broadband networks has been cultivated significantly. The advent of the 5G era has provided a solid foundation for various online services. It can be said that in the context of the Internet era, online education is destined to become an important trend in the future development of the education industry. It is worth noting that after the pandemic, the network foundation and hardware facilities will be improved, and online education is bound to experience homogeneous competition. Therefore, the quality of teaching will be the key to determine the competitiveness of online education companies.

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Modeling in Early Childhood Education: A Contribution to the Integral Development of the Child

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Abstract- This writing deals with Modeling in the conception of Mathematics Education and has as its guiding question: What elements of the Modeling tasks make it possible to contribute to the development of children in Early Childhood Education? The objective is to explain the principles and constituent stages of the Modeling tasks that contribute to the child's development, based on the analysis of 3 (three) dissertations supervised by Burak, or authors who follow his assumptions. Initially, Higginson's conception and Mathematics Education (1980) and the conception of Modeling in Mathematics Education proposed by Burak (1992) are clarified. This is qualitative bibliographic research. As a result of the analyzes and descriptions of the dissertations, it can be pointed out that: the fact of making children the protagonist of their learning is a differential; allows the child to act in an active, complex way, analyzing, synthesizing information, formulating hypotheses to explain the problem raised, in addition to significantly favoring the development of fine and gross or broad motor coordination, in expanding vocabulary, in oral language, in the form of expression of children and notably in self-confidence.

Keywords: *pedagogical practice; children, development, autonomy.*

GJHSS-G Classification: *DDC: 372.21*

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Modeling in Early Childhood Education: A Contribution to the Integral Development of the Child

Modelagem na Educação Infantil: Uma Contrubuição Para o Desenvolvimento Integral da Criança

Dionísio Burak

Resumo- Este escrito trata da Modelagem na concepção da Educação Matemática e tem como questão norteadora: Que elementos dos quefazeres da Modelagem possibilitam contribuição para o desenvolvimento da criança na educação Infantil.? O objetivo é explicitar os princípios e as etapas constituintes dos quefazeres da Modelagem, que contribuem para o desenvolvimento da criança, a partir da análise de 3(três) trabalhos de dissertação orientados por Burak, ou autores que seguem seus pressupostos. Inicialmente são esclarecidas a concepção e Educação Matemática de Higginson (1980) e a concepção de Modelagem na Educação Matemática proposta por Burak (1992). Trata-se de uma pesquisa bibliográfica de natureza qualitativa. Como resultado das análises e descrições das dissertações pode-se pontuar que: o fato de tonar a crianças protagonista de sua aprendizagem é um diferencial; permite à criança atuar de forma ativa, complexa, analisando, sintetizando informações, formulando hipóteses de explicação para o problema levantado, além de favorecer de modo significativo o desenvolvimento de coordenação motora fina e grossa ou ampla, na ampliação do vocabulário, na linguagem oral, na forma de expressão das crianças e notadamente na autoconfiança. A Modelagem na concepção a Educação Matemática apresenta um forte potencial para se constituir em nova racionalidade no processo de ensino no âmbito da Educação Infantil.

Palavras-chave: prática pedagógica; crianças, desenvolvimento, autonomia.

Abstract- This writing deals with Modeling in the conception of Mathematics Education and has as its guiding question: What elements of the Modeling tasks make it possible to contribute to the development of children in Early Childhood Education? The objective is to explain the principles and constituent stages of the Modeling tasks that contribute to the child's development, based on the analysis of 3 (three) dissertations supervised by Burak, or authors who follow his assumptions. Initially, Higginson's conception and Mathematics Education (1980) and the conception of Modeling in Mathematics Education proposed by Burak (1992) are clarified. This is qualitative bibliographic research. As a result of the analyzes and descriptions of the dissertations, it can be pointed out that: the fact of making children the protagonist of their learning is a differential; allows the child to act in an active, complex way, analyzing, synthesizing information, formulating hypotheses to explain the problem raised, in addition to significantly favoring the development of fine and gross or broad motor coordination, in expanding vocabulary, in oral language, in the form of expression of children and notably in self-confidence. Modeling in the conception of Mathematics Education has a strong potential to constitute a new rationality in the teaching process in the scope of Early Childhood Education.

Keywords: pedagogical practice; children, development, autonomy.

I. Introdução

As últimas quatro décadas têm mostrado muitos avanços no âmbito da Educação de modo geral, seja no desenvolvimento de novas teorias principalmente da área da Psicologia, seja no âmbito de inserção do estudante na escola, a partir de Leis de Diretrizes e Bases da Educação 9394/96, ou no âmbito da inserção da tecnologia da informação e da comunicação. No entanto, apesar de muitos esforços os resultados em relação a algumas áreas, em específico do ensino da Matemática mostram avanços pouco significativos em relação ao aprendizado da Matemática.

Os resultados pouco significativos têm trazido maior atenção para as questões relacionadas aos processos de ensino e aprendizagem. Esta preocupação levou muitos pesquisadores a buscarem metodologias mais adequadas e que ponderassem uma maior consideração sobre o ser do estudante.

Essa busca teve início na década de 1984 quando procurava algo novo, diferente para o ensino, hoje denominado Educação Básica[1]. O mestrado em Ensino da Matemática realizado na Universidade Estadual Paulista - UNESP – Campus de Rio Claro, SP., e o Doutorado na área da Educação realizados na Universidade Estadual de Campinas – Campinas SP, e as vivências posteriores trouxeram uma nova possibilidade para o ensino e a aprendizagem no

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[1] A Educação Básica a parti da LDB 9394/96 de 1996 envolve a Educação Infantil, O ensino Fundamental I, Ensino Fundamental II e Ensino Médio.

âmbito desse nível da escolaridade. A Educação Básica se constituiu no foco permanente do meu trabalho.

Inicialmente no mestrado a preocupação foi com um problema sério a época, um grande número de reprovações na passagem da antiga 5ª série para a 6ª série o que apresentava um quadro de congestionamento. Uma pergunta se fez presente: Por que as crianças têm tanta dificuldade em compreender a Matemática, ou as ideias iniciais e não conseguem formas seus conceitos? A partir da questão exposta, iniciei a buscar metodologias que pudessem tornar os estudantes mais receptivos para a Matemática e outras áreas seja ela como uma metodologia de ensino, seja ela como uma prática pedagógica na Educação Infantil.

A partir dos anos 1990[2] iniciei os trabalhos com a modelagem em cursos de especialização de professores de 1ª a 4ª Séries, denominado Anos iniciais para crianças a partir de sete anos, como forma de superar as preocupações com o ensino e a aprendizagem nessa etapa da escolarização. Tal envolvimento tinha como propósito trazer alternativa para o ensino das ideias iniciais e construção do conhecimento matemático de forma distinta da usual empregada quando o professor expõe o conteúdo, realiza alguns exercícios e propõe uma série de exercícios com o propósito de que o estudante apreenda o conteúdo.

Assim feita essa contextualização passamos a tratar sobre a Educação Matemática na concepção de Higginson (1980) e a Modelagem na concepção a Educação Matemática de Burak (1992, 2004, 2010, 2020).

II. Concepção de Educação Matemática de Higginson

Disposto a investir na Modelagem, mas em uma concepção distinta daquela concepção da Matemática Aplicada pois, vislumbrava sua utilização no âmbito da Educação Básica, prioritariamente na Educação Infantil e Fundamental I e Fundamental II e a concepção de Higginson(1980) chamou minha atenção.

Em seus estudos durante sua licença sabática na Universidade de Cambridge, Higginson (1980) partiu de três pressupostos sobe a natureza e a eficácia da educação matemática:

> O primeiro chama a atenção para a significativa parte da responsabilidade profissional: professores, pesquisadores, escritores de currículo, à consideração e ações sobre as questões relacionada com aquisição do conhecimento matemático ; O segundo pressuposto que o objetivo de um educador matemático é otimizar, do ponto de vista intelectual e emocional, a experiência de aprendizagem matemática dos seus estudantes; e o terceiro é que as experiências de aprendizagem de matemática para a maioria dos estuantes, não foi nem intelectualmente, nem emocionalmente satisfatória para a maioria dos estudantes, a exposição à Matemática não foi prazeroso e nem os tornou mais competentes (HIGGINSON , 1980, p.3).

Para o autor se esses pressupostos são válidos, então os educadores de matemática têm como obrigação explicar o motivo de tantas crianças terem dificuldades em aprender matemática. Para Higginson a questão não é trivial e nem fácil de responder, poderia haver muits respostas, no entanto fundamental para o que se segue é a convicção de que temos uma visão excessivamente estreita dos fatores que influenciam nossa disciplina, a matemática. Até hoje, referindo -se ao tempo em que realizava seus estudos, afirma que: "não conseguimos criar nenhuma metodologia ou metodologia maior e coerente na educação matemática, em grande parte porque ignoramos alguns aspectos essenciais de seus fundamentos". Ibidem).).

Dessa forma, propõe o esboço de uma estrutura de educação matemática para a aprendizagem da matemática:

> Uma demarcação de território, um esboço do uma tentativa de modelo, Afirma que: existe quatro dimensões para a educação matemática e que, ao ver as relações estruturais entre essas dimensões na forma de um modelo tetraédrico, estaremos em uma posição melhor para entender o que aconteceu e o que pode acontecer no futuro quando os alunos encontram a matemática (HIGGINSON, 1980, p.4).

Para Higginson (1980) qualquer concepção de educação matemática deve ter sua base na disciplina de Matemática. A questão imediatamente é saber se há algo além de matemática significativamente envolvida na educação matemática? Para o autor essa questão está na raiz de um dos mais graves problemas, a lacuna de incompreensão entre matemáticos e educadores matemáticos. Parece ser o sentimento de alguns pesquisadores matemáticos que nada mais do que a matemática realmente conta na educação matemática.

A afirmação clássica dessa visão foi feita por G.H. Hardy[3] no contexto de seu discurso presidencial à

[2] A de Diretrizes e Bases da Educação que vigorava à época era a Lei 5692/71 de agosto de 1971, conforme § 1º Para efeito do que dispõe os artigos 176 e 178 da Constituição, entende-se por ensino primário a educação correspondente ao ensino de primeiro grau e por ensino médio, o de segundo grau, Art. 18. O ensino de 1º grau terá a duração de oito anos letivos e compreenderá, anualmente, pelo menos 720 horas de atividades. Art. 19. Para o ingresso no ensino de 1º grau, deverá o aluno ter a idade mínima de sete anos.

[3] Godfrey Harold Hardy nasceu em Surrey, em Inglaterra, a 7 de fevereiro de 1877 O seu interesse pela Matemática foi desencadeado por A. E. H. Love. Em 1900, Hardy foi eleito Fellow de Trinity e, no ano seguinte, foi distinguido com o prémio Smith. Foi Presidente da Sociedade Londrina de Matemática de 1926 a 1928 e, novamente, de 1939 a 1941.

Associação Matemática em 1925. Para qualquer pessoa que não alguns matemáticos de clausura, parece óbvio que há uma segunda dimensão fundamental para a educação matemática, a psicologia.

Mesmo do ponto de vista conservador de Hardy, a importância das habilidades e interesses mentais dos indivíduos é indiretamente reconhecida. No ensino de matemática, Hardy afirmava: "há apenas uma coisa da importância primária, que o professor deve fazer uma tentativa honesta de entender o assunto que ele ensina e também pode, e deve expor a verdade a seus alunos até os limites de sua paciência e capacidade ". (p. 309). Envolvido como esteve há tantos anos no sistema de exame competitivo dos tripos de Cambridge, Hardy não teria defendido a homogeneidade da capacidade do estudante. Os educadores matemáticos têm procurado aprender com os psicólogos, por meio da literatura e pela constatação das diferenças individuais, motivação e de suas intuições.

Para Higginson (1980, p.4), "a consciência das muitas características matemáticas dos processos gerais de pensamento significou que a subclasse de desenvolvimento cognitivo se tornou a parte da psicologia mais interessada para os educadores de matemática". A atuação pelo reconhecimento da dimensão psicológica na educação matemática tem sido empregada, para quase todos os aspectos, há algum tempo.

Outra dimensão está no reconhecimento do papel dos bens sociais e culturais é, no entanto, um processo que ainda está em curso, e deve-se ao aumento da sensibilidade à dinâmica interpessoal das salas de aula e ao papel social desempenhado pelas escolas. Segundo Higginson, esse reconhecimento se justifica a partir de que a maior parte do ensino e aprendizagem de matemática ocorre dentro das escolas, que são instituições complexas. Além disso, os valores culturais predominantes, econômicos a estrutura social e alcance da tecnologia disponível exercem uma influência considerável.

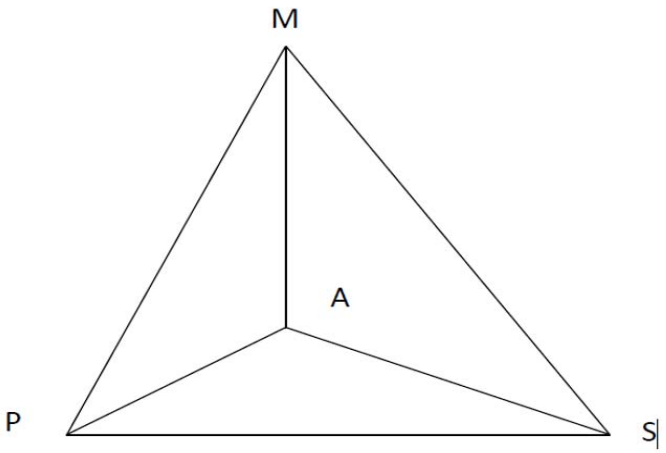
A dimensão sociocultural que lida com a influência de grupos de indivíduos e suas criações. É aqui, por exemplo, que o papel da linguagem passa a ser visto como sendo muito importante nesta experiência. Para Higginson, o argumento até este ponto tem sido que a "educação matemática tem suas raízes em três áreas relativamente distintas: da matemática, psicologia e da sociologia (com o último termo sendo usado em um sentido pouco ortodoxo para representar um número de 'ciências sociais'."(ibidem).

Para Higginson (1980, p. 4), toda atividade intelectual é baseada em algum conjunto de pressupostos de tipo filosófico,

> Os pressupostos particulares variam de disciplina para disciplina e entre indivíduos e grupos dentro de uma disciplina Eles podem ser explicitamente reconhecidos ou apenas tacitamente, mas eles irão sempre existir reduzidos à sua essência, essas suposições lidam com preocupações como a natureza do "conhecimento", "ser", "bom", "beleza", "propósito" e "valor". Mais formalmente temos, respectivamente, os campos de epistemologia, ontologia, ética, estética, teleologia e axiologia mais geralmente, temos as questões de verdade, certeza e consistência lógica.

Apresentados esses elementos vamos ao denominado Modelo de Tetraedro de Higginson.

O modelo do tetraedro de Higginson, para a Educação Matemática denominado MAPS, em M = Matemática, A = Filosofia, P = Psicologia e S= Sociologia.



Fonte: Burak e Klüber (2008), p.98

Figura 1: Modelo do Tetraedro de Higginson

O fato de o tetraedro ser fechado pode ser uma maneira de perceber rapidamente a alegação de que as quatro áreas fundamentais não são apenas necessárias, mas também suficiente, para determinar a natureza da educação matemática. Usando o modelo MAPS, Higginson (1980, p. 5)[4] assevera que a questão do "O que" diz respeito à dimensão matemática, "Por que" à filosófica, "Quem" e "Onde" diz respeito à dimensão social e "Quando" e "Como" à dimensão psicológica.

Considerando o tetraedro podemos observar o contínuo e o discreto as faces, as arestas e os vértices. Sob o ponto de vista contínuo pode-se postular a existência de um ponto de otimização que varia com o tempo. Para Higginson (1980) ideia aí contida é que ao longo do tempo haja mudanças significativas, mudanças em todas as formas das dimensões constituintes, quando um novo aparato é inventado, mais matemática pode ser criada e melhor compreensão da psicologia humana é alcançada essa otimização também pode variar.

Essa forma de conceber o Modelo do Tetraedro traz possibilidades de envolver estudos que possam contribuir com melhorias do processo de ensino e aprendizagem da Matemática em nossas escolas e atender as diretrizes estabelecidas para a Educação. Na figura 1 os encontros a aresta MP, confluem os interesses da Matemática e da Psicologia, e pode ensejar estudos sobre a aprendizagem das ideias matemáticas na Educação Infantil, Anos Iniciais, e para estudantes com necessidades especiais. É evidente que aí de forma implícita estão envolvidas outras dimensões: sociocultural, bem como, a dimensão filosófica. Outros estudos decorrentes dessas ideias podem envolver, educação de Jovens e Adultos, a Educação do Campo entre outras. É um vasto e rico campo para pesquisa. A aresta MS, por exemplo, conflui os interesses da Matemática e Sociologia, então abrigam temas como Matemática para Todos, Educação Indígena, Educação de Jovens e Adultos estão contemplados. Ainda que façamos referências a sociologia evidentemente a Psicologia e a Filosofia estão presentes.

III. A Modelagem na Concepção da Educação Matemática

A forma de ver Modelagem Matemática[5] de Burak (1987,1992), após os momentos da dissertação e da tese, passou por vários ajustes, seja ponto de vista do conhecimento matemático seja do ponto de vista dos referenciais teóricos que se foram constituindo ao longo de quase quatro décadas, no que denomino hoje de Modelagem na concepção da Educação Matemática, simplesmente Modelagem na Educação Matemática, ou Modelagem.

Ao introduzir os pressupostos da Educação Matemática de Higginson e por já acolher pontos de vista distintos do que chamamos Modelagem Matemática, originária da Matemática Aplicada, e pertencente a conceção das Ciências Naturais, conforme Rius (1989 a) procuramos uma trajetória de buscas de material de literatura que pudesse contemplar a nossa expectativa para um ensino de Matemática desde os primeiros anos da escolaridade a até os cursos de licenciatura que formam professores para atuarem na Educação Básica[6].

As concepções da Educação Matemática e da Matemática diferem: pela natureza, pois a Educação Matemática além da Matemática, envolve as áreas da Educação Psicologia e Sociologia e a Filosofia. Pode-se dizer que a Educação Matemática tem afinidade com os paradigmas das Ciências Sociais e Humanas, além da Matemática

Consideramos que o Objeto da Matemática é a construção da Matemática, teorias, enquanto que a Educação Matemática, surgida pelas próprias deficiências de comunicação da Matemática, tem como objeto, os processos de ensino e aprendizagem. Também diferem pela metodologia, enquanto a Matemática se vale de uma metodologia de natureza quantitativa, a Educação Matemática se vale da metodologia de natureza qualitativa. Na Matemática prevalece o método científico própria das ciências naturais e na Educação Matemática a visão antropológica. Na visão das Ciências Naturais independe do objeto se humano ou natural, o método é o mesmo, o denominado método científico. Nas Ciências Humanas e Sociais o método a ser empregado depende do objeto a ser estudado, pois se considera que cada objeto requer um método específico para melhor estudá-lo. (Rius,1989 b) É o

[4] De acordo com a tradição jornalística, estes são as cinco perguntas que um editor espera de um texto bem escrito notícia para responder as questões. Um teste pode ser chamado de critério jornalístico ou cinco "W's": " What"; O que? "Why" por que? "Who" and "Were" quem e onde? "When" and "How" quando e como? A expressão How foi acrescentada para os propósitos da estrutura da Educação Matemática.

[5] Para diferenciar a Modelagem na concepção da Educação Matemática, da Modelagem Matemática própria das Ciências Naturais, conforme Hierarquização a das Ciência por A. Conte (1844) como em Rius(1989a) utilizaremos as expressões: Modelagem na Educação Matemática ou simplesmente Modelagem

[6] A Educação Básica de acordo com a Lei de Diretrizes e Bases da Educação -LDB 59394/96, vigente, em seu 21. A educação escolar compõe-se de: I - educação básica, formada pela educação infantil, ensino fundamental e ensino médio.

caso quando se trata, por exemplo, do processo de ensino e aprendizagem

A Modelagem na Educação Matemática de Burak segue os pressupostos de Higginson e além do referencial teórico da Psicologia da Cognição, incorpora elementos da Aprendizagem Significativa (Ausubel,1968), e da teoria da aprendizagem de Vygotsky (1987). Em relação aos paradigmas incorpora o Paradigma Emergente de Boaventura de Sousa Santos (2006) e a epistemologia da Complexidade de Edgard Morin (2006, 2014).

Para Burak (1992, p.62) a modelagem Matemática constitui-se em um conjunto de procedimentos cujo objetivo é tentar explicar matematicamente os fenômenos do cotidiano do ser humano ajudando-o a fazer predições e tomar decisões. Também são considerados dois princípios para o desenvolvimento das práticas com Modelagem na Educação Matemática: 1. Partir sempre do interesse do(s) grupo(s) envolvido(s) 2. Os dados, sempre que possível, devem ser coletados no ambiente onde se dá o interesse do(s) grupo(s). Além desses princípios são sugeridas 5(cinco) etapas, não rígidas, mas importantes para os encaminhamentos das práticas: 1. Escolha do tema;2. Pesquisa exploratória; 3. Levantamento do(s) problema(s); 4. Resolução do(s) problema(s) e 5. Análise crítica da(s) resolução(ões).

1. Escolha do tema.

Esta primeira etapa da Modelagem consiste em que , após a formação de pequenos grupos de 3 a 4 participantes, os grupos decidam o tema de interesse. A função do professor é a de mediador, incentivando, procurando esclarecer alguns pontos e esclarecendo dúvidas dos grupos quanto aos temas.

Os temas podem envolver, brincadeiras, música, temas relacionados a comércio, agricultura, esportes saúde, temas atuais entre outros. Para níveis mais avançados da Educação, que envolvem estudantes que já dominam a escrita podem se valer da tecnologia para buscar esses temas, muitas vezes também os temas têm relação com o cotidiano dos estudantes.

Para as crianças da Educação Infantil idade entre 4 (quatro e 5 (anos) que não dominam a escrita a escolha do tema deve contar com a participação dos seus pares, pais, tio, primos, irmãos, além da professora.

Para saber dos interesses são importantes as rodas de conversas com as crianças, para conhecer seus interesses, seus gostos, suas expectativas. Normalmente nessa fase da escolarização, brincadeiras antigas, músicas, contação de história, vida dos grandes animais são os temas preferidos.[7]

2. Pesquisa exploratória.

A pesquisa exploratória constitui a etapa que se segue, após a escolha do tema, os grupos vão buscar conhecer e aprofundar seus conhecimentos sobre o tema de interesse. Nos níveis mais avançados, no qual os estudantes já dominam a leitura e a escrita as buscas se dão em sites, por meio da literatura, entrevistas *in loco,* visitas a instituições de interesse tais como estação de tratamento de água e esgoto, visita a locais onde se dá o interesse dos grupo ou dos grupos, por exemplo, em uma fazenda onde se planta milho, feijão soja ou locais onde se realizam pescarias nos chamados " Pesque Pague".

Nesta etapa é importante a mediação do professor para as trocas de ideias, as orientações sobre os temas, desenvolver o senso crítico dos estudantes em relação aos assuntos de interesse.

Na educação infantil, enquanto as crianças não dominam a leitura e a escrita é necessária a mediação docente, na comunicação com a família, pois a forma de obter os dados deve envolver a família, a leitura do docente sobre o(s) assunto(s) de interesse das crianças, as trocas de ideias entre os grupos de modo que, a criança tenha entendimento e compreensão sobre o assunto.

Não raras vezes, pode acontecer de as crianças perderem o foco ou mostrarem desinteresse. É necessária a atenção do docente para a mediação.

3. Levantamento do(s) problema(s).

Nesta etapa da Modelagem, ocorre o levantamento das questões e situações -problemas, sobre os dados coletados. É um momento especialmente rico pedagogicamente para os estudantes elaborarem a construção de problemas ou descreverem situações-problemas, a partir dos dados coletados ou informações sobre o tema.

Nos anos mais avançados é importante que os próprios grupos elaborem seus problemas sempre sob a mediação do professor, por exemplo, qual o consumo e papel na escola durante um semestre? Como economizar água? Quanto custa a construção de uma casa com 80m^2 de área?

Essa etapa da Modelagem na Educação Infantil deve ser encarada com muita atenção em relação ao que se entende por problema. Para uma criança que pergunta: o que come o leão? Ou do que se alimenta uma girafa? Como construir uma pipa? Estes

[7] 1. A construção de barcos, papagaio (pipa), avião, contação de história, músicas foram alguns dos temas escolhidos pelas crianças e trabalhados pela pesquisadora Belo (2016). Participaram 10 crianças entre 4 e 5 anos

2. Pintura, dinossauro, futebol, trens, balé, unicórnio e piano foram os temas de interesse das crianças e trabalhadas pela pesquisadora Abbeg (2019). Os participantes da pesquisa foram 22 crianças de 5 a 6 anos.

3. Animais; alimentação dos animais, coelho, cachorro, gato, girafa, dinossauros e leões, foram os temas de interesse das crianças e desenvolvidas pela pesquisadora Santos (2021). Participaram 17 crianças entre 4 e 5 anos.

questionamentos constituem problemas. Pode não ser para os estudantes dos anos mais avançados, ou mesmo para o professor, entretanto na concepção da Modelagem na Educação Matemática, na Educação Infantil pode ser considerado problema qualquer situação em que de início a criança não tenha uma resposta imediata e precise buscar, por algum meio, elementos para descobrir a resposta.

4. Resolução do(s) ou do(s) problemas.

Nesta etapa da Modelagem É quando se faz uso do instrumental matemático já construído ou a ser construído com os estudantes para resolver os problemas levantados. Esta etapa é muito enriquecedora, pois é quando o estudante mobiliza seus conhecimentos na busca de encontrar resolver o problema.

Para os estudantes dos anos finais da educação básica é o trabalho com os conteúdos matemáticos assimilados ou a serem construídos é nesse momento que se dá sentido aos conteúdos matemáticos, e desse modo as operações, equações, funções, gráficos, os elementos geométricos são importantes e significativos para os estudantes.

Na Educação Infantil essa etapa é quando se desenvolvem as ideias matemáticas nas ações e interações do docente com as crianças e das crianças com outras crianças e também se constroem outras aprendizagens sejam conceituais, procedimentais ou atitudinais.

Por exemplo, no trabalho com os animais as ideias de classificação, a ideia de seriação, ideia de posição, as ideias de classe inclusão, ideia de ordem, as ideias de conservação, podem ser trabalhadas. No âmbito da Educação Infantil, essas duas etapas levantamento dos problemas e resolução dos problemas acontecem quase que de forma simultânea.

5. Análise crítica da(s) resolução(ões).

A análise crítica das resoluções é um momento em que se analisa as respostas, os métodos empregados, as estratégias utilizadas. É quando se avalia a qualidade das respostas, se fazem as reflexões sobre a natureza das grandezas utilizadas e as coerências das respostas em relação aos conjuntos numéricos utilizados pois, muitas vezes, um problema pode ser resolvido matematicamente, no entanto a resposta mostra-se incompatível com a situação em estudol. É o caso quando se trabalha com grandezas contínuas e discretas. É um momento de reflexão importante na formação de um estudante mais crítico.

Na Educação Infantil essa etapa favorece também discussões importantes com as crianças. Na maioria das vezes as práticas são filmadas, as conversas nos grupos são gravadas para trazerem subsídios ao professor.

Dessa forma, a Modelagem Matemática na concepção da Educação Matemática em suas etapas reflete as dimensões envolvidas na Educação Matemática e no paradigma da complexidade de Morin (2014) e no paradigma emergente de Santos (2006).

IV. Reflexões Sobre as Práticas Realizadas

Nesta seção vamos apresentar algumas reflexões em relação às práticas desenvolvidas em trabalhos de dissertação que seguem a pressupostos de Burak (1992)

Quadro1: Autoras de dissertações envolvendo Modelagem na Educação Matemática

Autoria	Titulo	Ano	Orientador(a)
Cibelli Batista Belo	Modelagem Matemática Na Educaçãoinfantil: Contribuições Para A Formação Da Criança.	2016	Prof. Dr. Dionísio Burak
Ana Valéria Abbeg	Modelagem Matemática Na Educação Infantil No Município De Pinhais-Pr	2019	Profª Drª Neila Tonin Agranionih
Eloíze Caroline dos Santos	Modelagem Matemática Na Educação Infantil: Possíveis Potencialidades	2021	Prof. Dr. Dionísio Burak

Fonte: O autor

As três dissertações escolhidas para trazer elementos sobre as práticas realizadas e trazer relações com a Modelagem na Educação Matemática, no âmbito da Educação infantil sobre as implicações da utilização da Modelagem na Educação Matemática, na concepção de Burak, apontam nas etapas o que se segue:

1. Escolha do(s) tema(s)

Em relação à escolha do tema, a partir das descrições, mostra que, as pesquisadoras procuraram inicialmente conhecer as crianças saber o que elas, pensavam, do que gostavam, se, se apresentavam tímidas ou não. Essas primeiras interações com os estudantes se mostram nos fragmentos a seguir: Em Belo (2016, p.35), "*Inicialmente, a pesquisadora buscou observar as crianças, conhecer a turma, perceber o que elas gostavam e o que lhes chamava a atenção" e ainda "[...] a pesquisadora fez essas observações e trocou ideias com a professora regente e também com as crianças em conversas informais".* A pesquisadora

Abegg (2019, p. 85) também descreve esse primeiro momento com as crianças: *"O primeiro contato com a turma teve início no dia 26 de outubro de 2018. [...]*, ainda*, "Em uma roda de conversa com as crianças, onde foi explicado o trabalho que seria realizado adequando a linguagem para que as crianças compreendessem"* ou ainda, quando falou mais especificamente da escolha do tema, houve manifestações das crianças conforme o diálogo a seguir:

Agora vocês devem pensar em um tema.

Joaquim – O que é tema?

Marcia- Eu sei!

Pesquisadora- O que é?

Marcia - Tipo dinossauros.

Ainda para a escolha do tema, tendo em vista que muitos foram aventados pelas crianças, Abbeg (2019), descreve que: *Após a escolha foi realizada uma votação aberta, em que cada criança foi questionada sobre o que queria estudar, qual o tema de seu interesse. A pesquisadora foi anotando o tema no quadro e quando tinha algum tema repetido, era anotado um "risquinho" ao lado do tema. Os temas sugeridos pelas crianças foram: pintura, dinossauro, futebol, trens, balé, unicórnio e piano.* Além disso:" As crianças, com a orientação da pesquisadora, realizaram a contagem coletiva dos "*risquinhos" de cada tema, para se descobrir qual tema tinha mais votos. O tema escolhido foi Dinossauros que envolveu subtemas como: 1.A extinção dos Dinossauros; Subtema 2 - Os dinossauros e as suas patas; Subtema 3 - A alimentação dos dinossauros; Subtema 4 - Os dinossauros e os ovos e Subtema 5 - O tamanho dos dinossauros. Abbeg (2019, p.87)*

Também a pesquisadora (Santos, 2021, p.42) "A *escolha do tema se deu através da conversa entre a professora e as crianças. Estas, já estavam trabalhando sobre animais em relação as suas classificações entre mamíferos e aquáticos, possuíam muitas questões que gostariam de descobrir, 'informalmente' já viviam discutindo e criando hipóteses".* Esta etapa se deu, conforme a descrição de que "*através de uma conversa inicial que a pesquisadora realizou com as crianças, em roda de conversa. Todos os participantes, coletivamente, foram indagados com a seguinte questão: Se pudessem aprender algo que gostariam muito, o que queriam aprender? Complementando com alguns exemplos como: algo que a professora nunca ensinou e que vocês possuem curiosidade em saber.*

Ainda descreve (p.43-44), que: "*estimulava as crianças sempre com perguntas como: P1 Quais animais vocês têm em casa? São grandes ou pequenos? Mordem? O que comem? Vocês ajudam a cuidar? As perguntas são motivadoras e ao perguntar para uma criança, as demais também participam, muitas vezes "atropelando" a fala do outro, o que é normal já que estão desenvolvendo a autorregulação.*

Na segunda prática, sobre o tema Florestas, desenvolvida com as crianças também contou com a participação das famílias, mas as crianças já estavam mais atentas, participando de forma mais efetiva, menos retraídas Com o grande número de temas manifestados pelas crianças, conforme a pesquisadora (Santos 2019, p.55)*: "brinquedos, bonecas, fadas, unicórnios, dinossauros e o que morava na floresta. Por se tratar de ideias muito diferentes, foi preciso conduzir esse momento para uma votação. Então, no quadro foi escrito tudo o que as crianças iam apontando como ideia para se trabalhar."*

Observa-se nessa etapa da escolha do tema, pelos fragmentos apresentados que as pesquisadoras precedendo a escolha do tema buscaram conhecer os interesses das crianças, e mesmo para conhecer as crianças, principalmente quem não era professora da turma. As crianças mostraram-se na maioria receptivas, participativas e colaborativas. Houve participação intensa e importante das famílias na obtenção de dados para a decisão da escolha do tema.

Partir do interesse da criança tem respaldo em Dewey (1954), quando diz que é por meio do interesse que se constata que se garante a assimilação do conhecimento por parte do estudante. Para Dewey quando a criança percebe que o que se deseja ensiná-la tem relação com um todo, daí nasce o interesse. Nas palavras e Dewey (1954, p.55) "se o todo lhe pertence, ou se o seu próprio movimento o põe em contato com esse todo, aquela coisa ou aquela ação passa a interessá-la". Ainda para Dewey (1979, p 143)," interesse é uma palavra que exprime uma atitude. Atitude de quem toma parte de espécie de atividade, de modo a lhe dar direção". O interesse é um dos princípios para a prática com Modelagem na Educação Matemática, na concepção de Burak (1992).

Sob o ponto de vista da Educação Matemática a etapa da escolha do tema é uma forma de as crianças mostrarem relação com suas curiosidades, forma de cultura, envolver seu cotidiano, muitas vezes, a sua cultura, reflete a dimensão sociológica (ciências sociais). Também os aspectos da dimensão psicológica quando as crianças se expressam, sustentam suas posições com argumentos, promovem o diálogo, a interação. A filosofia se encontra na sua essência sobre propósito, ética e valores. A dimensão matemática pode ser percebida no instigar a criança às ideias e classificação ao colocar os tipos de animais, conceitos maior e menor, contagem dos animais, figuras ou "risquinhos.

2. Pesquisa exploratória.

Na etapa da pesquisa exploratória é importante salientar que, na fase da Educação infantil na qual as

crianças ainda, não dominam a leitura nem a escrita, no entanto apresentam oralidade, o seu vocabulário gira em torno de 1500 palavras e aproximadamente 90 dos sons da língua, cabe ao professor buscar alternativas como proporcionar o envolvimento de familiares, de seus pares, isto é, das próprias crianças, dos amigos de forma que possam abordar e conhecer sobre o tema de interesse Em suas dissertações extraímos algumas ações das pesquisadoras: Belo (2016, p.34) contou com o auxílio dos pais para buscar os dados quando manifesta: que "*solicitou que perguntassem aos pais e também enviou a eles um questionário, pois levou em consideração que as crianças podem ter dificuldade em se expressar e os pais teriam dificuldade em entender a proposta".* A professora pesquisadora organizou um instrumento para coletar as respostas dos pais:

Quadro 2: O questionário enviado aos pais para fornecer dados na etapa da pesquisa exploratória

Senhores Pais, estamos trabalhando sobre brincadeiras antigas. Favor contar para o seu filho (a), e responder abaixo:

1. Comparando com a facilidade de se ter brinquedos hoje em dia, ao contrário de antigamente, quando era pequeno, do que você gostava de brincar?
2. Quais brincadeiras e cantigas de roda costumavam brincar e cantar?
3. Na infância de seus pais (avôs), como eram os brinquedos? Do que eles costumavam brincar?

Fonte: Belo (2026, p.34)

Houve retorno da maioria dos pais que contribuíram de forma significativa para a obtenção dos dados. Um grande número de temas mais de duas dezenas conforme descrito p.34. Nas rodas de conversas com as crianças, que se seguiram em relação a apresentação dos dados incluíam, brincadeiras, jogos e histórias, em comum acordo com as crianças foram contempladas duas categorias: Brincadeiras e Contação de História

A pesquisadora Abbeg (2019, p.43) descreve que: "*Por se tratarem de crianças pequenas, esse momento da pesquisa, foi realizado em conjunto com as famílias, portanto, foi enviada para casa, uma folha com as seguintes informações: Senhores Responsáveis, que tipo de experiência seu (sua) filho (a) já vivenciou com animais, sítio, fazenda, ou algo do gênero. Conte-nos no espaço abaixo e se tiver alguma fotografia que registrou esse momento, também pode ser anexada para enriquecimento da pesquisa. E assim, os pais enviaram para escola, folhas com anotações, para que pudéssemos dar continuidade a pesquisa".* O tema foi "Dinossauros" e o subtema1 escolhido pelas crianças foi Extinção dos dinossauros. Segundo Abbeg (2019, p.88) *A pesquisa exploratória, foi realizada com a reprodução de vídeo sobre a extinção dos dinossauros10 e do vídeo do Quintal da Cultura11 sobre a extinção dos dinossauros. Também foi realizada a leitura das páginas 6, 7, 46 a 50, 54 e 55 do livro: "O livro dos dinossauros: 50 questões sobre os dinossauros" (CONNOR, 2012) e roda(s) de conversa(s) para retirada de dúvidas.*

Durante a apresentação do vídeo as crianças faziam muitas perguntas tais como: *Artur- Houve uma explosão? Pesquisadora - Sim, houve uma explosão, quando o meteoro bateu na terra. [...] Gabriel - Ele bateu na terra Pesquisadora - Isso e criou uma onda Gabriel - Tipo um tsunami Pesquisadora - Isso mesmo tipo um tsunami Joaquim - Tá vindo um furacão prof.? Um furacão?* Ainda Abbeg (2019, p.88), descreve que: "*Percebemos que as perguntas, algumas vezes, eram respondidas pelas próprias crianças, que faziam as relações com algo que viram ou ouviram falar, como o caso do tsunami".*

A pesquisadora (Santos, 2021) também envolveu a família, considerando que as crianças apenas verbalizavam, pois, as crianças ainda não dominavam a escrita e a leitura. A pesquisadora, conforme descrição, (p.56) solicitou *a contribuição da família, para responder a seguinte questão: "O que tem e/ou mora na floresta?" As crianças levaram para casa uma folha e nesta folha poderiam colar imagens, escrever frases pequenas ou até mesmo desenhar o que sabiam ou pesquisar sobre a temática. Foi enfatizado que os pais deveriam oralizar com a criança essa atividade, para que elas pudessem contar aos demais colegas no próximo dia.* As pesquisas que retornaram foram bem elaboradas, apresentavam imagens, desenhos, frases criadas pelas próprias crianças. Teve uma grande diversidade de temas, portanto, no *Quadro 3,* cito os elementos que mais surgiram. Ainda, Santos, 2021, p.56) descreve que: *As pesquisas que retornaram foram bem elaboradas,*

apresentavam imagens, desenhos, frases criadas pelas próprias crianças. Teve uma diversidade, portanto, no quadro abaixo, cito os elementos que mais surgiram nas pesquisas.

QUADRO 3: O QUE TEM OU MORA NA FLORESTA.

PARTICIPANTES	TEMAS ABORDADOS
C1	Cobra, Jacaré, Tucano, Onça Pintada
C2	Pássaros e Aves, Árvores, Água, Rios, Cachoeiras
C3	Árvores, Pássaros, Cobras
C4	Árvores Frutíferas
C5	Animais diferentes como: Sapos, Aranhas, Preguiça, Lobo
C6	Insetos, Árvores, índio, Peixe, Jacaré
C7	Animais: Onça, Cavalo, Lobo, Girafa, Pássaros, Cobra, Sapos
C8	Animais: Leão, Elefante, Capivara
C9	Flores, Árvores, Cobra, Rio e Peixe, Ar, Vento.
C10	Peixe e Árvores
C11	É um sistema vivo, cheio de Árvores, Animais, Aves e Insetos.
C12	Montanhas, Tartaruga, Aves, Árvores, Javali
C13	Arara e Passarinho
C14	Plantas, Animais, Rios
C15	Rios e Árvores

Fonte: a autora, 2020.

As descrições apresentadas nesta etapa da pesquisa exploratória pelas pesquisadoras, apontam para a importante participação das famílias nas respostas às solicitações das pesquisadoras à elaboração dos dados sobre as questões. Também a reprodução de vídeos também foi uma estratégia utilizada por uma das pesquisadoras, como alternativa para que as crianças compreendessem sobre os temas de interesse. Além dessas, outra estratégia, para uma melhor compreensão a crianças foi a leitura de livros pela pesquisadora, bem como, das rodas de conversas que se mostraram muito produtivas.

Esta etapa também contempla as dimensões da Educação Matemática, e dentre elas a dimensão da Psicologia, relacionada a cognição quando as crianças tem a possibilidade de imaginar, pensar sobre, e aquisição de diversos tipos de conhecimento. Envolve também a dimensão matemática quando faz a classificação dos animais, fazem contagem, ordenação, inclusão e classes, estabelecer uma estrutura logico matemática, para a assimilação e organização.

Em relação a Modelagem possibilita o desenvolvimento de competências dos estudantes, das crianças na medida em que promove e incentiva o diálogo, a liberdade para buscar, tomar decisão, oportuniza a criação de alternativas de buscas para conhecer um assunto. É uma etapa que promove a capacidade de articulação, de expressão, de desenvolver a linguagem e a comunicação.

3. Levantamento do(s) problema(s)

Na Modelagem os problemas normalmente estão vinculados aos dados coletados na etapa da pesquisa exploratória. Na Educação Infantil esta etapa da Modelagem a expressão "problema" tem entendimento distinto de níveis de escolaridades mais avançados. Na Educação Infantil problema é qualquer situação que de início não se conhece a resposta, é necessário buscar por algum meio para encontrar essa resposta. Um exemplo de problema na Educação Infantil é: Do que se alimentam os dinossauros?

É importante também esclarecer que as crianças não seguem padrões, elas falam ao mesmo tempo, elas perguntam sobre o assunto, fazem relação com outro assunto e assim por diante. Cabe ao professor na função da mediação organizar as falas, fazer as intervenções necessárias, manter diálogo permanente com as crianças de modo que se sintam lives para opinar, perguntar e interagir com seus pares.

Segundo a pesquisadora Belo (2016, p.44). As crianças decidiam as brincadeiras a partir da roda de conversas. *Agora, outra brincadeira que os pais brincavam era lenço atrás ou bola atrás. Vocês lembram como se brinca? Vocês já brincaram? Crianças: Sim! Criança: Vamos brincar de pato-pato-ganso? Pesquisadora: Eu não sei como se brinca. Criança: Assim! (e levantou para mostrar como fazia).* Assim também ocorreu com o tema sobre brincadeiras de roda. Para a pesquisadora os problemas levantados nessa investigação são constituídos com estreita relação com conceitos matemáticos ou outros tipos de noções, previstos nas diretrizes para essa fase de escolarização.

A pesquisa Abbeg (2019, p.89) descreve que os problemas foram do tipo: *"Como é porque os dinossauros morreram? Ou "Os dinossauros morreram há quanto tempo?* Ainda *"Será que alguns dinossauros sobreviveram após o meteoro? Quantas patas os dinossauros usam para andar?*

A pesquisadora Santos (2021, p.57), ao comentar sobre essa etapa da Modelagem expressou que: "*Para que essas questões surgissem partindo das pesquisas trazidas de casa, realizamos uma roda de conversa, quando as crianças sentam-se ao chão, com a pesquisadora para que iniciarem uma conversa*".

Em relação as questões levantadas pelas crianças temos os seguintes conforme Santos (2021, p. 58) :" C1-*Os animais brigam muito lá? Porque eu e meu irmão se ficarmos sozinhos a gente briga; C2- Como eles acham comida? C3- Ué devem ser das árvores, por isso, elas são tão grandes! C4- Eu quero descobrir se lá*

tem pessoas, porque ninguém disse se tinha. C7- Eu disse sim! Lá moram índios (nesse momento a criança mostra na pesquisa que trouxe de casa a imagem que recortou e colou nela da figura de um índio).”

A etapa do levantamento do(s) problema(s). Os problemas abarcam as dimensões cognitivas, a cognição ao transformar e processar informações para transformá-la em conhecimento, além de traduzi-las em problemas.Os problemas estão em linguagem natural. Ainda, na dimensão da Psicologia a interação que segundo Vygotsky está ligada ao desenvolvimento acontece de fora para dentro, a partir do momento em que a criança internaliza suas interações com o ambiente e com outros com vistas à aprendizagem. Envolve as dimensões sociocultural como a linguagem A dimensão filosófica em sua essência trata do ser, valor e propósito.

4. Resolução do(s) problema(s)

No trabalho da pesquisadora Belo (2016, p.38) as brincadeiras envolvendo dobraduras, músicas brincadeiras de roda as histórias, e outras atividades realizadas durantes as práticas tinham como propósitos *“o desenvolvimento de coordenação motora fina, lateralidade conceito de espaço, forma e tamanho, no trabalho com as dobraduras.*” Ainda, Belo (2016, p.39) com a música barquinho virou *com objetivo de “trabalhar a linguagem oral a socialização das crianças”.*

No trabalho da pesquisadora Abbeg (2019, p.92), ela descreve que*: “A resolução do problema aconteceu da seguinte forma: foram utilizados 33 dinossauros de brinquedo para a classificação, onde cada criança recebeu um dinossauro e o classificou com a ajuda dos colegas, conforme o critério: anda com 2 ou 4 patas”*. Algumas crianças resolveram a situação por meio de desenhos como se constata nas páginas (.93,94 e 95). A pesquisadora também se utilizou de fichas com informações dos dinossauros para ampliar os problemas, após a roda de conversas com as crianças. Segundo Abbeg (2019, p. 96) descreve que: “*A turma que já estava dividida em equipes de 4 crianças e cada equipe recebeu um número de 21 fichas diferentes que continham as informações sobre os dinossauros, como tamanho, peso, alimentação, números de patas e se era bípede ou quadrúpede. As fichas foram apresentadas para as crianças e foram disponibilizadas para a manipulação junto com dinossauros de brinquedo”. Observou*-se que os problemas envolveram a classificação, segundo a alimentação. As soluções foram por meio de desenhos que envolveram também os algarismos representando o número de animais, conforme (p. 98 e 99)

A pesquisadora Santos (2021, p. 58), em relação a etapa da resolução dos problemas descreve que;” *As escolhas das atividades foram pensadas, de modo que atendesse boa parte das questões e proporcionasse às crianças, diferentes sentimentos, emoções, vivências e experiências*” e ainda:” *a professora precisou de três encontros, pois no primeiro, foi conversado com as crianças que eles teriam um desafio para cumprir e que para realizar esse desafio, eles teriam que sortear o nome de um animal, levar para casa e com a família, realizar uma pesquisa na qual deveria responder; o que gostava de comer, como dormia, o que costumava fazer, entre outras curiosidades. No segundo encontro, iniciamos as apresentações que foram concluídas no terceiro encontro.* Uma das crianças a C9[8], mostrou a pesquisa e durante a exposição a pesquisadora e demais crianças participaram na busca de responder as questões eis o diálogo conforme, a descrição em Santos (2021, p.59) sobre animal cobra:

P1- Vamos lá! Conte para nós o que você descobriu sobre a cobra.

C9- Ah! Eu vi que ela não tem patas, ela gosta de andar assim (criança imitando como é o movimento da cobra), que algumas cobras são muito perigosas porque tem veneno e outras não. Também vi que algumas são grandes demais e outras bem pequenas, mas que todas elas são perigosas e mordem, por isso, não pode mexer se ver alguma cobra tem de chamar a mamãe.

P1- Nossa! Quantas coisas legais você encontrou, adorei tua pesquisa, parabéns.

P1- Alguém quer perguntar algo para o amigo sobre a cobra?

C7- Eu não sei o que elas comem, você sabe?

C9- Eu não lembro.

P1 – Nesse momento, a professora pergunta se alguém tem ideia do que a cobra come para as demais crianças. E então ...

C3- Eu já vi uma vez que come rato, mas não sei se são todas.

C2- Eu também já vi, e vi ovo, ela fica com uma “bolona” na boca, porque ela não sabe mastigar.

Nesta etapa da Modelagem denominada de resolução dos problemas, toma contornos diferentes na Educação Infantil, não se trata de resolver problemas matemáticos , mas situações que envolvem as ideias matemáticas, essas situações evolvem a dimensão da psicologia social principalmente para contribuir para o desenvolvimento das funções executivas nas crianças segundo o Comitê Científico do Núcleo Ciências para a Infância (2016), “Funções executivas constituem um conjunto de habilidades que são fundamentais para o controle consciente e deliberado sobre ações, pensamentos e emoções”. Essas funções, segundo o

[8] As crianças eram denominadas por Laura, Eduardo ...Tiago, nomes fictícios pela Pesquisadora Abbeg (2019), por C1, C2, ...C10, pela pesquisadora (Santos, 2021 ou ainda Criança 1, Criança 2.... pela pesquisadora (Belo, 2016). Essa forma foi adotada para preservação do anonimato das crianças.

Comitê Científico do Núcleo Ciências para a Infância (2016, p.5), são constituídas por três dimensões: memória de trabalho, controle inibitório e flexibilidade cognitiva:

> 1. Memória de trabalho: permite armazenar, relacionar e pensar informações no curto prazo. Sem essa capacidade, por exemplo, o indivíduo não se lembraria do que estava fazendo após ser interrompido. 2. Controle inibitório: possibilita controlar e filtrar pensamentos, ter o domínio sobre atenção e comportamento. Conseguir ler um texto, mesmo na presença de barulhos incômodos, é um exemplo de uso dessa habilidade. 3. Flexibilidade cognitiva: permite mudar de perspectiva no momento de pensar e agir, e considerar diferentes ângulos na tomada de decisão. Por exemplo, essa capacidade é fundamental para o indivíduo perceber um erro e poder corrigir.

Além disso, segundo o mesmo Comitê (Ibidem), para as crianças, as habilidades relacionadas à memória de trabalho possibilitam,

> realizar atividades que envolvam algumas etapas sem o uso de lembretes, fazer brincadeiras de diferentes tipos, formular estratégias em jogos de regras. Também o aspecto do controle inibitório relacionado à inibição cognitiva, por sua vez, significa resistir a pensamentos e memórias não intencionais, capazes de tirar o foco e ainda Como terceira dimensão fundamental das funções executivas, ao lado da memória de trabalho e do controle inibitório, a flexibilidade cognitiva está relacionada à possibilidade de mudar de perspectiva no momento de pensar e agir.

Também se fazem presentes nessa etapa da Modelagem: a dimensão da Matemática em formas de conceitos e ideias de classificação, comparação, ideias de ordem nas contagens, e inclusão hierárquica nas ideias de número entre outras. Na dimensão filosófica o ser, o belo, as artes, o propósito, os valores, e na dimensão sociocultural as brincadeiras, parte das culturas das famílias das crianças, a importância da linguagem como forma de comunicação.

5. Analise crítica da(s) resolução(es)

Na última etapa da Modelagem na concepção da Educação Matemática denominada análise crítica da(s) resolução(ões). É um momento importante no âmbito da Educação Infantil para a formação a criança Esta etapa quando as crianças apresentam suas pesquisas, promovem as discussões, em alguma medida refletem sobre as soluções encontradas, assistem por meio de vídeos suas apresentações, suas danças, seus movimentos constitui-se em oportunidade de observarem seus movimentos, se estão de acordo com o ritmo da música, e ainda fazem o canto. Essas ações trazem benefícios como de colaborar no desenvolvimento cognitivo, a musicalização estimula potencialidades dos circuitos cerebrais que auxiliam para uma compreensão mais clara da linguagem e comunicação. Para Bréscia (2003), em relação à dança a expressão corporal na Educação Infantil é muito importante, principalmente no que diz respeito ao reconhecimento do corpo, de suas possibilidades e limitações espaciais, temporais e laterais. Nas ações que envolviam as dobraduras envolvendo, barquinho e avião respectivamente. sua importância para o desenvolvimento da coordenação motora; sequência; cores; figuras geométricas Belo (2016, p.39 e 45). Nas dobraduras, a parte cognitiva quando as crianças ouviam as instruções da pesquisadora e traduziam em ação correta para a construção do barquinho ou avião, mostrou-se importante.

Para Abbeg (2019, p.105) ao tratar da análise crítica descreve que: *A análise crítica das soluções ocorreu após o término dos registros das crianças. Cada uma das crianças explicou o seu desenho para os colegas. Eduardo expressa a classificação realizada: "Como o tipo… Até o pequeno ou o maior a gente sabe como medir porque quando oh… Como, por exemplo, a gente mede com a régua eles do rabo até a cabeça. Tem uns que parecem iguais que tem a mesma medida, mas a gente se engana".* Ou ainda como ao descrever Joaquim: que aponta com o dedo enquanto fala: "*Aqui é o os que vão na frente, os menores depois tem o tiranossauro rex é aquele bem grandão. Esse aqui e esse aqui são os pequenos, esses são os médios, e esse aqui é o grandão*". Na fala a criança qualifica e classifica os dinossauros em pequenos, médios e grandes.

Para a pesquisadora (Santos, 2021, p. 59), a última etapa da modelagem que é a análise crítica da resolução, foi realizada em seguida a cada apresentação das crianças. Cada uma das apresentações permitiu muitas conversas sobre cada um dos temas muitas foram as questões e, as trocas de ideias, as dúvidas surgidas e discutidas entre todas as crianças, sob mediação da pesquisadora. Ao final de cada apresentação a pesquisadora fazia uma síntese, conforme descrição:" *P1- Algumas cobras comem ratos, que são aquelas que vivem soltas na natureza, outras se alimentam comendo camundongos comprados para alimentar as cobras que estão sendo cuidadas por alguém ou algum lugar. Algumas se alimentam de ovos, que encontram quando estão rastejando, e às vezes, acabam se alimentando de aves, sapos, peixes, insetos, lagartos, entre outros. (Ibidem).*

O trabalho com a Modelagem na Educação Matemática segundo as percepções das pesquisadoras apresenta pontos a serem destacados como a seguir, conforme manifestação de Belo (2016, p 98), *A utilização da Modelagem Matemática como uma metodologia para o ensino de Matemática vai além dos conhecimentos matemáticos envolvidos em uma situação, pois procura trazer outros conhecimentos envolvidos em um tema, seja uma brincadeira, uma música ou um jogo.*

Ainda "*as práticas na concepção da Modelagem Matemática na Educação Matemática*

favorecem a interdisciplinaridade na medida em que envolve outras áreas do conhecimento. Um exemplo é o que ocorreu na atividade do tema Brincadeiras Antigas a qual envolveu a dobradura de um barco. É possível explorar com as crianças esse meio de transporte, em que regiões ele é mais usado, de que material é feito, enfim, podem ser explorados muitos aspectos.

Em relação ao trabalho em pequenos grupos[9] de 3 a 4 participantes destaca que: *o trabalho em grupo favorece também o que na teoria de Vygotsky é conhecido como Zona de Desenvolvimento Proximal, um dos conceitos mais importantes de sua teoria*. Além disso, *o fato dessa metodologia da Modelagem partir sempre do interesse dos participantes, cria o aspecto afetivo e potencializador da aprendizagem pelo diálogo e pela preocupação com o ser do educando. A Modelagem na Educação Infantil possibilita trabalhar diversos conceitos matemáticos, além de desenvolver a socialização entre as crianças, o desenvolvimento da linguagem oral, os aspectos contidos nas propostas pedagógicas das Diretrizes Curriculares Nacionais da Educação Infantil (DCNEIs. Favoreceu de modo significativo nos participantes dessa experiência o desenvolvimento de coordenação motora fina e grossa ou ampla, na ampliação do vocabulário, na linguagem oral, na forma de expressão das crianças e notadamente na autoconfiança.*

A pesquisadora Abegg (2019, p.127) em suas considerações finais aponta que: *A Modelagem Matemática desenvolvida nesta pesquisa contribuiu para a Educação Infantil, enquanto prática pedagógica, pois exigiu a ação direta da criança tanto na elaboração do tema quanto dos problemas e suas possibilidades de resolução. Promoveu o envolvimento e a motivação para a resolução de problemas, envolvendo conhecimentos matemáticos e não matemáticos, pois, a construção de uma prática de Modelagem Matemática na Educação Infantil respeita a criança como um sujeito ativo no processo de construção do conhecimento*. Ainda mais," *essa prática pedagógica permite que as crianças exponham suas curiosidades, seus questionamentos, seus conhecimentos prévios, estimulando a criatividade e a imaginação, proporcionando práticas lúdicas, onde o conhecimento, não só matemático, seja construído de forma natural, relacionado ao contexto das crianças".*

A pesquisadora, ainda descreve que: *A interdisciplinaridade aparece nas diferentes etapas da Modelagem Matemática na Educação Infantil, estando presente na formulação das questões sendo indissociáveis do tema até as resoluções dos problemas. Assim, exige um amplo campo na pesquisa exploratória para abranger as diferentes possibilidades de questão e de respostas, gerando novas questões e novos conhecimentos*. Para a pesquisadora Abbeg (2019, p.128) descreve que: *Na interação prevaleceu a mediação da pesquisadora, mantendo a curiosidade latente nas diferentes etapas da intervenção, incitada a partir de uma interrogação"* e ainda destaca que: *Neste processo de interação há significativa valorização do conhecimento prévio da criança, que é confrontado com novas conhecimentos, novas informações, novos questionamentos, ampliando sua curiosidade e prática social.*

Nas considerações da pesquisadora Santos (2021, p.78) a partir de sua questão norteadora da pesquisa: *Quais são as potencialidades da Modelagem na Educação Matemática, com crianças de 4 e 5 anos*? *Destacamos que a primeira percepção que tivemos em relação às potencialidades, é que a criança pode tudo, dentro do seu universo infantil. Aqui, neste trabalho, tentamos evidenciar o quanto é importante a valorização da criança como construtora da sua própria cultura e do seu conhecimento.* Descreve também que*:* "*Com as duas práticas realizadas, vimos ser possível trabalhar dentro de um tema apenas, mas abordando as atividades mais diversas. Trabalhamos através da interdisciplinaridade, quando trouxemos assuntos além do pensamento-lógico matemático ".*

Acrescenta ainda que: *Os conteúdos abordados relacionado a interdisciplinaridade estão ligados a linguagem quando trabalhamos a questão fonética ao brincar com rimas, a ampliação do vocabulário ao exercitar a fala de palavras com funcionalidades e ao estímulo da mesma, assim como, a oralidade ao verbalizar frases, relatar fatos entre outros.* Também acrescenta que: "*Desenvolvemos questões relacionadas a artes, como desenho, pintura, manipulação de materiais diversificados com texturas e tamanhos diferentes. Destacamos questões de psicomotricidade com relação ao movimento de pinça a brincadeira de mímica nos proporciona um amadurecimento da parte motora, coordenação motora fina e grossa, equilíbrio, espaço. Abordamos questões de noções de conceitos e ideias inicias da matemática".* Para concluir Santos (2021, p.80-81) descreve*:* "*Portanto, se alguém me perguntar quais são as potencialidades da Modelagem na Educação Infantil, direi que são as mais diversas, mas dentre elas a uma gama grande de noções matemáticas e interdisciplinares que conseguimos abordar, bem como, solidariedade, respeito pelo colega, interação entre as crianças e crianças e professor foram observadas durante as práticas".*

Diante das manifestações de quem viveu a experiência com a Modelagem na concepção da Educação Matemática, esta se mostra com grande potencial para a Educação Infantil. É uma prática pedagógica capaz de promover uma nova racionalidade no processo de ensino e aprendizagem

[9] Na realização das práticas com Modelagem os participantes constituem grupos com 3 a 4 participantes. O trabalho em grupo encontra respaldo em vários teóricos, dentre eles: Vygotsky1982), (1989) Piaget (1982).

para as nossas crianças e para os níveis Fundamental e Ensino médio da Educação Básica.

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Integrating STEM Approach at Primary Education in Bangladesh: Perception and Challenges of the Teachers

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Abstract- Bangladesh is aspiring to develop a competitive workforce for the 21st century. To reach this aspiration, STEM education can be a good way as it has widely been considered to have the potential to prepare students with 21st-century skills. The potentiality of STEM can be fully utilized only when teachers apply STEM approaches effectively in their practices. Since teachers' prior views and perceptions influence their STEM teaching, the study aims to explore the teachers' perception of STEM education. This study also analyzes the challenges of introducing STEM at primary education in Bangladesh. A qualitative research design is adopted in this study. Teachers' perception of STEM education was explored through semi-structured interviews. Additionally, in-depth and semi-structured interviews were conducted to examine the challenges of implementing STEM education at the primary level. Data were analyzed thematically following an inductive approach.

Keywords: *STEM education, integrated learning, perception, challenges.*

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Integrating STEM Approach at Primary Education in Bangladesh: Perception and Challenges of the Teachers

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Abstract- Bangladesh is aspiring to develop a competitive workforce for the 21st century. To reach this aspiration, STEM education can be a good way as it has widely been considered to have the potential to prepare students with 21st-century skills. The potentiality of STEM can be fully utilized only when teachers apply STEM approaches effectively in their practices. Since teachers' prior views and perceptions influence their STEM teaching, the study aims to explore the teachers' perception of STEM education. This study also analyzes the challenges of introducing STEM at primary education in Bangladesh. A qualitative research design is adopted in this study. Teachers' perception of STEM education was explored through semi-structured interviews. Additionally, in-depth and semi-structured interviews were conducted to examine the challenges of implementing STEM education at the primary level. Data were analyzed thematically following an inductive approach. One of the key discoveries made in this research is that a large majority of teachers have limited knowledge about STEM education. Despite this lack of familiarity, it was observed that these teachers occasionally apply the STEM approach unintentionally. Most teachers perceive STEM education as effective, however, it has several challenges to implement, such as a lack of teachers' knowledge about the discipline and pedagogical approach, inadequate physical facilities, lack of STEM-related training, the mindset of stakeholders, etc. The findings of the study can be practical guidelines for academic institutions, curriculum developers, teachers' trainers, and policymakers.

Keywords: STEM education, integrated learning, perception, challenges.

I. Introduction

The 21st-century world is very complex and fast-changing. In this complex world, it is necessary to make the future citizen an effective workforce who can think innovatively through proper reasoning and critical thinking. The Government of Bangladesh (GoB) is concerned with developing human resources, and that is why several initiatives were taken in the education sector (Chowdhury & Sarkar, 2018). Nevertheless, it is a matter of great concern that a substantial number of individuals become educated but struggle to bridge the gap between theoretical knowledge and practical application. Consequently, they encounter challenges in effectively utilizing their skills within a professional context, resulting in a deficiency of competence (Drucker, 2013). STEM education would be a solution to overcome this situation, as it would allow the students to learn with real-world experience and hands-on activities (Thomasian, 2011). Furthermore, STEM offers meaningful learning opportunities and positively influences students' attitudes toward STEM, potentially shaping their future careers (Tseng et al., 2013).

The term STEM (science, technology, engineering, and mathematics) was often used in the 1990s to describe anything that involves one or more of the four disciplines: science, technology, engineering, or mathematics (Bybee, 2010). Over the course of recent decades, STEM education has predominantly emphasized the enhancement of science and mathematics as independent disciplines (Breiner et al., 2012), with limited attention given to the integration of technology or engineering (Bybee, 2010).

STEM initiative aimed to offer critical thinking skills to all students so that they would become creative problem solvers and the ultimate workforce in the competitive job market. It is believed that someone who is STEM literate would be at an advantage over other students from general schools (White, 2014). The significance of STEM education is widely recognized for assisting students in acquiring 21st-century skills such as critical thinking, cooperation, problem-solving, etc in every area of their lives (Erdogan & Ciftci, 2017). Existing study shows that students' learning is effective when they can connect their knowledge to real-world situations, and this may be accomplished by learning with the STEM approach, which influences students' attitudes toward STEM learning in their future careers (Tseng et al., 2013).

Hence, STEM education should be introduced in primary schools to develop the perception and knowledge of STEM education from the elementary level (Nadelson et al., 2013). Despite the significant scope of STEM education, its implementation was not successful at the school level owing to inadequate preparation, a lack of competent STEM teachers, a lack of funding for teachers' professional development, a lack of STEM-related research collaboration, etc. (Ejiwale, 2013).

Additionally, there are constraints at the individual, institutional, and societal levels in developing countries like Bangladesh (Siddiqa & Braga, 2019). Moreover, research shows that teachers' prior views and

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perceptions impact on how they teach STEM subjects (Margot & Kettler, 2019). According to Gess-Newsome (2015), teacher perception and belief may serve as a filter and enhancer for teachers' actions. Therefore, teachers' views and challenges are important forces to develop an appropriate framework in the particular context to integrate the STEM approach into teaching.

Bearing this in mind, this study aims to explore primary school teachers' perceptions of STEM education and the challenges to implementing STEM at primary education in Bangladesh. To address these objectives, the following research questions are selected:

a) What are the perceptions of primary teachers about integrated STEM education?
b) What are the challenges in integrating the STEM approach at the primary level?

II. Literature Review

a) *Perceptions of Teachers of STEM Integration*

While providing definitions and concepts of STEM is simple, putting STEM education into reality is considerably more difficult. Teachers play a significant role in allowing students to actively participate in STEM activities. STEM teaching, on the other hand, needs a distinct knowledge base of science teaching. The role of the teacher is different in STEM compared with the traditional approach but as important as the traditional approach. Teachers must offer inquiry-based teaching that promotes critical thinking and innovation while improving students' comprehension of subjects and concepts (Nadelson et. al, 2013). Teachers must employ unconventional questioning methods to encourage students to engage in higher cognitive processes to make them think deeply about concepts and ideas to solve STEM problems (Bruce et al., 2014). However, Srikoom et al. (2017) showed that the majority of teachers in Thailand (85.5%) had never heard of STEM education, whereas 19% couldn't define it. Moreover, teachers believe that STEM education is important, but many teachers have concerns about engineering topics. Even some teachers consider it is science-math oriented, others believe it is based on engineering, and some believe it is inquiry-based learning (Srikoom et al., 2017; Weld et al., 2016). Thus, administrators and policymakers need to understand what teachers feel and what constraints resist them to develop STEM talent in schools. According to Johnson (2006), many teachers perceived that they don't possess the skills to conduct inquiry-based learning experiences for their students. Yet, Margot and Cattler (2019); Smith et al. (2015); Park et al. (2016) revealed that teachers' perceptions depend entirely on teacher variables such as age, experience, gender, and interest in STEM.

Existing literature also shows that teachers agreed about the importance of design, engineering, and technology, but they were unfamiliar with the contents of STEM (Hsu et al., 2011). Many teachers also identified some aspects and factors of STEM education, such as learner motivation/engagement in the classroom, challenges associated with pedagogy, curriculum, school structures, and so forth (Gess-Newsome, 2015; Lesseig et al., 2016). Similar to the prior research, Park et al. (2016) mentioned that the majority of teachers had a favorable impression of STEM education but they recognized some challenges, such as time, additional workload, and lack of financial or administrative support (Park et al., 2016). Moreover, a group of teachers considers that STEM education's four components or disciplines cannot be connected and STEM is seen as a separate concept (Bybee, 2013). In addition, studies indicated different perceptions and resistance from teachers respectively towards the interdisciplinary approach and changing the way of teaching where teacher's education, age, gender, and school level were the determinants (Al Salami et al., 2015).

b) *Challenges of STEM integration*

It can be said without any doubt that for authentic learning experiences, the importance of STEM education is obvious. However, the realization of its importance hinges on its proper and effective implementation. Numerous challenges impede the effective implementation of integrated STEM education, affecting not only teachers but also students and stakeholders. Extensive research has been conducted to identify and address these challenges in the successful integration of STEM education. As posited by English (2017) and Bybee (2013), the challenges surrounding STEM education encompass several aspects, including the need for seamless integration of STEM disciplines while preserving the integrity of each individual subject. Moreover, there are concerns regarding equitable attention being given to all subjects, the absence of engineering in traditional STEM disciplines, and the integration of engineering within an already comprehensive curriculum. Additionally, the successful execution of integrated STEM hinges upon teachers' willingness and ability to effectively incorporate the diverse disciplines of STEM education. In their study, Asunda and Walker (2018) identified several challenges associated with integrated STEM education. Notably, these challenges encompass a lack of collaboration among teachers and a limited understanding of what integrated STEM truly entails. Moreover, the scarcity of tools, administrative support, and financial resources to acquire essential materials poses further hurdles. Additionally, inadequate knowledge and skills among teachers in regard to integrated STEM teaching and learning, along with the complexities of assessing

students' activities, emerge as significant obstacles. Furthermore, the dearth of accessible professional development programs for teachers in the realm of integrated STEM education adds to the challenges faced in this domain. Herschbach (2011) asserted that engaging students in integrated STEM instruction poses significant challenges, while another obstacle lies in the misconception held by many teachers, who perceive it as suitable only for the secondary level. He also said that the lack of training for pre-service teachers to incorporate technology successfully is another challenge. Teachers' capacity, meeting with students' abilities and educational aims and policies at the national level are also barriers to integrated STEM education (Lee et al., 2019). In another study, it was found that students learning might not be identical in all subjects, it could be too much for students' cognitive processes (Pearson, 2017). He also indicated that lack of timing, funding, and planning are also potential challenges of integrated STEM education. According to Ryu et al. (2019) school structure and instructional methods, heavy workload, difficulty in shifting learners' minds from traditional methods to collaborative and interactive learning strategies, pushback from teachers to implement integrated STEM approach, a lack of content knowledge apart from teachers field of expertise, a lack of role model or model teachers and model curriculum to follow on how to teach and develop curriculum for integrated STEM approach are some of the challenges of integrated STEM education. In line with that Dare et al. (2018) claimed that not only teachers but also students found it troubling to connect the components of STEM in the classroom. While conducting experiments, students were unable to measure equipment accurately and had difficulties in correctly interpreting the data (Glancy et al., 2017). Hsu and Fang (2019) pointed out that, low motivation of students and teachers' beliefs are also barriers to the successful implementation of integrated STEM education. Tao (2019) in his study stated that there are several challenges to the successful implementation of integrated STEM such as teacher's unfamiliarity with STEM education, a lack of participation in workshops and seminars, poor confidence while discussing technology and engineering with students, developing integrated STEM lessons, shortage of confidence to conduct the integrated STEM activities, inadequate preparation to implement integrated STEM approach in the classroom, lack of training on integrated STEM, insufficient experience, large classroom and busy daily routines. From these discussions, it is visible that though the integrated STEM approach is a great asset for STEM teaching and learning, it comes with a lot of challenges and barriers.

III. Methodology and Sample

For this study, we have opted an interpretative (Ernest, 1989) approach as this approach would allow us to interact with teachers closely and would enable us to construct the knowledge of reality from their perspective. It is a wide-ranging assumption that qualitative methods are closely associated with interpretivism (Passer et al., 2009).

Data was collected by semi-structured interviews, which were conducted with the primary school teachers to find their views about integrated STEM education. To identify the challenges of the schools (e.g., the physical facilities) and the curriculum to integrate the STEM approach, semi-structured interviews and in-depth interviews were conducted with the teachers (from both the STEM and traditional primary schools) and primary education curriculum experts. The questions of the interview were mainly open-ended in nature and all interviews were recorded (audio).

Data was collected from the teachers of both primary schools and STEM schools in Bangladesh. A total of 12 primary schools (06 urban and 06 rural) were selected from different metropolitan cities, municipalities, and villages of Bangladesh through stratified and purposive sampling. Semi-structured interviews were conducted with 12 primary teachers (one from each school) practicing science and mathematics subjects. Besides, four STEM teachers (who are practicing the STEM approach in their teaching) were selected through purposive sampling. A total of nine in-depth interviews were conducted where the participants were two primary curriculum experts, four head teachers, and three STEM experts. The selection of schools in different areas would allow us to explore how the perception of different groups of people varies and what the challenges are to integrate the STEM approach for a specific context. Moreover, respondents were notified that they could exit the study anytime. Participants were assured that their identity and the information they provide will be kept confidential and not shared with anyone else.

IV. Findings

In this chapter, interviewed data is analysed in line with the objectives of the study. The focus of the analysis is to understand primary school teachers' perceptions of STEM education and to find out what are the challenges in integrating the STEM approach at the primary level. The demographic information of this study is shown in the table-1.

Table 1: Demographic Information

Male Govt. teachers: 06	Female Govt. Teachers: 06
Rural Govt. Teachers: 06 (Code: TR)	Urban Govt. Teachers: 06 (Code: TU)
Trained Govt. Teachers: 08	Untrained Govt. Teachers: 04
STEM Teachers: 04 (Code: ST)	Head Teachers: 04 (Code HT)
Curriculum Experts: 02 (Code: CE)	STEM Experts: 03(Code: SE)

a) Perception of teachers regarding integrated STEM education

Table-2 summarizes the findings of the perceptions of primary school teachers about STEM education.

Table 2: Teacher's Perception of Integrated STEM Education

Theme	Male			Female			Male			Female		
PERCEPTION	TU- 1	TU-2	TU-3	TU-4	TU-5	TU-6	TR-1	TR-2	TR-3	TR-4	TR-5	TR-6
Before briefing session												
Familiar with STEM	√											
Familiar with the integration approach												
After briefing session												
Familiar with STEM	√	√			√				√			
Understand the STEM approach	√	√			√		√		√	√	√	
STEM approach is interesting	√	√	√	√	√		√	√	√	√	√	
Familiar with the integration approach												
Multidisciplinary					√			√				
Trans-disciplinary												
Interdisciplinary	√	√	√	√	√		√	√	√	√	√	√
STEM approach applied without intention		√		√	√		√				√	√
To integrate the STEM approach-												
Knowledge of various disciplines	√	√	√	√	√	√	√	√	√	√	√	√
Necessity of ICT skill	√	√	√	√	√	√	√	√	√	√	√	√
STEM helps teachers to become more skilled	√	√		√		√	√	√	√		√	√
STEM approach will prepare students for-												
21st-century skilled citizen	√		√	√	√	√	√	√	√	√		√
To become a skilled workforce		√	√	√	√		√	√			√	√
To change traditional mindset	√		√		√		√		√	√		
Concerning issue to fulfill academic expectation through STEM education-												
Parent												
Teacher	√	√	√	√	√	√	√	√	√	√	√	√
Students		√	√		√	√		√	√		√	
Aged teachers prefer to teach-												
Conventional/traditional	√	√	√	√	√	√		√	√	√		√
Without technology	√	√	√		√	√		√	√	√	√	√

b) Teacher's knowledge about STEM Education and its integration into disciplines

The findings of our study show that STEM education is very unfamiliar to teachers at the primary level. Most of the teachers have not heard about STEM education previously. The only teacher who had heard about it was from an urban area but did not know it in detail. After briefing about STEM to them, a few of the teachers expressed their familiarity with the STEM approach and some of the teachers were able to understand the STEM approach eventually. One of them said,

> *So, STEM can be said as an integrated learning process including two or more components: Science, Mathematics, Engineering and Technology, where students will learn through activities and problem-solving. (TU- 2)*

Our analysis shows that none of the teachers knew about the types of integration (e.g., disciplinary, multidisciplinary, interdisciplinary, and trans-disciplinary) before the briefing session. However, after the session, most teachers perceived that the interdisciplinary approach would be more relevant and appropriate for introducing STEM education in primary schools. Yet, two of the teachers argued with this statement and one of them mentioned,

> *The students are learning and solving problems as an individual discipline which is traditional and students are habituated with that. If the authority wants to apply an interdisciplinary approach replacing the traditional approach, it will not be easy for the students to get used to it. (TR-2)*

The teachers also shared their experiences of integrating the content knowledge of different subjects. They believe that better learning happens in most cases when students encounter integration. However, weak students often struggle to cope with it. Some of the teachers stated that mixing content knowledge during classes was quite obvious but unintended; sometimes, they do it to get students' attention. Although they were never exposed to STEM approach before, they occasionally followed the knowledge integration technique.

In the current context, there are many topics commonly taught in two or three subjects. Pointing to an example one of the teachers said,

> *Most integrations happen when I teach students about "environment" as it is an important chapter and has been included in subjects, such as Bangladesh and Global Studies, Language and Science. So, whenever I take classes on environment in English, I used to link it with the environment in science. Students also find it interesting. (TR-2)*

Another teacher from the urban area said,

> *I try to integrate two or more disciplines. To determine the length, width or area of something in science, we need to use the measurement of mathematics. Also, they can learn basic engineering by measuring the tables and benches in the classroom. There are more scopes of integration in math and science compared to other subjects. (TU-1)*

c) *Teacher's view on the importance of discipline knowledge*

All the participants have perceived that integration is essential for conducting classes through the STEM approach to allow the students to reshape their learning system. A participant has emphasized that,

> *Content knowledge is important for integrating various disciplines. It was mentioned that teaching or delivering lessons properly is not possible if the content knowledge of the teacher is not enough. (TR-3)*

The content knowledge of mathematics and science was found more important to conduct a fruitful class and to integrate subjects, but teachers should be aware of student's workload during integration.

d) *Teacher's view of the effectiveness of the STEM approach*

- To hold students' interest

Most teachers perceived that STEM is very interesting and will work well with students. Teachers felt that students of this generation would like this type of integration and activity-based learning. Students welcome that whenever they are allowed to work according to their interests. According to them, STEM will make learning more interesting to the students as they do not enjoy the lecture method. This (new approach) will pave the way to learning something through problem solving and real-life-based learning. When students do project work, they will become more confident about science. Respondents have also said that the students will be able to link one subject knowledge with another; it is a more comprehensive, analytical, creative approach which will ensure better learning outcomes. However, a few teachers believed that effectiveness is mostly dependent on teachers' quality as well as the representation of the STEM approach.

- To meet 21st-century skill

Most respondents indicated that students will learn 21st-century's skills through STEM education. STEM is believed to replace memorizing habits with scientific and logical reasoning among students. One of the urban teachers stated that STEM can be a gateway to clarifying various concepts of science, which is not very feasible in the current mode of teaching. She said,

> *STEM is a relevant concept and will be very effective for students. There are a lot of topics in science and technology that can be related to mathematics and engineering. This will help the students understand science clearly to fulfill the needs of the 21st century. (TU-5)*

- To change students' traditional mindset and prepare a skilled workforce

Most of the teachers shared their views that the current status and culture of the job market are being changed. The recruiters focus more on skills and experiences than traditional degrees. STEM is believed to provide the necessary skills and expertise to students and will change their career aspirations. Teachers mentioned some skills that might be acquired through STEM practice. Some of those skills, such as leadership skills, technological skills, collaboration and communication, professional skills, computer literacy, information skills, mathematical and logical reasoning, problem-solving skills, etc., are perceived as the most important for the 21st-century job market. Moreover, students should care about their passions and interests. Teachers also believe that STEM can guide students to the desired skills and career paths.

Some of the teachers shared their opinions and said that students, after skills development through STEM activities, would change their traditional mindset while choosing their desired careers. As the number of government jobs is limited, students prefer skill-based professions over white-collar jobs. Respondents also added that the aim of education in the last century was narrow in terms of skills and activities, but it has now widened. Students in Bangladesh have already been switching their career options and want to become more self-dependent. One of the teachers from the urban area said,

STEM will enhance the learning of the students. This will help them to achieve good learning outcomes, which help them to be highly ambitious about their career. (TU-2)

Teachers also hoped that the new workforce would contribute more to nation-building than the traditional one as the STEM workforces are expected to have more entrepreneur mentality. STEM students are likely to be highly skilled and are expected to work efficiently. This skilled generation will create jobs rather than look for them.

- To become a skilled teacher

It was found that most of the teachers perceived positively about the effectiveness of STEM education. They believe that STEM is not only necessary for science, mathematics, technology and engineering but also for other subjects. For instance, one of the teachers expressed his view as while learning about the scientific names of fruits in English, they will also learn English words (language). The majority of the teachers claimed that STEM integration would not only create scope for invention and creativity among the students but also allow teachers to become more skilled. All of the teachers claimed that for integrating STEM education, ICT skill is vital. One of the urban teachers express,

……. However, in order to prepare students for 21st-century, teachers need to be skilled too. The teachers need to be skilled in ICT, or else they will struggle to fulfill the needs of the 21st century. (TU-3)

e) Teacher's view on the fulfillment of academic expectations

All teachers expressed that STEM education will fulfill teachers' academic expectations. However, they perceived that as STEM education is a very unfamiliar approach in Bangladesh, the fulfillment of theoretical expectations through STEM education is a concerning issue. A teacher from a rural area said,

When a new approach or pedagogy is introduced, teachers and students become puzzled. Most students have the same questions to what extent the teacher will deliver, and the teachers ask themselves to what extent students will accept the process. There will be an argument about meeting academic expectations. (TR-3)

Teachers also elucidated that there are many teachers with a traditional mindset and they would prefer to teach in very conventional ways like "chalk and talk". They don't want to integrate technology and student-centric activities. The age of the teachers is perceived to be a big factor in this issue.

Some teachers perceived that STEM would meet the expectations of most students. Primary students are very keen to learn in a joyful and more explorative learning environment. A few students may struggle for some days, but they will surely overcome if the teachers deliver the lesson properly. But the teachers were concerned about fulfilling the expectations of the parents. They said that the parents are mostly reluctant to breach the traditional learning system. They prefer examination scores more than activities and creativity. The teachers of the rural area shared that they faced challenges whenever they tried to involve students in the activities. For example, some parents used to say when teachers involved students in activities, "Oh, if the students work by themselves, then why you teachers are here!!" But teachers also anticipate that if STEM becomes generalized all over the country and everyone gets used to it, then the mindset of parents will also change.

V. Challenges Regarding Implementing Stem Education

a) Challenges Associated with Discipline Knowledge

Most teachers perceive that lack of discipline knowledge and pedagogical knowledge are major barriers to integrate the STEM approach at the primary level. They also claimed that there are scarcities of qualified and skilled teachers. Similarly, the STEM teachers think that the initiative of integrating the STEM approach will be hampered due to the lack of experienced and subject-expert teachers. One of the STEM teachers said,

Teachers themselves are a challenge. We do not have subject expert teachers at the primary level and they also do not possess the required skills to conduct STEM classes. (ST-1)

Besides, teacher's unwillingness to adopt a new approach is perceived as another challenge by the participants. One of the head teachers expressed,

Our teachers are not motivated. They do not want to accept changes. Also, there is a lack of qualified teachers, which is also a big challenge. (HT-1)

Moreover, teachers discussed that the lack of effective training to develop teacher's capacity for discipline knowledge is another potential challenge. They think that training failed to address the necessary pedagogical knowledge as well as discipline knowledge for integrating the STEM approach in their teaching practice.

b) Challenges associated with teaching strategies

Most teachers expressed that conducting classes with different activities is a challenging task as they have to look after many students in the classroom. Teachers also feel that lack of time to prepare for a class will make it difficult for teachers to conduct activity and problem-based classes. Similarly, one STEM expert said,

> *Though project-based learning is an effective strategy for STEM, however, it has some limitations, such as it is time-consuming, lack of materials and lack of skilled teachers (SE-01)*

Furthermore, primary teachers discussed that due to deficiencies in knowledge and skill to use various teaching strategies in the classroom, teachers are often reluctant to use teaching aids even if they have access to them. STEM teachers also shared the same view as primary teachers. They think that teachers-students ratio, class duration and lack of availability of teaching aids are some challenges to integrate the STEM approach. One of the experts said,

> *I think the lack of teaching materials to conduct various activities is a challenge. Also, the duration of each class is not enough to conduct activity-based work. Each teacher has to deal with a lot of students in a class. (ST-2)*

They also feel that lack of relevancy of content for the STEM approach, teachers' unwillingness to look at the curriculum and teachers' guide are some other challenges to be faced while implementing the STEM approach.

c) Challenges associated with the learning system

Most teachers identified the classroom and school infrastructure as a potential challenge. They think that to conduct various experiments or activities in the classroom, a lot of space is needed and that is quite unlikely in Bangladesh context. Most of the classrooms in this country are small and occupied by a lot of students. Few teachers talked about the mindset of their colleagues and guardian as a potential barrier, as they do not want to accept changes. One of the teachers said,

> *One day I took my students outside the classroom to teach about plants and their classification. After conducting the class, I got complaints from my colleagues and also guardians about my approach. They told me that what I was doing was not acceptable. (TR-5)*

Other teachers said that they want to take classes using various activities, but their school does not have adequate resources. Most participants agree that the schools' infrastructure will be a problem in implementing the STEM approach as schools do not have adequate financial support. One of the participants said,

> *I think the schools do not have the proper financial support to have the necessary resources, and infrastructure to implement the STEM approach in classrooms. (ST-1)*

Furthermore, they said that seating arrangement, classroom culture, and structure are some other challenges that teachers will have to face in the classroom.

d) Challenges associated with expectations

Fulfilling academic expectations is another challenge identified by the teachers. They argued that the integrated STEM approach might not be accepted among the teachers and the guardians as this approach might not fulfill their expectations. One of the teachers said,

> *Our guardians expect that the teachers will highlight the passages from the textbook that students will memorize. If we do activity-based learning in the schools, then the guardians will not see any highlights or marks in the textbook. Then they will assume that their children are not learning anything. So, they will not accept this new approach. (TR-1)*

Teachers also feel that most senior teachers (old/aged) do not accept any changes in the education system. They expect everything will be same as it always was. They believe that this mindset persists in some other teachers too, and giving a few training sessions to these teachers will not change their belief. One of the teachers said,

> *I fear that this new approach will not be accepted by all teachers. Some teachers do not want any change. They want everything to remain the same. Especially the older teachers. (TU-5)*

Some teachers fear this new approach won't meet students' expectations. Some students have a desired learning style. Students may struggle with this new approach. During integration, slow learners cannot remember prior lessons from different topics, and teachers lose their teaching flow. Consequently, students may not accept this integration, stop attending school, and create a learning gap.

VI. Discussion

To develop a skilled, creative, and competent 21st-century workforce, there is no alternative to implementing the STEM learning approach, and this approach cannot move forward without the acceptance and readiness of the teachers. Hence, this qualitative study has explored teachers' perceptions and challenges to embrace STEM education in primary schools. It seems interesting that the findings of other contemporary studies were quite similar to this research.

This research has revealed that earlier teachers were unfamiliar with STEM education but after interference by the researchers, they realized that it would be very effective for the students and teachers of primary level. This finding is closely similar to a few other researches where teachers also perceived that a STEM approach would increase the efficiency and confidence

of the learners and facilitators (Lehman et al. 2014; Van Haneghan et al. 2015).

Besides, teachers were found very appreciative of activity-based and integrated learning systems, though some of the respondents were focusing more on technology-enhanced learning (TEL) rather than focusing on integrating four components. The teachers were also aware of the importance of discipline knowledge so were the participants in the findings of Stohlmann et al. (2012). Moreover, similar to Daugherty and Carter (2017), all of the respondents in this research found an interdisciplinary approach is very appropriate for implementing STEM education. Teachers also insisted that mixing up discipline knowledge is helpful but becomes complex for weak students.

Consequently, this study found that teachers' discipline knowledge, pedagogical knowledge, lack of skill, and lack of training are some challenges. This is similar to the studies of Walker, 2018; English, 2017; Lesseig et al., 2016 and Herschbach, 2011; where they found inadequate discipline knowledge and skill of teachers, Lack of pedagogical knowledge and unavailability of teachers' professional development programs as some challenges.

Derived data showed that using collaborative/ group work, role play, project work, experiments, discussion, game-based learning, and demonstration methods were perceived as important for STEM implementation, which was also found by Siew et al., 2015; Sutaphan & Yuenyong, 2018; Kim et al., 2020; Gao et al., 2020. In addition, participants mentioned that science fairs, robotics, and other innovation challenges have significance in implementing STEM at the primary level.

In this research, respondents shared mixed reactions to the question regarding the current curriculum and textbooks' support for this new approach. But all of the teachers and experts also agreed that the teaching strategies should be student-centric and more real-life oriented (Burgland et al., 2021; Ritz & Fan, 2015). Besides, it was found that trained teachers were able to align the curriculum, teaching materials, textbooks, teachers' guide and teaching strategies more appropriately with the STEM education compared to the untrained teachers.

Furthermore, this study found that the teacher-student ratio, lack of time for teachers to prepare for classes, lack of teaching aids and class duration, the infrastructure of the school and classroom, teachers' attitude/mindset, lack of resources, and finance are some challenges for performing STEM and activity-based teaching strategy. This finding is similar to the studies of Tao, 2019; Ryu et al., 2019; Walker, 2018; Pearson, 2017; Park et al., 2016 and Lesseig et al., 2016 where they found that inadequate preparation before the class and lack of teaching aids as some barriers to the STEM approach.

This research found that social communities such as parents, SMC, social-political leaders, etc., can successfully contribute to implementing STEM education. However, respondents from rural areas argued that most parents do oppose everything beyond traditional teaching. The same scenario is also seen in the case of senior teachers, which is consistence with the findings of Nadelson et al. (2013), who stated that senior teachers rarely accept anything new. The study also found that accepting the STEM approach is varied according to different context areas whereas gender has no significant effect on this issue. This finding is opposed to Smith et al., (2015) and Park et al., (2016), who argued that gender is a significant factor in STEM teaching. Moreover, the teachers from urban areas and science backgrounds were found to be comparatively more confident and technologically sound, which can be aligned with the findings of Bagiati and Evangelou (2015) and Park et al. (2017). Again, teachers have doubts about the contribution of the learning system as practicing STEM outside the school may not be possible due to students' socio-economic conditions. In a research, Tan et al. (2013) also mentioned that students' socioeconomic condition is a factor in practicing and choosing a STEM-based career.

After all barriers and blessings, teachers hoped that STEM education is expected to generate 21st century's skilled workforce for developing a better nation. They suggested STEM conceptual training, subject-based foundation training for the teachers and counselling for the parents and other stakeholders for better implementations.

VII. Implications and Conclusion

This study explores the perception of primary teachers about STEM education for integrating this STEM approach into the teaching-learning process. This study also reveals the challenges in integrating STEM education into primary education in Bangladesh. This study has some practical implications for academics and policymakers. Utilizing the findings of the study, the curriculum experts can redesign the primary mathematics and science curriculum to bring these in line with the integrated STEM education. This study can be utilized by the teacher trainers to develop the STEM-based professional skills of the teachers. Again, the teachers must accept to change their mindset from the traditional teaching approach, take interest to undergo relevant training and follow the effective approaches for STEM education. The findings of this study may be helpful to the policymakers to bring significant changes in the policy to make STEM education feasible for all the stakeholders.

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IPET a Training Model for the Teaching of Environmental Education in Basic Education

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Summery- In Colombia, the environmental dimension in the school is circumscribed to the transversal model, however; Teachers, in particular, of basic education do not have adequate, updated and broad conceptual frameworks that allow them to generate necessary actions against the objectives of environmental education and the training of citizens capable of making decisions about the environmental situations of the territories that inhabit. Teachers generally have reduced visions of the environment and environmental education and their actions are activists with little reflection or leading to real transformations. This research advocates giving importance to teacher training so that the teaching of environmental education at school is reflected and new models are promoted. The research is qualitative, transformative and presents the case of 6 natural science teachers from Ibagué Tolima in Colombia.

Keywords: teacher training, environmental education, teaching models.

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IPET a Training Model for the Teaching of Environmental Education in Basic Education

IPET un Modelo Formativo Para la Enseñanza de la Educación Ambiental en la Educación Básica

Gloria Marcela Flórez Espinosa [α] & Iván Darío Loaiza Campiño [σ]

Resumen- En Colombia la dimensión ambiental en la escuela está circunscrita al modelo transversal, sin embargo; los profesores, en particular, de la educación básica no poseen marcos conceptuales adecuados, actualizados y amplios que les permitan generar acciones necesarias frente a los objetivos de la educación ambiental y a la formación de ciudadanos capaces de tomar decisiones sobre las situaciones ambientales de los territorios que habitan. Generalmente los profesores tienen visiones reducidas del ambiente y la educación ambiental y sus acciones son activistas poco reflexionadas o no conducentes a reales transformaciones. Esta investigación aboga dar importancia a la formación del profesorado para que se reflexione la enseñanza de la educación ambiental en la escuela y se promuevan nuevos modelos. La investigación es cualitativa y transformadora, participaron seis (6) profesores de ciencias naturales de Ibagué Tolima en Colombia y para esta comunicación se presenta en profundidad resultados del caso la profesora del grado primero. Permitió luego de un año académico de trabajo formativo y reflexivo permanente, la transformación de los modelos de enseñanza de estos profesores. Se concluye que procesos formativos y de reflexión sobre la propia práctica permiten mejoras sustanciales en los modelos de enseñanza de educación ambiental en la educación básica.

Palabras clave: formación de profesores, educación ambiental, modelos de enseñanza.

Summary- In Colombia, the environmental dimension in the school is circumscribed to the transversal model, however; Teachers, in particular, of basic education do not have adequate, updated and broad conceptual frameworks that allow them to generate necessary actions against the objectives of environmental education and the training of citizens capable of making decisions about the environmental situations of the territories that inhabit. Teachers generally have reduced visions of the environment and environmental education and their actions are activists with little reflection or leading to real transformations. This research advocates giving importance to teacher training so that the teaching of environmental education at school is reflected and new models are promoted. The research is qualitative, transformative and presents the case of 6 natural science teachers from Ibagué Tolima in Colombia. It allows as results after an academic year of permanent formative and reflective work, the transformation of the teaching models of these teachers. The formative processes and reflection on the practice itself are concluded, allowing substantial improvements in the teaching models of environmental education in basic education.

Keywords: teacher training, environmental education, teaching models.

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I. Introducción

Vincular a los profesores en investigaciones donde ellos son actores principales, implica reconocer que hay aspectos de la enseñanza que es posible mejorar, así como darse cuenta de las potencialidades que poseen. Este tipo de investigaciones participativas vinculan de manera directa al profesor y su enseñanza, les permiten actualizarse y transformar sus prácticas de manera real. Al ser una actividad voluntaria, los profesores tienen la posibilidad de explorar un universo de alternativas para la enseñanza y para la investigación de su quehacer, ya que adquieren herramientas conceptuales, metodológicas y procedimentales que les permiten hacer un ejercicio permanente de observación, reflexión y transformación.

De esta manera, importa en esta investigación que los profesores que participan del proceso de reflexión y formación permanente, sean capaces de autoevaluar la manera cómo enseñan la EA o la vinculan a sus procesos de enseñanza y que, de manera autónoma, evidencien sus potencialidades y aspectos por mejorar; así, ellos mismos van fortaleciendo sus modelos de enseñanza al comprender los elementos conceptuales y estructurales que tienen que ver con la enseñanza de la EA.

Díaz (2006) expone el importante papel de los profesores con relación a su actuar profesional al decir que:

> El docente desde el deber ser de su actuación profesional, como mediador y formador, debe reflexionar sobre su práctica pedagógica para mejorarla y/o fortalecerla y desde esa instancia elaborar nuevos conocimientos, pues en su ejercicio profesional continuará enseñando y construyendo saberes al enfrentarse a situaciones particulares del aula... La reflexión desde la práctica implica la condición de un docente investigador; más real que ideal, pero; no obstante, a pesar de las formalidades declarativas se

mantiene una concepción, heredada de la tradición, de formar sólo para enseñar porque se supone que la investigación está reservada a los expertos o son otros profesionales quienes deben investigar los problemas de la educación, lo cual no es verdad", es decir, el docente no solo enseña, sino que desde esta enseñanza deben abrirse los espacios de reflexión e investigación de su propia práctica para transformarla.

En consecuencia, es necesario dar respuesta a esta situación y generar los espacios de participación de los profesores para investigar sobre sus prácticas, ya que, lo contrario se ha identificado como un problema. Así, por ejemplo, Shulman (citado por Vergara & Cofré, 2014) señala en sus investigaciones: "The great gaps that teachers present in the field of educational work, in terms of the way of teaching (communicating scientific knowledge), for which it raises the need to generate strengths both at a conceptual and pedagogical level (later I would call it didactic)," en aras de hacer comprensible de manera efectiva la ciencia a enseñar por parte de los estudiantes. En consecuencia, algunas investigaciones han hecho evidentes problemas relacionados con la enseñanza (y el aprendizaje) de las ciencias, Fenshman (1999, 2004, citado por (Velásquez, Flórez, & Tamayo, 2014) señalan situaciones como: supeditar la enseñanza de la ciencia a repetir hechos científicos, leyes y teorías y la dependencia de los libros de texto por parte de los maestros, de ahí que sea necesaria la formación del profesorado en este campo.

Con relación específica a lo ambiental, teniendo en cuenta los cambios naturales, económicos, sociales, políticos, entre otros; es decir, ambientales, que caracterizan el mundo de la contemporaneidad, se requiere que éstos sean abordados desde la escuela con miras a garantizar la inclusión de la dimensión ambiental y la generación de pensamiento ambiental en los diferentes actores escolares, profesores y estudiantes.

II. Problema

El problema de la formación de profesores en EA, es común observar las reacciones de los educadores de todos los niveles educativos por afrontar problemas relacionados con la EA debido a su falta o escasa formación en este campo de conocimiento. Según Eschenhagen (2003), en muchas ocasiones los profesores suscitan un activismo inmediatista ciego, sin reflexiones profundas y críticas del cómo, por qué y para qué la EA; este actuar conlleva a posiciones instrumentalistas y tecnologicistas, tanto a lo que se refiere al contenido enseñado, como también los modelos para su enseñanza, sin considerar las objeciones, revisiones y propuestas que se han hecho en esta área.

El problema de la formación de los profesores está relacionado con la naturaleza del campo de conocimiento de la EA. Este tiene un carácter interdisciplinar, sistémico y complejo, que todavía no está resuelto para el hecho de su enseñanza, ya que existe una incomunicación entre las disciplinas que dificulta avanzar en este desarrollo y, más bien, la EA en la escuela se ha convertido en activismo ecológico. Al respecto (García, 2006) plantea que.

La complejidad del proceso de enseñanza de la EA tiene que ver con la heterogeneidad de conceptos que cohabitan en ella, lo que origina diversidad de paradigmas teóricos, estrategias de acción y escenarios de análisis e intervención, y que al predominar concepciones reduccionistas en los profesores, se privilegia la "práctica" obviando el hecho de que para alcanzar los fines de la EA es necesario un marco teórico de referencia y el desarrollo de propuestas didácticas que den sentido a la acción.

En Ussa y Diaz (2014 p. 29) se identifica en relación a la formación docente en Educación Ambiental que aún es poco lo que se ha podido avanzar. Por lo cual, una problemática de las comunidades educativas en el campo ambiental tiene que ver con las deficiencias o incluso carencias de la formación profesional del profesor, que permita desde trabajos reflexivos identificar la integralidad de los diferentes modos de concebir el mundo y las posibilidades de vincular los diferentes tipos de saberes.

Por su parte, Terrón (2004), ubica como un problema de estructura para la enseñanza de la EA, además de la ambigüedad conceptual del campo, el hecho de la precaria formación del profesorado en temas teórico prácticos en la educación inicial y permanente y, como problemas conceptuales, el hecho de que los maestros perciben la EA como asociada o parte de la biología y, por ende, se ubican en una perspectiva naturalista-ecológica del ambiente. También Sauvé, (2005) afirma que la escasa formación de los profesores en el campo de la EA y la multiplicidad de enfoques existentes, dificulta una verdadera transversalización, cayendo en el mencionado activismo ecológico.

III. Antecedentes

En esta propuesta investigativa, se pone en tensión la llamada EA como eje transversal, ya que sin docentes formados en el área se hace difícil dicha articulación a las demás áreas del conocimiento y se corre el riesgo de transversalizar el saber ambiental de manera inadecuada. Sobre el tema de la EA, desde el modelo transversal, se encuentran mayores desarrollos en el marco referencial; sin embargo, esta no es una categoría de análisis para esta investigación.

Como dice Alba, (1992, citado por Eschenhagen, 2003) en la EA, el argumento de este activismo se centra en la "urgencia de las acciones" y en muchas ocasiones se muestra un franco rechazo a

la reflexión y a la construcción teórica. Este tipo de activismo derivado de una escasa o inadecuada formación de los profesores es reduccionista frente a lo que se espera de la EA y se arriesga a que sin claros fundamentos se aumente el distanciamiento entre la teoría y la práctica.

Interpretando a Leff (citado por Eschenhagen, 2003), existe un problema con la vinculación de la EA como adquisición de conocimiento sobre la naturaleza como objeto, sin dar casi importancia a los factores sociales, políticos, económicos, epistemológicos, ni a competencias éticas, críticas y estratégicas y al vincular, explicar o justificar la EA a través de isomorfismos provenientes solamente de la ecología.

La formación de maestros es un elemento central para la enseñanza de la EA; este campo de conocimiento como ya se dijo está caracterizado por su complejidad y una visión reduccionista de él dificulta su comprensión y por tanto su acción. Aunque la proliferación de programas de formación en EA va en aumento en todo el mundo, las tendencias formativas son variadas y no atienden a la totalidad de los maestros en ejercicio y en formación.

Falconi e Hidalgo (2019) citan desde diferentes trabajos de Leff (1986, 1998) que queda claro como la educación no puede estar separada del conocimiento de la vida y el ambiente, y que se requiere una nueva racionalidad social y ambiental para comprender la complejidad del mundo para con ello resignificar las concepciones de crecimiento económico sin límites, desarrollo y progreso y la urgencia por un mejor habitar.

Boada & Escalona (2005) y García (2002, citados por Flórez-Espinosa, Velásquez-Sarria, & Arroyave-Escobar, 2017). Plantean la importancia de generar programas que atiendan esta necesidad desde una visión compleja e integral que respondan a la multi y trans disciplinariedad que la caracterizan. Por su lado, Ferrera 2001, (citado por Flórez-Espinosa, y otros, 2017), hace un llamado para que la formación de maestros orientada a la enseñanza de la EA atienda el tratamiento didáctico de los contenidos a enseñar de forma holística, en vista de las dificultades a las que se ven enfrentados los profesores cuando se trata de la planeación y el desarrollo de sus clases.

Existen propuestas importantes encaminadas a la formación de profesores para desempeñarse en el campo de la EA, tanto en el ámbito local como internacional; tal es el caso de Bonil, y otros, (2012) quienes realizaron, en el contexto español (Catalunya) la investigación “Un modelo formativo para avanzar en la ambientalización curricular” orientada a profesores de primaria, secundaria y asesores en EA. Su modelo tiene como finalidad replantear la distancia que existe entre el planteamiento ideológico de la EA y su concreción práctica en las aulas que a menudo constituye un obstáculo para lo que denominan ambientalización curricular. Para ello, la propuesta formativa se fundamenta en el concepto de idea de alto nivel y su conexión con la práctica que se ha concretado en la determinación de cuatro esferas: conceptual, creativa, didáctica e investigación. Otros documentos hablan de la importancia de la formación docente en este campo, pero no precisan un modelo de actuación claro.

IV. Fundamentación Teórica

En sus prácticas de enseñanza los docentes recurren a diferentes estrategias, trazan caminos o rutas de acciones cargadas de sentido y significado que generalmente responden a sus procesos de formación, creencias y vivencias; estas se convierten en rutinas de actuación las cuales constituyen sus modelos de enseñanza. Para Porlán (1993, citado por Ruiz, 2012, pág. 29) los modelos de enseñanza se definen como un conjunto de conceptos, principios y esquemas de acción, articulados de manera dinámica y flexible para dar respuesta argumentada a problemas de índole educativo.

Los trabajos de Mayorga & Madrid (2010, citados por Ruiz, 2012), asumen el modelo como una acción reflexionada, donde en primer lugar se representa la tarea a ejecutar y se reflexiona sobre lo planeado con el fin de elegir la representación mental más adecuada para mejorar la práctica y enriquecer el conocimiento didáctico y, en segundo lugar, importa apoyar estas reflexiones y las decisiones a tomar en el aula con elementos científicos, sociales y culturales.

En el caso de la enseñanza de la EA en la escuela, la transversalidad específicamente en Colombia, se lleva a cabo de manera instintiva y bajo las concepciones propias de cada profesor, las cuales son diversas. Digo instintiva porque no están resueltos interrogantes esenciales al respecto, ¿Qué es transversalidad en EA?, ¿Qué es lo que se transversaliza de la EA en las diferentes áreas del conocimiento en la escuela? ¿Cómo asumen los maestros la transversalidad? ¿Cuáles son las apuestas formativas para que los profesores logren transversalizar la EA? En este contexto Los profesores deben atender la directiva ministerial dónde se insta a transversalizar diferentes ejes, entre ellos, la educación ambiental, pero lo hacen sin procesos formativos teóricos y metodológicos que permitan darle sentido a esta práctica.

Para el caso de la educación básica secundaria y media, es el profesor del área de ciencias naturales quien relaciona los estándares básicos de competencia de ciencias naturales y EA establecidos por el Ministerio de Educación Nacional; además en las instituciones educativas se desarrollan los Proyectos Ambientales Escolares (PRAE) como estrategia de la política nacional de educación ambiental, para incorporar la dimensión ambiental en la escuela. (Flórez-Espinosa, y otros, 2017); sin embargo, Rodríguez y García (2009),

por ejemplo, plantean como preocupación el hecho de la falta de un debate riguroso sobre el papel excesivo del activismo en la práctica de la EA en las instituciones educativas.

Una de las dificultades para la enseñanza de la EA se establece en la multiplicidad de conceptos de ambiente que coexisten en el pensamiento del profesor y, en sus modelos de enseñanza. Eschenhagen (2010) en su texto 'Los límites de la retórica verde', propone tres maneras de ver el ambiente: el ambiente como objeto, en tanto la naturaleza es "una cosa" que se puede medir, parametrizar, utilizar y, pues permite la interacción de elementos sociales y culturales con la naturaleza y la idea de que hacemos parte de un todo; y, el ambiente como crítica la visión dominante o complejidad, en tanto hay que hacerse preguntas frente a las maneras de pensar, llamadas por la autora, "bases epistemológicas", que están relacionadas con las maneras de actuar y de habitar el mundo; se trata en esta última acepción de confrontar las maneras de vivir, las maneras de gobernar y de someter, no sólo a lo que hemos llamado naturaleza, sino a la humanidad misma. la EA ha estado asociada a la educación ecológica y conservacionista.

Desde una mirada crítica, no se quiere decir que deba alejarse totalmente de esta perspectiva; lo que sucede es que el ambiente se concibe en la actualidad como complejo, interdependiente con otras disciplinas; los problemas ambientales no son sólo de la naturaleza y, en consecuencia, se integran lo social, cultural, político y económico, entre otros aspectos. Sin embargo, prevalecen en la escuela concepciones de ambiente sólo como la naturaleza, lo que nos lleva a un reduccionismo de lo ambiental y, por lo tanto, de su enseñanza. García (2004) afirma en consecuencia que, en la corta historia de la EA hemos centrado su enseñanza en los contenidos ecológicos ("lo verde") y de manera más actual se pasa a aspectos centrados en lo social e ideológico, dejando de lado la ecología.

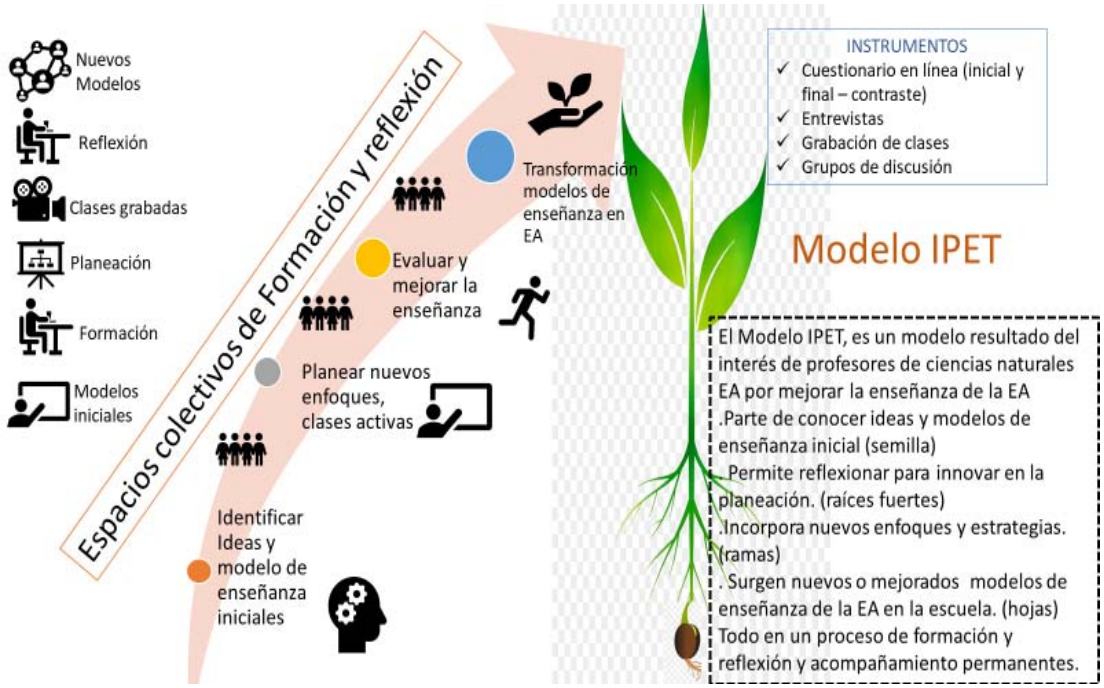
De igual manera existen visiones reducidas de la educación ambiental por parte de los profesores en ejercicio, generalmente asociadas al reciclaje o la celebración de fechas ambientales; en contraposición se asume en esta investigación una EA comprometida con la sustentabilidad de la vida, y aunque no es la responsable de encontrar alternativas de solución a los problemas que nos aquejan en la actualidad, sí tiene como objetivos la construcción de saber y pensamiento ambiental en el diálogo de saberes, buscando contribuir en el mejoramiento de las relacionas ser humanos, sociedad, naturaleza.

En la carta de Belgrado (1975) se afirma que la EA debe considerar al ambiente natural y al creado por el hombre en sus dimensiones ecológica, económica, tecnológica, social, legislativa, cultural y estética; se entiende así entonces la EA como un proceso continuo y permanente, interdisciplinario, intra y extraescolar, que debe enfatizar en la prevención y mitigación o solución de los problemas ambientales; tener una perspectiva mundial reconociendo las diferencias regionales, basarse en las condiciones ambientales presentes y futuras, examinar críticamente los procesos de desarrollo y crecimiento desde la perspectiva ambiental y promover el valor como la necesidad de la cooperación en la solución de los problemas ambientales y la posibilidad de cambios en las formas de habitar.

V. Diseño Metodológico

La investigación opta por el paradigma cualitativo para atender el contexto real y particular en el que se desarrolla la acción investigativa. Por tanto, no se desvincula a los sujetos de sus acciones particulares, ni de los significados que representan en su cotidianidad; más bien se toma conciencia de dichas acciones y significados y, se aportan herramientas para que los profesores vinculados al proceso reflexionen frente a su desempeño y mejoren su enseñanza en una combinación entre lo que generalmente realizan y consideran pertinente, alimentado por los nuevos aportes teóricos y metodológicos.

El diseño de la investigación obedece al resultado del proceso formativo orientado por el investigador principal y apropiado por los profesores participantes desde su interés por mejorar la enseñanza de la EA. En su desarrollo los profesores tuvieron un momento inicial para compartir lo que sabían y pensaban sobre el ambiente, la educación ambiental y otros aspectos relacionados con su enseñanza por medio de un cuestionario en línea, previo al inicio del proceso. Seguidamente, se concretó un cronograma de estudio y se establecieron encuentros quincenales para los debates y la formación entre pares. Se grabó una clase inicial para observar el modelo que se estaba desarrollando; se reflexionó de manera colectiva sobre la clases y modelo iniciales y se procedió a planear, desarrollar y grabar las siguientes clases (6), luego de los cuales siempre hubo reflexión crítica, espacio formativo y nueva planeación. Así durante un año académico los profesores lograron proponer o mejorar sus modelos de enseñanza la educación ambiental. Es de aclarar que hubo 4 momentos de caracterización para ver la evolución de los modelos enseñanza. Este modelo de formación y reflexión, se denominó IPET, cuyas siglas significan: Identificar, Planear, Evaluar para mejorar y Transformar la enseñanza de EA; fue un modelo emergente atendiendo a los rasgos de la investigación acción participativa IAP no preestablecido en su totalidad, si no alimentado por la propia dinámica de los profesores participantes a partir de una propuesta inicial de los investigadores. En la figura # 1 se muestra el diseño investigativo adoptado.



Fuente propia.

Figura # 1: Diseño de la investigación en el Modelo IPET

VI. Resultados

Se propone y valida un modelo de formación que tiene como centro la reflexión crítica, compartida y la formación permanente de los profesores que participan en espacios de cooperación y se nutren de tres componentes básicos: la planeación, el compartir del desarrollo de la clase y la experiencia de clase reflexionada, en medio de las cuales se responde las preguntas orientadoras (4) que guían los modelos de enseñanza que se van construyendo: ¿Por qué enseñar EA? ¿Qué enseñar en EA? ¿Cómo enseñar en EA? y ¿Cómo evaluar y mejorar la enseñanza en EA? los cuales permiten reconocer el pensamiento del profesor en relación a su desempeño en el aula y la manera como este evoluciona y mejora. A manera de síntesis general se presenta la gráfica #2

Fuente propia

Figura # 2: Resultados generales en el pensamiento y el desempeño de profesores derivado del Modelos de formación reflexión IPET en cada una de las cuatro caracterizaciones realizadas durante 6 clases en un tiempo de un año escolar.

En la columna de pensamiento (a la izquierda) se ubican de abajo hacia arriba las respuestas dadas por los profesores en diferentes momentos, en los cuales es posible ver su evolución, cambios en sus ideas, fortalecimiento o replanteamiento de estas. En la primera caracterización (antes de iniciar el proceso formativo crítico) por medio de un cuestionario en línea, se pueden identificar ideas de los profesores sobre ambiente y educación ambiental, en relación a ello hablan de medio ambiente, de la educación ambiental como la conservación, mencionan actividades como recolección de basuras y jornadas de embellecimiento institucional, las cuales se consideran activistas y poco reflexionadas, de igual manera se refieren al ambiente o medio ambiente pero alejado o como algo diferente de la educación ambiental. En la segunda caracterización luego de observar la primera clase dentro del modelo IPET y de responder a una entrevista y participar de la primera sesión de formación y reflexión crítica en grupo de discusión; los profesores hablan de ambiente desde la biología y desde las ciencias naturales, conciben la educación ambiental como una necesidad actual, empiezan a comprender el ambiente como un sistema donde no solo hay naturaleza sino aspectos sociales y culturales que interactúan con ella. En la tercera caracterización luego de desarrollar, grabar y observar las clases 2 y 3, es posible evidenciar avances, al relacionar el ambiente y la educación ambiental no solo con la biología, sino como y desde los problemas ambientales existentes, resultado de la formación inician a incluir en sus posibles ideas para la clase aspectos del enfoque de solución de problemas en el marco de la comprensión del ambiente como complejidad. En la cuarta caracterización luego de haber desarrollado las clases 4, 5 y 6, de haber participado de los encuentros de formación y reflexión crítica y de responder a una nueva entrevista y al cuestionario inicial en una segunda aplicación a manera a contraste, es posible evidenciar como los profesores piensan en la educación ambiental y el ambiente como un sistema complejo que involucra aspectos políticos y normatividad, además logran pensar la educación ambiental desde problemas y conflictos ambientales, y potencialidades.

En la columna de desempeño (a la derecha), es posible también observar, cambios, o evolución de los modelos de enseñanza propuestos por los profesores bajo el modelo formativo IPET; de abajo hacia arriba, igual que en la columna del pensamiento, aparecen los 4 momentos de caracterización, con las mismas fuentes de información (cuestionario, clases grabadas, entrevistas, espacios de formación y reflexión crítica, grupos de discusión). Se observa en la primera caracterización como sus clases son mono disciplinares y dogmáticas desde las ciencias naturales, sin articulación con la educación ambiental ni problematización de los contenidos; en la segunda caracterización aparecen los primeros intentos de transversalidad de la educación ambiental en sus clases de ciencias naturales (escuela primaria) o de bilogía (escuela secundaria), de igual manera inician la transformación de estrategias de enseñanza, pasando de clases magistrales al trabajo en equipo y al fortalecimiento del trabajo individual. Para la tercera caracterización sus modelos de enseñanza adquieren un fuerte componente del enfoque de solución de problemas, se da importancia al juego de roles (por ejemplo, representando los actores de un conflicto ambiental, o representando el rol de investigadores o científicos) los debates, la construcción de secuencias didácticas. En la cuarta caracterización, los profesores incluyen estrategias para el desarrollo de pensamiento crítico, estudios de caso, análisis de causa – consecuencia, conclusiones, argumentación y toma de decisiones; algunos profesores optan por dar espacio para desarrollar clases auténticas de educación ambiental, sin la dependencia de temas de las ciencias naturales, pero problematizando los contenidos con diferentes campos del saber.

De manera particular, a continuación, se presenta la tabla #1 con los cambios y mejoras en la construcción del modelo de enseñanza de la profesora del grado primero elemental en educación básica.

Tabla # 1: Cambios en el modelo de la enseñanza de la EA de la profesora de grado primero derivados de la participación en el modelo formativo[1] – reflexivo IPET

COMPONENTES DEL MODELO	CLASE # 1	CLASE # 2	CLASE # 3	CLASE # 4	CLASE # 5	CLASE #6
¿POR QUÉ ENSEÑAR EA?	No se tuvo en cuenta la EA	Desarrollar Sensibilización	Desarrollar Reflexión crítica. Relaciones con el entorno	Desarrollar Pensamiento crítico. Solución a problemas ambientales	Promover mejores Aprendizajes y el Pensamiento ambiental	Desarrollar Conciencia ambiental entorno al cuidado de la vida en todas sus formas. Fortalecimiento de valores Trabajo colaborativo

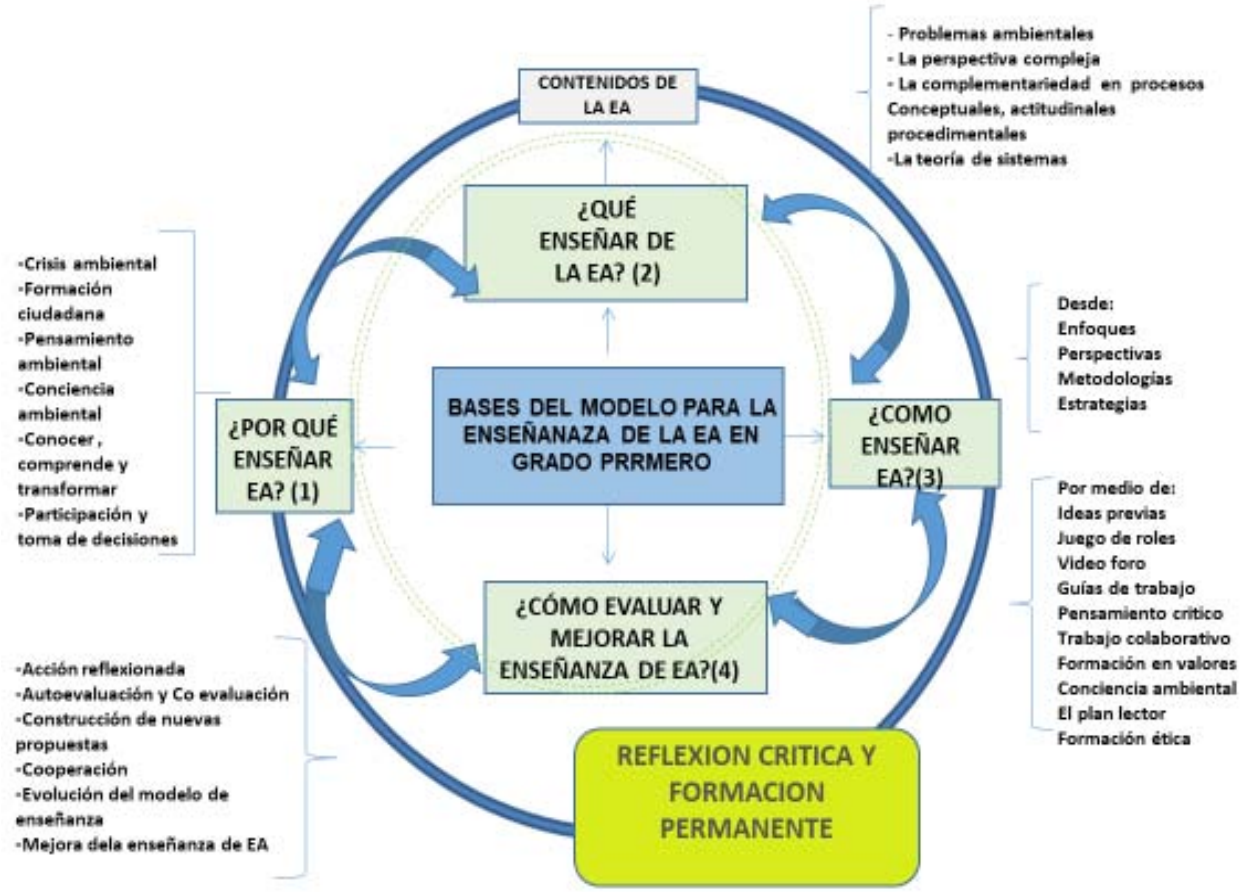
[1] Esta tabla es el resultado de la investigación desarrollada en el marco del programa Maestría en Educación ambiental de la Universidad del Tolima realizado por las profesoras Erika María Lopera y Gloria Marcela Flórez Espinosa en el año 2020

¿QUÉ ENSEÑAR DE LA EA?	No se tuvo en cuanta la EA	Cuidado de las plantas	Los estudiantes como investigadores en la huerta escolar	Problemáticas ambientales reales	La importancia de la buena nutrición y la relación directa de la comida empaquetada con la contaminación por residuos solidos	Articular la EA con el proyecto de plan lector desde el área de castellano y en otros espacios curriculares
¿CÓMO ENSEÑAR ASPECTOS DE LA EA?	Guías Ideas previas de los estudiantes conceptos	Preguntas problema. Comparación de estructuras Sensibilización. Ideas previas	plantea y desarrolla una clase basada en una experiencia práctica alrededor de la germinación de las plantas Juego de roles Materiales especializados como lupas libretas para la observación directa Practica fuera del aula	Por medio del video foro de dibujos animados sobre la depredación del hombre sobre toda forma de vida en el planeta Guía de trabajo. Resolución de problemas Socialización de ideas para la solución de problemas presentados en la guía	Estudio de casos de contaminación por residuos sólidos, confrontación directa con lo que trae en la lonchera de comida empacada frente a la hecha en casa. Sensibilización frente a los azucares y las grasas presentes en sus empaquetados.	El trabajo colaborativo con roles definidos de acuerdo a sus habilidades. El cuento como herramienta de aprendizaje ambiental. Guía de sopa de letras con palabras claves del cuento. Producción de canción o poesía además de mensaje para el conejo ambientalista y crítico, protagonista del cuento. Evaluación de la clase y sus actividades con un ticket de salida.
¿CÓMO EVALUAR Y MEJORAR LA ENSEÑANZA DE EA?	Fortalecer la conceptualización de la profesora para avanzar en el modelo. Integrar la EA a la clase de ciencias naturales.	Proponer en las clases tareas vivenciales y, desde la articulación de temas ambientales. Para fomentar el conocimiento ambiental y sensibilizar a los estudiantes.	Se avanza el proponer que los estudiantes Socialicen y reflexionen. Realizar salidas al campo con los estudiantes dejan la puerta abierta a un sin número de posibilidades de los temas que se pueden trabajar con los estudiantes en relación a las ciencias naturales y la educación ambiental, es posible reflexionar sobre muchos aspectos que se observan y no estaban planeados.	El cambio de rol del profesor. Una mejor planeación, El uso de nuevas estrategias El enfoque crítico y los materiales educativos.	Preparar una clase con una articulación conceptual con un tema de ciencias naturales como la nutrición. Plantear pequeños estudios de casos acorde a las realidades ambientales de los niños. El confrontar situaciones cotidianas como la comida empaquetada con la comida hecha en casa y su afectación en la salud de los niños y al ambiente.	Para La transversalidad de la enseñanza de la EA es necesario tener una visión más amplia en la articulación de los temas" y para "potenciar" su enseñanza. Desarrollar estrategias y evaluar las mismas en cuanto a su efectividad. Fomentar el trabajo colaborativo dese las edades iniciales para que desarrollen competencias y habilidades sociales Implementar el auto y co evaluación de las actividades. Hacer los ajustes necesarios en la preparación y desarrollo de las clases, incluir la resolución de problemas y promover mejores aprendizajes. Tener claridad conceptual lo mejora todo.

La tabla presenta la reflexión crítica y propuestas de mejora clase a clase elaborados por la propia profesora de grado primero quien construyó un modelo enseñanza de la educación ambiental basado en el juego de roles y la solución de problemas, poniendo a prueba los aprendizajes y reflexiones obtenidos entre pares., teniendo en cuenta las preguntas orientadoras propuestas como base para la construcción o mejoramiento de su modelo.

Finalmente, después del proceso formativo bajo el modelo IPET, la profesora del grado primero logra construir un modelo dinámico que ajusta a sus

necesidades de clase para la enseñanza de la educación ambiental en articulación con la enseñanza de las ciencias naturales siguiendo las orientaciones para el proceso, concebidas como elementos conceptuales y estructurales de su propuesta didáctica, como puede verse en la siguiente figura:



Fuente: Elaboración propia: Flórez y Lopera, (2022)

Figura # 3: Modelo de enseñanza de la educación ambiental construido por la profesora del grado primero de educación básica bajo el modelo IPET

VII. Conclusiones

Los profesores de educación básica requieren de procesos formativos, investigativos, situados, permanentes y acompañamiento para mejorar sus modelos de enseñanza de la educación ambiental.

La formación logró que los profesores avanzaran de sus ideas reducidas de ambiente y la educación ambiental, lo cual deriva en planeaciones y procesos de enseñanza pertinentes y contextualizados.

El modelo de formación y reflexión IPET permitió diferentes estrategias de comprensión y mejora de las prácticas en el aula de educación ambiental en la educación básica.

La formación y reflexión crítica centrales en el modelo IPET permitió mejorar los modelos de enseñanza de la educación ambiental en la educación básica de los profesores que hicieron parte de la investigación.

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Coding Activities for Children with Autism: A Sample Application

By Fatih Aydoğdu & Figen Gürsoy
Erzincan Binali Yıldırım University

Abstract- *Purpose:* The research was conducted to test the effects of coding activities on the development of children with autism.

Method: Five children aged 6-8 who received education from a special education application center in Erzincan city center participated in the research. In the study, coding activities consisting of four sessions, two sessions a week, were made for two weeks. Coding activities consist of shadow finding, mate finding, pattern creation and completion activities. Dunn Sensory Profile for mothers in order to determine the effect of coding activities; Interview Form and Questionnaire for teachers; Concept Evaluation Form was applied to children.

Results: As a result of the research, it was determined that coding activities increased the multi-sensory processing, attention, visual perception, interest and acting in accordance with instructions, motor, hand-eye coordination, imitation ability, interest, fun, memory retention, eye contact, and conceptual skills of children with autism. In addition, it was determined that children with autism increased their ability to match and complete objects, find the shadow of objects and create patterns in relation to the application.

Keywords: *coding, autism, child, skill.*

GJHSS-G Classification: *LCC: RJ506.A9 C65*

Strictly as per the compliance and regulations of:

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Discussion and Recommodation: In line with the results, it is recommended that coding activities be integrated into the educational environments of children with autism.

Keywords: coding, autism, child, skill.

I. Introduction

The proliferation of technological tools and programming environments provides the opportunity for creative coding activities for children and increases the need for appropriate teaching practices (Papavlasopoulou, Sharma, & Giannakos, 2020). Due to rapid changes in technology, children are increasingly exposed to these systems. This naturally makes children wonder about how objects work or move automatically (Lee and Junoh, 2019). As a result of the opportunities offered by new technological tools and programming environments, coding practices have enabled the design of effective learning experiences (Papavlasopoulou, Giannakos, & Jaccheri, 2019). Coding is a relatively new form of literacy but has become an essential tool for reading, interpreting data and communicating with others in a digital society (Bers, 2018a).

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Studies on coding activities have increased in recent years and its effect on many skills has been proven. By participating in coding activities, children learn critical thinking, higher-order thinking, problem solving (Çakır et al., 2021), creative thinking (Çakır et al., 2021), numerical thinking (Tonbuloğlu & Tonbuloğlu, 2019), executive function (Arfé, Vardanega and Ronconi, 2020), scientific process (Turan & Aydoğdu, 2020), algorithmic thinking (Shim & Kwon, 2019), design (Tuomi et al., 2018), logical thinking (Bocconi et al., 2016) and collaboration (also Oliveira et al., 2018) can improve their skills. Constructivist theory clarifies how coding activities can support so many skills. There are strong opinions for children who are supported by a constructivist approach to learn to code (Kafai & Burke, 2015). Constructivism assumes that when children are deeply and actively involved in constructing their own meaningful structures, their interactions with others are strengthened, they structure the learning process themselves, and thus knowledge is gained better (Papavlasopoulou, Giannakos, & Jaccheri, 2019).

Coding-based practices are important for the development of children with normal development, as well as supporting the development of children with special needs (Cannon et al., 2011; Hwang and Taylor, 2016; Israel, Maynard, and Williamson, 2013; Meyen and Greer, 2010; Pennington et al., 2014; Taylor, Vasquez & Donehower, 2017; Taylor, 2018; Van Staden, 2013; Waters & Boon, 2011). Among disability types, students with ASD are educated in more inclusive environments with ever more access to general education curriculum, including STEM education (Fleury et al., 2014). As a result of the social and communication difficulties of children with ASD, opportunities such as repetition and predictability provided by coding activities instead of learning with adults or peers cause them to turn to coding practices (Knight et al., 2019).

Coding is a complex and abstract process; therefore, teaching and learning can be difficult (Çakır et al., 2021). For children with disabilities, this process can be more complex. It is stated that children with disabilities generally underperform in STEM education compared to their typically developing peers (Basham & Marino, 2013). Especially considering the competencies of children with autism, it seems more difficult to design coding activities. Although there are many applications that can help children with ASD, there is little empirical

evidence that any of them have positive effects, and these difficulties may be said to be effective (Hourcade et al., 2013). To overcome various obstacles to learning to code (e.g. difficulty, boredom, confusion, etc.), appropriately designed and engaging coding activities are needed (Papavlasopoulou, Giannakos, & Jaccheri, 2019). However, by integrating coding into pedagogical contexts in an intuitive and engaging experience (Sáez-López, Román-González, & Vázquez-Cano, 2016), all developmental areas of children can be supported with carefully selected and developmentally appropriate coding practices (Bers, 2018).

Research on approaches, models and regulations regarding coding practices for children with autism spectrum disorder (ASD) is limited (Ehsan et al., 2018). As a reflection of this idea, it was aimed to test the effect of coding activities prepared for children with autism.

Within the scope of the research, "Do coding activities support the development of children with autism?" The answer to the question has been sought.

II. Method

a) Research Model

This study, which focuses on the effects of coding activities on the development of children with autism, was conducted with a single-subject experimental design model based on the quasi-experimental method.

b) Participants

Five children with autism between the ages of 6 and 8 who were educated in a special education application center in Erzincan city center were included in the study. The teachers' views on the developmental characteristics of children with autism are as follows:

C1: He is 8 years old and a boy. There is a distraction. When we're done, it swings sideways when it's released. He has no behavioral problems that harm others. It is considered academically successful. What is said repeats, learns early. However, what they learn is not permanent. Knows some basic concepts. He makes eye contact, but cannot initiate communication himself, is sensitive to strangers, becomes restless when in the same environment with strangers. Fine motor skills are weak.

C2: He is 6 years old and a boy. His attention span is scattered, unable to maintain joint attention and interest. Has difficulty communicating with eye contact. They do not have communicative skills such as greetings and goodbyes. Has trouble with academic skills. They have poor skills in recalling what they have learned from memory to use when needed.

C3: He is 8 years old and a boy. Fulfills assigned tasks and obeys instructions. He forgets very quickly. Attention span is normal. Makes eye contact, communication is good. When a concept is to be taught, he learns well during the activity. However, he has difficulty remembering what he learned in the next time period. Can't generalize. She cries when she can't do something.

C4: He is 7 years old and a boy. He acts in accordance with the instructions. There are not many problem behaviors. He can match, his visual perception is very good. Has limited area painting skills. Concept knowledge is very little. For example, it pairs concepts as big and small. But he does not know the names of the beings. Auditory perception is very low.

C5: He is 6 years old and a boy. Attention span is very short. He has a focus problem. He often avoids making eye contact. He sometimes exhibits aggressive behavior. His fine motor skills are good. Recognizes colors and numbers. He can mostly follow the instructions. Imitation skills are good, but there is a tendency to repeat the same things. Likes social reinforcers, loves competition.

III. Coding based Application Design

The application was made using the "Scratch 3.0 Block" based coding tool. The Scratch 3.0 program was downloaded from (https://scratch.mit.edu/download) and installed on the computer. It is planned to carry out activities such as "finding a shadow", "finding a mate", "creating a pattern" and "completion" to be used in the application.

In this context, the animals to be used in the application (https://www.pngwing.com/tr) and “google images” (https://www.google.com.tr/imghp?hl=tr&tab=ri&authuser=0&ogbl) site “.png The pictures have been downloaded with the file extension”. The shadows of the downloaded animal images were removed using the “Corel Draw” program to use in the “shadow finder” activity.

The activities were carried out in the following order.

Finding Shadow: A blank project page has been opened in Scratch. Colorful images of animals and shadow images made with the “Corel Draw” program were added to the program as puppets. Decor is added from the decor section and the event name is written in the decor editing section. When the command to start the activity is given, the shadows of the animals appear on the screen in order. After the animals appear on the screen, the color image of the animal whose shadow is desired appears in the middle. The positions of the shadows of the animals have been determined and the code has been added. Drag mode, non-drag code has been added to prevent shadows from dragging. In colored animal images, it is determined which animal will appear on the screen, respectively. In order to indicate that if the child carries the image of the colored animal on a wrong animal shadow, a code was written

to indicate that the answer would be wrong, so that the colored image would not be placed in the wrong animal shadow and would go back to its middle position.

In Figure 1, visuals related to the design of the shadow finding activity are presented.

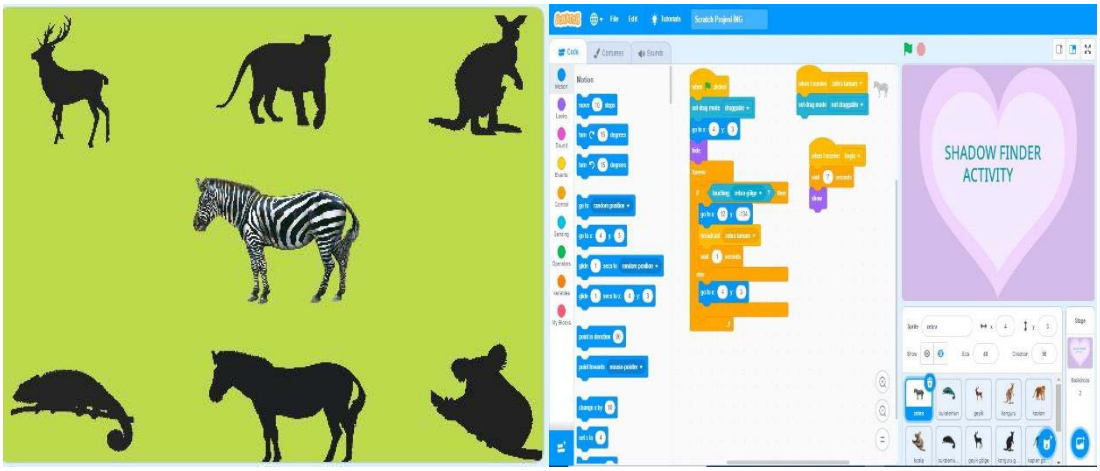

Figure 1: Designing the shadow finding activity

Finding a Spouse: A blank project page has been opened in Scratch. Images of animals were added as puppets twice. Decor is added from the decor section and the event name is written in the decor editing section. The first added dummy will appear on the side. The second added puppet is positioned in the middle in such a way that its size will constantly increase and decrease and its shape will be visible. When the child clicks on the partner of the puppet that appears in the middle, that puppet will disappear and the next puppet will be passed. If he clicks on the wrong dummy, it will not disappear. Code that cannot be dragged into puppets has been written.

In Figure 2, the visuals related to the design of the mate-finding activity are presented.

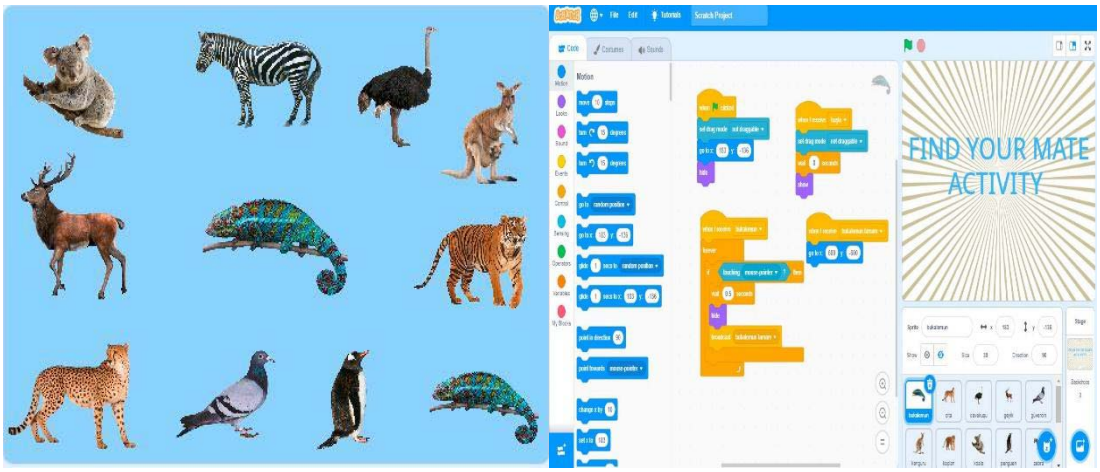

Figure 2: Designing the mate-finding activity

Creating Patterns: A blank project page has been opened in Scratch. Images of animals were added as puppets to form a pattern. A question mark puppet has been added to ask about the next animal. Decor is added from the add decor section and the event name is written on the decor from the decor editing section. After the first animal appeared, attention was drawn by increasing and decreasing its size. Then the second animal appeared and the same attention was drawn by increasing and decreasing the size. Then, the first animal appeared in the third row, again conspicuously. The fourth animal, on the other hand, appeared as a question mark puppet and immediately appeared in both animals in the middle of the screen. If the child chooses the right one of these animals, the pattern will be completed and there will be a transition to the other pattern level. If it makes a wrong pattern, the code is written so that the puppet will not settle and the process will continue until the right pattern is found.

In Figure 3, visuals related to the design of the pattern-making activity are presented.

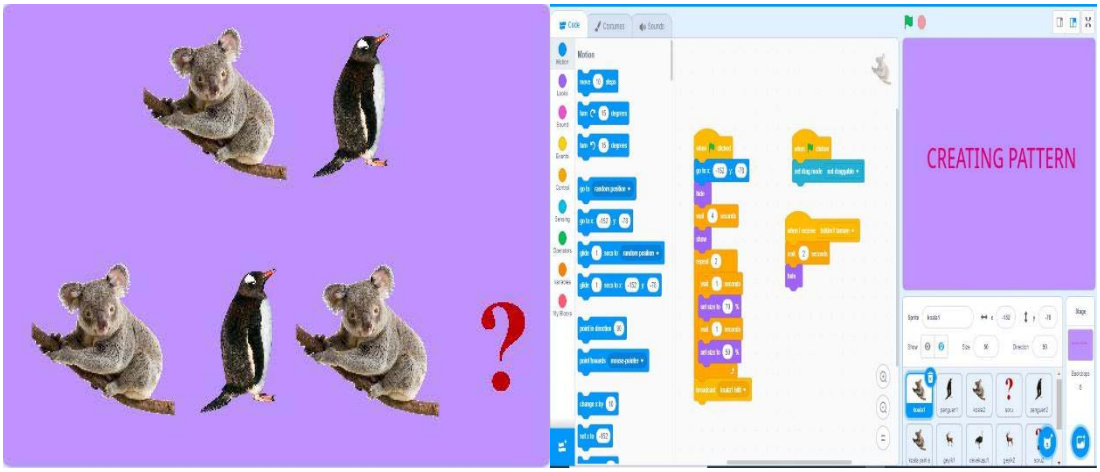

Figure 3: Designing the pattern-making activity

Completion: A blank project page has been opened in Scratch. Animal images to be used are added as puppets. Decor is added from the decor section and the event name is written on the decor from the decor editing section. The added animals are divided into two from the costume editing part and positioned on the screen. Necessary codes have been written so that children can complete the process using either the lower part or the upper part. If the correct match is made, the completed version of the animal will be displayed on the screen. If a wrong completion is made, the puppet will return to its original position and the completion will not take place until the student reaches the correct result. After all the completion process is completed, it will be passed to the vertical completion section.

In Figure 4, visuals related to the design of the completion activity are presented.

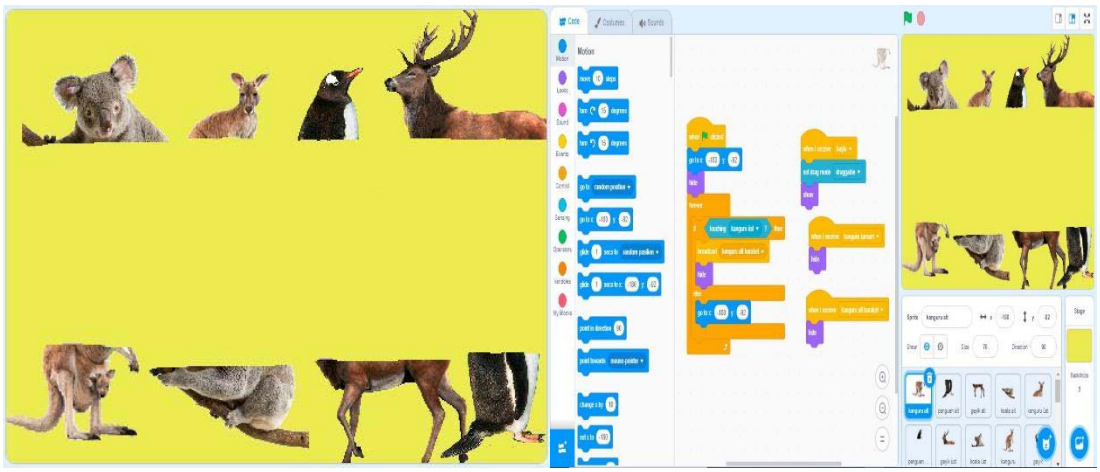

Figure 4: Designing the completion activity

a) Implementation Process

Before the implementation phase, information about the developmental characteristics of the children was collected. In this context, information was obtained from the school administrator about the demographic information of the children, the types and degrees of disability. Afterwards, the children's teachers were interviewed one by one and information was given about the application, and feedback was received on whether the children could participate in the application. It was thought that the use of animals with autism in coding activities would leave more lasting effects, since animals show vitality with their voices and movements and are interesting creatures. The names of the animals in a list with images of different animals were asked to the children, and it was determined which animals they did not know. Animals such as cats, dogs, horses and chickens that children with autism frequently see in their environment were considered to be used in practice, but in order to determine the effectiveness of the program in acquiring concept knowledge, it was decided to use mostly animals whose names the children did not know. In this context, animal images such as chameleon, cheetah, ostrich, deer, pigeon, kangaroo, tiger, koala, penguin and zebra were used.

The application was carried out two days a week for two weeks. The applications were completed in four sessions: "shadow finding", "matching", "patterning" and "completion". The applications were carried out in an empty practice class under the supervision of a teacher in the classroom where the children were educated. The children took turns coming to the application class with their teachers from their classrooms, and one-to-one application was made by the researchers. During the application, the teachers both supported the researcher in the orientation of the children to the activities and were in the application class as an observer. Children were not interfered with during the application, and they were expected to experience the activities to be done by noticing them. For children who did not understand the application, the researcher made an exemplary application and became a model for the child, and then the child was given the opportunity to experience the activity again. The applications were made to the children twice. In each session, the activity done in the previous session was repeated and the children were reinforced. The applications took approximately 10-15 minutes for each session and child. Since children with autism will have more health problems than children with normal development in general, the pandemic process was taken into consideration, shielding, mask and gloves were worn during the application, and cleaning rules were meticulously observed.

In Figure 5, visuals related to the implementation of coding activities are presented.

Figure 5: Implementation of coding activities

b) Measures

Dunn Sensory Profile, Interview Form, Questionnaire Form and Concept Evaluation Form were used in the research.

Dunn Sensory Profile: Developed by Winnie Dunn (1999), Kayihan et al. (2015), the assessment tool, adapted to Turkish culture, measures the sensory profile of children aged 3-10 years. The test is completed by the person (parent or caregiver) with whom the child has one-to-one contact in his daily life. The Sensory Profile Test consists of three parts: sensory processing, modulation (concentration), behavioral and emotional responses. In this study, the multi-sensory processing (7 questions) subsection of the sensory processing

section was used. During the test, it is asked how often the child does the behavior specified in each question. In response to each question: always (0% of time for normal behavior), often (25% of time for normal behavior), sometimes (time for normal behavior 50% of time), rarely (time for normal behavior % of time) 75), never (normal behavior duration 100% of the time), is asked to tick one of the options. While statistical evaluation is made, scoring is made from 1 to 5, with "always" 1 point and "never" 5 points. In this evaluation, 1 point indicates the situation with the most impaired behavior related to the sensory profile and 5 points indicate the situation with completely normal behavior.

Interview Form: This form was developed by the researcher in order to determine the contribution of teachers' coding activities to children with autism. In the form, questions were asked to the teachers about the behaviors they observed in children and their achievements during and after the coding activities.

Questionnaire Form: This form consists of closed-ended questions to measure the general competencies of children with autism (attention, visual perception, reaction to stimuli and compliance with instructions) and application competencies (shading, finding a partner, creating and completing a pattern) of teachers' coding activities. The questionnaire is scored between 1-5. While 1 point indicates the lowest level of skill, 5 points indicate the highest level of skill.

Concept Evaluation Form: This form was created by the researcher. Animal pictures are shown while applying the form. When the picture is shown to the child, "What is it called?" and if he knows, the "knows" tab is marked, if he does not know, the "doesn't know" tab is marked. Children were asked about the names of animals such as chameleon, cheetah, ostrich, deer, pigeon, kangaroo, tiger, koala, penguin and zebra.

c) Data Collection

Before collecting the data, necessary permissions were obtained from the Human Research Ethics Committee of Erzincan Binali Yıldırım University (Protocol No: 04/07, Date: 31/03/2021). Information was given about the purpose of the researcher and the application process by interviewing school administrators and teachers. Afterwards, the parents of the children were interviewed, detailed explanations were made about the purpose and importance of the coding activities to be applied to the children, their contributions to the children, and the implementation process, and they were asked to sign the parent consent form. Dunn Sensory Profile was applied to the mothers before and after the application. The questionnaire form was applied to the teachers before and after the application. The interview form was applied to the teachers after the application. The Concept Evaluation form was applied to the children before and after the application.

d) Analysis of Data

In the study, t-test was performed for dependent samples in the analysis of the data obtained from the Dunn Sensory Profile. Thus, it was tested whether there was a significant difference between the pretest and posttest. Average scores were obtained in the questionnaire form applied to the teachers, and thus, comments were made about the results before and after the training. Interviews with teachers were reported using descriptive analysis method. The results obtained from the concept evaluation form were compared by making percentage calculations.

IV. Results

a) Data Obtained from Mothers

The pretest-posttest results of the multiple sensory processing scores of children with autism are given in Table 1.

Table 1: T-Test Results for Dependent Samples Regarding the Difference Between Multisensory Processing Post-Test Scores and Pre-Test Scores of Children with Autism

Dependent variable	Group	n	$\bar{X}$	SS	Sd	t	p
Multi-sensory Processing	Pre-Test	5	17,40	2,96	4	-2,994	,040
	Post-Test	5	22,00	1,41			

When Table 1 is examined, it is seen that the multi-sensory processing post-test scores of children with autism are significantly higher than the pre-test scores. Accordingly, it can be said that coding activities have a significant effect on the multi-sensory processing scores of children with autism.

Data Obtained from Teachers

1. Results Obtained from the Interview Form

C1's Teacher: After the practice, the children began to say the names of the animals. Although the implementation period of the activities was short, he learned new animal names. It focused more easily on coding activities than our activity apps. Attention span increased. Because the activities caught the attention of the child. Motor skills and hand-eye coordination improved. He started to use the laptop mouse better. His visual perception is better developed. The ability to imitate has improved. He started making the movements and sounds of the animals he learned.

C2's Teacher: Thanks to the coding activities, the child learned animals that he did not know before. He wasn't normally a boy who made his reactions clear. However, it was obvious that he was having fun during this event. At first, he was hesitant to come to class for practice. When she saw that the activities were fun, she started to give positive reactions. Completion and matching activities in coding activities improved his attention.

C3's Teacher: He was interested in coding activities, he was eager and excited about doing the activities. These events attracted more attention. In the coding activities, the child could see the completed version of the activity. So, for example, when we have the find your mate activity in the activity books, the child matches half of an entity with the other half using a pencil. He could not see the combined state of beings. In coding activities, the child connects the two halves of the entities with the mouse and can see the entity as a whole. Therefore, I think that their visual perception is very well developed.

C4's Teacher: Visually, it became a more permanent application. The child is already interested in the digital environment. So it was about coding activities. After the application, the number of animals he knew increased. Focus time lapsed. He was very enthusiastic about coming to the practice class. As his interest increased, his swinging behavior decreased during the activity. He paid more attention to the instructions given about the activity and directed towards the goal.

C5's Teacher: He confused the concepts as he had difficulty in memorizing what he had learned. At first, he could not complete the activities. But then he focused. He was very excited while doing the activities. He was making better eye contact during the application. I once asked him if he liked the activities. He said that he liked it very much, that he was happy. He was very careful in finding the shadow of animals at events.

2. Results Obtained from the Questionnaire Form

Table 2 shows the average of the results of the answers given by the teachers before and after the application on general competence and practical competences of children with autism.

Table 2: Results Obtained from the Questionnaire Form

Features	Before application ($\bar{X}$)	After (application ($\bar{X}$))
General qualification items		
1. The child has a good attention span, the child is focused.	2,4	3,6
2. The child's visual perception level is high.	3	3,4
3. The child responds positively to different/interesting stimuli.	2,4	3
4. The child acts in accordance with the instructions.	1,8	2,4
Application-related items		
1. The child matches the given object with its shadow.	3,2	3,4
2. The child finds the match of the given objects.	3,2	3,4
3. The child places the appropriate object in the empty place in a given pattern.	3,2	3,4
4. The child completes half by finding the other half of the given object.	3	3,4

When Table 2 is examined, it is seen that the post-training averages of children's attention, visual perception, reaction to different/interesting stimuli, and acting in accordance with instructions have increased compared to pre-education. When the results of the application skills are examined, it can be said that the skills of finding the match of the objects, completing the pattern, finding the other half of the objects and matching the objects increased after the training.

b) Results from Children

The results of the answers given by the children with autism regarding the concept evaluation form before and after the application are presented in Table 3.

Table 3: Results of the Concept Evaluation Form

Sequence No.	Concepts	Before application		After application	
		Know	Don't know	Know	Don't know
1	Chameleon	-	5	1	4
2	Cheetah	-	5	2	3
3	Ostrich	-	5	2	3
4	Deer	1	4	2	3
5	Pigeon	-	5	1	4
6	Kangaroo	1	4	3	2
7	Tiger	-	5	4	1
8	Koala	-	5	1	4
9	Penguin	2	3	4	1
10	Zebra	1	4	2	3
Total (f)		5	45	22	28
Total (%)		%10	% 90	%44	% 56
Rise (%)		%44-%10= %34			

While the number of animals children knew before the application was five (10%), the children knew the names of 22 (44%) animals after the application. The rate of increase in the number of animals that children know has been determined as 34%.

V. Discussion and Conclusion

According to the results obtained from the evaluation form applied to the mothers, it was determined that the multi-sensory processing skills of the children with autism increased significantly after the education compared to the pre-education. The visuality of coding activities, their attractiveness, the opportunity for children to observe the results of the activities, and the fact that they provide opportunities such as giving instructions during the application can support their sensory development. According to our research, there is no research to determine the effect of coding activities on the sensory processing skills of children with autism. However, since providing more stimuli to children with autism supports their sensory processing skills (Case-Smith, Weaver, & Fristad, 2015), coding activities are likely to support their sensory processing skills. Children with special needs show lower performance in STEM applications than their peers (Basham & Marino, 2013). However, coding activities prepared in line with the developmental characteristics of the disabled and especially the children with autism, who are in the more disadvantaged group in terms of sensory processing skills, can support their development at a higher level.

According to the results obtained from the questionnaire form applied to the teachers, it was concluded that coding activities increased the attention, visual perception, interest and ability to act in accordance with the instructions of children with autism. However, after the application, children with autism compared the objects before the application; It was determined that the ability to find the shadow of objects and create patterns increased. According to the results obtained from the open-ended questionnaire applied to the teachers, it was determined that coding activities increased the skills of children with autism such as vocabulary, attention/focus time, motor skills, hand-eye coordination, visual perception, imitation ability, interest, having fun, keeping in mind, and making eye contact. has been done. Coding activities support children's skills as they include interesting and fun applications. It is stated that integrating coding into pedagogical contexts in an intuitive and interesting experience can change children's skills such as logic, critical thinking, problem solving and their attitudes towards computer use (Sáez-López, Román-González, & Vázquez-Cano, 2016). It has been revealed that applications made with robotic coding improve the cooperation (Wainer et al., 2010), communication (Knight et al., 2019), hand-eye coordination (Sullivan & Bers, 2013) and basic collection (Yikmis, 2016) skills of children with autism.

According to the concept knowledge form applied to children with autism, it was determined that the concept knowledge after education (44%) increased significantly compared to before education (10%). Since coding activities offer visual stimuli, the concept information of the visual is better memorized and remembered better when asked. Studies to determine the effect of coding activities on the concept knowledge of children with autism are limited. When technology-based studies were examined, activities were applied using multimedia to teach children with autism to verbally describe letters, syllables, words, text, reading comprehension and composition. As a result of the research, improvements were recorded in sentence writing, phonological synthesis skills and writing skills of children with autism (Basil & Reyes, 2003). Similarly, multi-sensory coding strategies applied to hearing-

impaired children were found to be effective in the development of reading and vocabulary skills (Van Staden, 2013).

There is limited research on STEM teaching; It is stated that there are no studies evaluating coding, robotic or programming skills as dependent variables. However, research has pointed out the problems that students with disabilities may encounter during their performance in STEM education. However, among these, very few have openly discussed issues related to individuals with autism spectrum disorder (ASD) (Ehsan et al., 2018). This research is an important research in terms of filling the gap in terms of investigating the effect of coding activities for children with autism. However, it is considered important to ground the research within the framework of constructivist theory. Coding is the area where constructivism theory is widely applied (Kafai & Burke, 2015). According to this theory, learning is gained to the extent that children experience the active construction of works that can be seen by the world and are acquired through doing (Papavlasopoulou, Giannakos, & Jaccheri, 2019). In line with this view, the research was based on coding activities, children were expected to complete the activities themselves, they were not intervened unless it was necessary, and they were supported by giving positive feedback.

In the study, the effects of coding activities on many developmental characteristics of children with autism were tested. The results reveal that coding activities make significant contributions to the development of children with autism. In fact, coding events are now featured on many digital event pages. However, these activities should be programmed within the framework of their competencies, taking into account the developmental characteristics of children with autism. In this context, priority should be given to designing coding activities aimed at acquiring basic skills for children with autism. Technology classes should be established in schools where children with autism are educated, and digital-based activities should be offered within the framework of the program. Practical training on digital activities and applications should be given to teachers of children with autism and special education teacher candidates. Researchers should design coding activities for children with moderate and severe autism disabilities and their effects on different developmental areas should be tested.

a) Limitations

Since the research was conducted during the pandemic period, it was able to be conducted on five children. Because parents do not want to send their children with autism to school due to the epidemic. However, since the designed activities are not suitable for children with moderate and severe autism, they were not applied to more children. The language and intellectual disability problems of children with moderate and severe autism were not included in the study, since children's problems in understanding the instructions and giving appropriate answers to the instructions were limited. Another limitation of the study is children's difficulties in using the computer mouse. As a contribution of some teachers coding activities; Although hand-eye coordination improved because children used mice during activities, some children had difficulty using mice. Considering this limitation, subsequent researchers on the subject can apply coding activities using touch screens, taking into account the developmental characteristics of children.

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Qualities of an Effective Teacher: The Perspectives of Tertiary-Level Students in Bangladesh

By Maisha Sadaf
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Abstract- Effective teaching involves valuable interactions between teachers and students which can facilitate students' learning process. It makes a positive impact on the learners' learning process. Good teachers are a part and parcel of effective teaching. They can make a congenial learning environment inside the classroom and motivate their students. Effective instructors play a vital role in the academic field of tertiary-level students. They can guide their students to build up their academic as well as future professional skills. Good teachers can also increase the curiosity of the students to learn new things by implementing different teaching techniques inside the classroom. In a developing country like Bangladesh, some teachers are not qualified enough and they lack sufficient training. Effective teachers are inadequate in the context of Bangladesh.

Keywords: effective teaching, teachers, training, qualitative methods, positive, negative qualities, effective communication.

GJHSS-G Classification: LCC: TP156.P4

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Qualities of an Effective Teacher: The Perspectives of Tertiary-Level Students in Bangladesh

Maisha Sadaf

Abstract- Effective teaching involves valuable interactions between teachers and students which can facilitate students' learning process. It makes a positive impact on the learners' learning process. Good teachers are a part and parcel of effective teaching. They can make a congenial learning environment inside the classroom and motivate their students. Effective instructors play a vital role in the academic field of tertiary-level students. They can guide their students to build up their academic as well as future professional skills. Good teachers can also increase the curiosity of the students to learn new things by implementing different teaching techniques inside the classroom. In a developing country like Bangladesh, some teachers are not qualified enough and they lack sufficient training. Effective teachers are inadequate in the context of Bangladesh. The main objective of this study is to identify the qualities that teachers should have to make their students efficient in every sphere of life. This study is also important for understanding the contributions of good teachers to students' academic performances. The researcher followed qualitative methods for this study. The researcher took semi-structured interviews of ten participants all drawn from a private university in Bangladesh. Based on primary data, the researcher found that teachers have both positive as well as negative qualities, for instance, classroom management, loving and monitoring their students, creating effective communication, biased, strict, and commercial mindset, etc. This study explored the qualities that students expect from their teachers, the challenges students face while becoming effective teachers, and some suggestions through which students can become good teachers in the future.

Keywords: effective teaching, teachers, training, qualitative methods, positive, negative qualities, effective communication.

I. Introduction

a) Importance of Effective Teachers

Teachers play a significant role in the lives of students. They provide knowledge to the students which is essential for their future careers. Effective teachers have a great impact on student's academic performances. Good teachers always try to monitor and assess their students in a proper way. They love their students and try to show them the right path in their lives. Block, Crochet, Jones & Papa (2012) explained twelve major characteristics of effective teachers. Among these characteristics are clarity, fruitful interaction with students, learner-centered class, leadership quality, and enthusiasm are the most important qualities of an effective teacher. Good teachers also help their students in various ways.

Effective and well-trained teachers try to apply different techniques to make the learning process interesting to the learners. In language classrooms, we can find many students who are shy and hesitate to talk with others. Efficient teachers try to provide task-based communicative activities to students so that introvert students can actively participate in those tasks. The assessment process also needs to be effective for the students. Teachers who know how to use Kahoot! platform inside the classrooms can use this to create a game-like environment among the language learners as well as they can also assess students' language proficiency through Kahoot! platform. According to Kaur & Naderjan (2019), Kahoot! was invented in 2013 and immediately became a global educational brand. Kahoot! also provides teachers around the world to track students' performances in the game and reassess and make relevant adjustments in their English teaching approach in some instances. Kaur & Naderjan (2019) also conducted a study in an international school situated in the northern region of Malaysia to examine students' experiences of using Kahoot application in their English language classes and mostly got positive responses from them. Most of the participants said that their teachers are well-trained and implemented Kahoot activity twice a week in English language learning classrooms to motivate their students. Moreover, in Bangladesh, effective teachers are essential for students' future welfare. They can guide their students in a proper way and encourage students to learn new things. In the following section, the researcher will explain the context of this study.

b) Bangladeshi Context

Teachers are important members of society. They not only teach their students prescribed knowledge but also give them lessons in practical life. In Bangladesh, teachers try to help their students to build up their future careers. Therefore, some of the teachers still lagging behind in terms of their efficiency. Some teachers do not get enough motivation for participating in Govt and non-govt. teacher training programs. Teacher Training colleges in Bangladesh organize a lot of training programs but the teachers do not willingly participate in those programs (Walid, 2022). For this lack of experience, Bangladeshi teachers cannot implement interactive classroom activities for their students. In most

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of the schools and colleges of Bangladesh, we can see teachers follow the traditional method to teach their students.

Teachers mostly follow the Grammar Translation Method inside the classrooms which is based on books. They do not give their students enough opportunities to participate in classroom discussions rather they depend on their own lectures. Therefore, some teachers also do not monitor and assess their students' performances properly. Bangladeshi teachers need proper knowledge of how to make their classes interactive to increase their students' curiosity in learning. Moreover, digital literacy is also important to become an effective teacher. Many Bangladeshi teachers do not know the use of technological tools inside the classroom which can make their class communicative for their students, Bangladeshi teachers poorly use technological tools in pedagogical practice because they only use ICT for transferring knowledge without taking care of learners' learning process (Walid, 2022). This study will explore Bangladeshi tertiary-level students' perceptions of effective teachers, the challenges students might face in becoming good teachers, and the ways of becoming efficient English teachers in the Bangladeshi context.

II. Literature Review

The chapter represents existing literature on the qualities of good teachers from the perspectives of students who belong to various countries and the challenges of becoming efficient teachers. This chapter also explains the information gap in the existing literature.

a) Qualities of a Good Teacher

There is a proverb that, "Every coin has two sides." A person has both positive as well as negative qualities. A teacher is an important member of our society and is considered the backbone of a nation. A good teacher is always respected by his/her students in every sphere of life. Bandara & Atchuthan (2017) conducted a study with 100 Sri Lankan grade eight students. They expected their teachers to explain their lessons with clarity, express love to the students, be gentle and kind in behavior, have pleasant personalities, and motivate their students. Sri Lankan students also want their teachers to be free to communicate with them in class discussions. 80% of Sri Lankan students mentioned that their teachers explain their lessons in class in a systematic way and for this reason, students can understand their lessons easily. About 50% of Sri Lankan students expect their teachers to be good people, which will encourage them to respect their teachers (Bandara & Atchuthan, 2017). Effective teachers always try to inspire their students to think critically and work collaboratively with other classmates.

Alzobiani (2020) did research on the qualities of good teachers with 150 students and 40 teachers from public intermediate schools in Saudi Arabia. They stated that maintaining good teacher-student relationships is also a significant quality of efficient teachers. Teachers also need to show good moral character to their students so that students can learn from them.

Moreover, Saudi Arabian students think that teachers need to show friendly attitudes toward their students so that learners can participate in classroom activities without any hesitation (Alzobiani, 2020). Sometimes we can see teachers become biased toward good students but it is not a good quality of a teacher. According to Alzobiani (2020), Saudi Arabian students think that teachers need to engage all students in the learning process and teachers should have good knowledge of the particular subject that they are going to teach their students.

According to Alzobiani (2020), teachers should have the ability to receive criticism from their students for their self-improvement. Saudi Arabian students think that, good teachers always encourage their students to express their opinions freely inside the classroom (Alzobiani, 2020). Apart from Saudi Arabia, teachers from abroad also mentioned some of the distinctive qualities of an effective teacher.

International instructors try to make their lectures as communicative as possible by implementing various game-based activities. Sahin & Adiguzel (2012) conducted a study on foreign teachers who work in the United States of America. They are experienced, computer teachers of grades 4-12 from a renowned school in the USA. International teachers think that good teachers should enjoy their teaching process. They also mentioned in their interview session that effective teachers should have the ability to make study materials enjoyable to their students. Well-trained teachers always try to encourage all of their students to actively participate in group discussions (Sahin & Adiguzel, 2012). Therefore, in a non-western country like Bangladesh, students expect certain qualities from their teachers.

Tuhin, Haque, Islam, Rab & Uddin (2019) conducted a study on primary school teachers and students in Bangladesh. The researchers followed mixed methods for their study. From the survey, more than half of the total Bangladeshi primary school teachers do not understand Communicative Language Teaching Method effectively and take help from guidebooks. In most cases, Bangladeshi teachers do not give their students enough opportunities to express their opinion. They rely on books and their own lectures which are not beneficial for their students' progress. This happens for the lack of training and experience. In urban areas of Bangladesh, we can see university teachers are more experienced than primary/secondary-level

teachers. Therefore, aspiring Bangladeshi teachers need to work hard to achieve desired qualities of an effective teacher through proper training and motivation. The researchers will explain the challenges students might face while becoming good English teachers in the next section.

b) Challenges of becoming Efficient Teachers

Hard work is essential for becoming an effective teacher. Teachers need to conquer certain qualities so that they can get proper love and respect from their students. A teacher cannot achieve those qualities in one day rather they need to gather experiences from various places. Before joining the teaching profession, aspiring teachers should become competent in a particular subject that they are going to teach their students. According to Dwivedi (2012), without having proper knowledge of a particular subject one cannot become an effective teacher. Therefore, content knowledge plays a significant role in the career of new teachers. Moreover, a strong academic background can make teachers efficient in their teaching profession.

Teachers who have poor academic backgrounds cannot become successful teachers (Dwivedi, 2012). For instance, for private university M.A students if the university authority recruits only S.S.C pass teachers then students will not get their desired benefits and teachers will also face problems while delivering their lectures. Advanced level knowledge is important for Master's level teachers. In addition, if teachers are well-trained and have strong academic backgrounds they can use interesting materials for their students inside the classroom. Dwivedi (2012) in his article stated that a lack of up-to-date books and materials can hamper students' learning process. Moreover, teachers should not only rely on books rather they should make their classes interactive for their students.

Dwivedi (2012) also mentioned that proper communication is needed among teachers- students inside the classroom. Introvert teachers cannot become effective teachers in the context of Bangladesh. Teacher-centered strategies mostly dominate the classroom (Dwivedi, 2012). If we consider Bangladeshi classrooms, most of the strategies are only teacher-oriented. This may create a challenging situation for the students because they will not get enough opportunities to share their ideas with their teachers. Teachers should adopt teacher- students-oriented strategies in which teachers and students both can participate in classroom discussions. Students can express their opinions and teachers can monitor their progress in learning. Therefore, teacher-centered techniques need to be avoided by effective teachers. In the next part, the researcher will explain the information gap in the existing literature.

c) Research Gap

It appears from the existing literature that teachers have positive as well as negative qualities. The existing literature reveals students' and teachers' perspectives on the characteristics of effective teachers who belong to various countries, for instance, the USA, Sri Lanka, Saudi Arabia, and Bangladesh. The literature review section also explains the obstacles that teachers may face while becoming good teachers. The researcher mentioned some of the challenges, for example, lack of content knowledge, poor academic background, lack of communication skills, etc. Academic research on the qualities of an effective teacher: Perspectives of tertiary-level students is inadequate in the context of Bangladesh. None of the researchers mentioned the leadership quality of a teacher, its importance and the negative qualities of a teacher in their articles. This study will explore the qualities that Bangladeshi tertiary-level students expect from their teachers, and the challenges that aspiring teachers may face while becoming effective teachers in Bangladesh. Moreover, the researchers in the existing literature followed quantitative and mixed methods. In this study, the researcher will follow qualitative methods to get in-depth insights from the participants.

III. Methodology

a) Research Design

Qualitative research method was used to conduct this research. The main feature of qualitative method is to investigate a central problem and develop an elaborate understanding of that problem. (Creswell, 2012). This research method is useful for the researcher to collect in- depth information from the participants. The researcher chose the inductive approach for this study. The purpose of using an inductive approach is that this approach can generate reliable and valid findings by scrutinizing qualitative data and the inductive approach is easier than other approaches in analyzing qualitative data. (Thomas, 2006). The researcher collected participants' opinions through semi-structured interviews to collect detailed information. The following section will highlight the research questions of this study.

b) Research Questions

The research questions of this study are:

1. What are the qualities Bangladeshi tertiary-level students expect from their teachers?
2. How do aspiring teachers (tertiary-level students) become effective teachers?

c) Participants

Choosing an appropriate sampling technique is essential for conducting a research.

Purposive homogenous and snowball sampling techniques were adopted for the study. According to

Patton (2015), in purposive homogenous sampling technique the researcher selects cases that are very similar to study the characteristics they have in common. The researcher must choose participants with similar characteristics. The researcher chose homogenous sampling technique because the main criterion of selecting participants was to choose Bangladeshi students who want to choose teaching as their future career path. The reason behind choosing this criterion is that if the students know about the qualities an effective teacher should have, they can answer the interview questions related to the research topic. Other criteria were: (b) the students must be from private university where the medium of instruction is English and want to become teachers in future (c) their age range is 19-25 (d) they are from Bangla medium background and (e) they were found willing to be a part of this study. For the reasons mentioned above the participants are suitable for this research. Most of the participants are from Bangla medium background.

Their pseudonyms are given below:

Participants' Table

Name (pseudonyms)	Background
Ratul	Bangla medium
Shafiqul	Bangla medium
Sreetoma	Bangla medium
Rajib	Bangla medium
Nipa	Bangla medium
Anjie	Bangla medium
Sandip	Bangla medium
Sidhu	Bangla medium
Pinky	Bangla medium
Torsha	Bangla medium

In addition, the researcher selected snowball sampling technique for this research. Researchers use snowball sampling when it is difficult to reach to the expected population for this study. (Anieting & Mosugu, 2017). Teaching is a well-known profession for Bangladeshi students. For this reason, the researcher followed snowball sampling technique. The researcher first posted in different Facebook groups to ask those students who want to choose teaching as their career path. One student responded to the post first. Then, the researcher contacted with the student via messenger and asked her whether she was free for the interview session. After getting her permission, the researcher took contact number of another student who want to choose teaching as his profession. Thus, the researcher could manage ten participants for the interview.

d) Instrument

Interview technique was used by the researcher to collect the data. According to Bolderston (2012), researchers take face-to-face qualitative interviews by listening and gaining information from participants. There are different kinds of qualitative interviews. Among those interviews E-mail or internet interview is a prominent one. Semi-structured interviews can be taken through electronic devices which include e-mail, instant messaging, video-conferencing and others. The researcher took semi-structured interviews of ten participants from a renowned public university of Bangladesh through zoom application. The researcher made ten open-ended interview questions for the participants. In qualitative interviews researchers ask topic-related questions and noted down their answers (Creswell, 2012). This instrument made this research reliable.

e) Data Collection Procedure

After making ten interview questions the researcher did a pilot study. The researcher piloted the interview questions with three participants Rahim, Nashrah and Antonio (pseudonyms). The researcher chose these three students because these students did their thesis by using qualitative method in their postgrad level and had good knowledge on the patterns of interview questions.

Harding (2013) mentioned that if the researcher pilots the interview questions, he/she can get an opportunity to change any question which is not related to the research topic. Therefore, among ten participants one participant did not want to give face to face interviews via zoom meeting because of her hesitation to speak in English. For this reason the researcher took

her interview via e-mail. According to Creswell (2012), researchers send open-ended questions to the respondents through their e-mail by using internet facilities .The researcher sent the interview questions to that participant via e-mail and the participant replied.

The researcher then noted down her answers. The rest of the participants gave their interviews via zoom meeting. One-on-one interviews are good for those respondents who can speak without any hesitation.(Creswell, 2012).The researcher did a member checking to develop validity and credibility of the study at the last stage of data collection process. (Carlson, 2010).

f) Interpretation of Data

Qualitative thematic analysis is a method which is used to analyze qualitative data in this research. Thematic analysis is a process which identifies, analyzes, describes and presents themes within discussion part. (Braun & Clarke, 2006). .The researcher adopted data analysis framework proposed by Braun & Clarke (2006) which consists of six steps. These steps are mentioned below:

Familiarization with collected data

In this phase, the researcher read transcript or listen to video recordings to become aware of the information. She read the answers of the interview questions thoroughly.

Generating Initial Codes

This phase scientifically analyzes data through codes. Qualitative coding helps the researcher to effectively classify the excerpts of the qualitative data. (Savage, 2000). The researcher tried to find out interpretive codes from the answers.

Searching for Themes

After coding data the researcher searched for similar codes to generate themes. King (2004) stated that, predefined codes need to be identified first. The researcher found major themes from the similar codes.

Reviewing Themes

Themes need to have connection with coded data. Then, the researcher reviewed the coded data to find coherence with themes. (Braun & Clarke, 2006).

Defining and naming themes

In here, the researcher gave names to each of the themes. She gave enough time to name the themes. King (2004) suggested that before finalizing themes it needs to be evaluated at least twice. After evaluating the data and codes the researcher finalized themes of the study.

Producing the report

After establishing themes, the researcher began to write the final report. (Braun & Clarke, 2006).Thorne (2000) encouraged that researchers need to develop the findings in a systematic process which will make the results believable.

g) Ethical Consideration

While seeking permission from the respondents the researcher explained the purpose of this research to them (Creswell, 2012). As the participants are classmates of the researcher, she (the researcher) asked for the permission of the participants through messenger chat and told them the purpose of the research. In addition, the researcher used pseudonyms of the participants in this study.

IV. Findings and Discussions

a) Leadership Quality

Teachers interact with their students on a daily basis and for this reason, they can make the best decisions for their students. Leadership quality does not only mean that teachers should guide their students in a proper way, but it also includes the qualities of motivating and making their students courageous and committed to their passion. Among ten students, Rajib who is a private university student in Bangladesh mentioned in the interview session that effective teachers need to be good leaders so that they can give instructions to their students properly. He also added that for the improvement of our education system teachers need to develop leadership quality which includes showing good communication skills, passion, commitment, and creativity toward their students. Teachers should encourage their students to actively participate in innovative classroom activities, for instance, role-play, information gap activities, impromptu or group presentations, etc. Another female student in the interview session also agreed that teachers should have leadership qualities because if a teacher can become a good leader, he/she can control the class and manage any kind of worst situation inside the classroom. For example, if a student becomes sick inside the classroom only a teacher can take the necessary steps to keep the student comfortable inside the classroom. Apart from some positive comments, the researcher also got some negative comments in the interview session.

Anjie who is a female student from a public university in Bangladesh asserted that the education system in Bangladesh has a common situation where teachers get leadership abilities by default. So, rather than leadership ability, she thinks teachers should gain more skills in monitoring and mentoring their students. From the researcher's perspective, she also agrees with the interviewee to some extent that a teacher needs leadership quality but he/she needs to pay more attention to monitoring his/her students in a proper way. From the literature review section, the researcher identified that Tuhin, Haque, Islam, Rab & Uddin (2019) conducted a study on primary school teachers and students in Bangladesh. From that study, they found that more than half of the total Bangladeshi primary

school teachers do not understand Communicative Language Teaching Method effectively and take help from guidebooks. Therefore, if Bangladeshi teachers cannot communicate with their students, how they can lead their students and monitor their students' learning processes which will remain a big question for us.

Moreover, another male student mentioned that leadership quality is not that important for an effective teacher rather he/she should focus on improving his/her teaching process. This quality is also important for an effective teacher. A teacher should have the ability to communicate with his/her students effectively which will make him/her a good teacher in the future.

b) Effective Communication

Effective teaching needs good communication skills. Teachers should give their students opportunities first to share their opinions inside the classroom to remove their hesitation. The researcher asked her interviewees whether their teachers effectively communicate with them inside the classroom. One male student (Ratul) mentioned that teachers make their classes interactive. They allow students to creatively choose topics and give them the freedom to speak up in class. However, they make effective communication by giving feedback on assignments or midterm scripts individually inside the class. Individual feedback is beneficial for the learners' betterment. According to Alzobian (2020), Saudi Arabian students think that teachers need to engage all students in the learning process which the researcher stated in the literature review section. Therefore, it can be said that grabbing the attention of the students is also a big quality of an effective teacher. Moreover, the researcher received one negative comment from a female participant.

She is a student at a public university in Bangladesh. She mentioned that her teachers do not communicate with students effectively inside the classroom because they do not have good communication skills. They do not implement task-based activities for their students and for this reason students are lagging behind. The researcher agrees with this statement that if teachers can not use interactive and real-life-based activities for their students they cannot develop their communication skills properly. Moreover, another respondent mentioned that her instructor makes communication with students effective inside the classroom. When she raises her hand to ask a question inside the classroom her teacher immediately answers that question but online communication is not effective all the time. Sometimes Zoom and Google meet applications do not have options to ask questions and teachers sometimes do not answer emails from their students. For this reason, skilled teachers are always good at communication skills. Therefore, having a good relationship between the teacher and students is also essential. In the following section, the researcher will discuss the teacher-student relationship.

c) Teacher - Student Relationship

Teacher-student relationship should be a positive relationship between the teacher and students inside the classroom. If teachers want to create positive vibes among the students they need to talk to them freely. Well-trained teachers can implement interactive classroom activities for their students in which students can actively participate without any hesitation. A male student from a private university in Bangladesh mentioned that there should be respect between the teacher and the students. The students should be able to speak in the classroom without fear of being rebuked or demeaned by their teacher. Some teachers try to demean their students when they make mistakes. Teachers should try to teach their students effectively so that they cannot make errors frequently.

Another female student asserted in the interview session that: A student-teacher relationship in the classroom is a positive relationship between the teacher and the student to gain trust and respect from each other. This relationship may consist of getting to know their students better, providing choices, and encouraging them to become stronger everyday learners. By doing these, teachers respect their students, value their individuality, and be polite. A positive relationship with students helps them become more successful in the classroom and makes it a safe and welcoming environment for all. Teachers can create a game-like environment for their students inside the classroom through various activities for instance, group work, pair work, Duolingo test, Kahoot! test etc. Another female participant defined the teacher-student relationship in one line that the teacher-student relationship needs to be a formal and learning- oriented relationship that can inspire the students to learn new things. In the interview session, a female interviewee said that student and teacher relationships should never reflect the relationship between superior and inferior. She has experienced several classes where the students do not dare to ask questions to the teacher. Similarly, teachers create an environment where he has the reign to control everything. Especially, math subjects, where teachers are adamant to follow his rule only. This results in two negative ways, one is the demolition of the student-teacher relationship and another is students forces themselves to memorize the math solutions. Therefore, it can be said that teachers should not create fear in students' minds rather they should try to remove the fear and hesitation from their minds so that they can become extroverts. If teachers want to develop good relationships with their students, they must have some significant qualities. In the following section, the researcher will discuss some

qualities of an effective teacher that the tertiary-level students mentioned in the interview session.

d) Qualities of an Effective Teacher

Teachers have positive as well as negative qualities in the teaching and learning process.

Teachers who have positive qualities can achieve respect and love from their students. One respondent in the interview session said that the most important quality that the teacher should have is pedagogical knowledge. They should be able to create a friendly environment inside the classroom and their content knowledge is important. It is okay if they do not have much digital literacy, but they should at least be able to check scripts online via Microsoft Word. The researcher agrees with this statement that teachers should have knowledge of classroom management and should know how to make the classroom environment convenient for the students. On the contrary, a female participant in the interview session mentioned that the essential qualities of an effective teacher are they should have great skill in communicating with their students. They should have listening and collaborative attributes as well. Teachers should have empathy and patience toward their students. Being organized, prepared, and positivity these qualities can significantly impact students. Apart from these qualities, some negative qualities of a teacher can be considered as barriers to students' learning process.

A male interviewee said that some teachers are strict and humiliate their students. They do not give positive feedback to their students. The researcher partially agrees with this statement that all teachers do not demean students. Teachers who have a good personalities and training always support their students. On the contrary, egoist teachers try to dominate their students. Another female respondent almost asserted the same negative qualities of a teacher. She said that: Some negative qualities of a teacher include not treating students equally inside the classroom, being disorganized, being less resourceful, discouraging students from asking questions, and being authoritarian in class. The researcher thinks that Bangladeshi school, college, or university teachers sometimes become biased toward meritorious students. This quality needs to be avoided by the teacher. Another female respondent mentioned that Bangladeshi teachers have too much commercial mindset (Coaching-oriented teaching) and lack of patience and anger these qualities of a teacher are harmful to their students. Teachers should try to implement real-life based tasks so that students can use that language in various situations. Moving on to the next section, the researcher will suggest some ways through which students can find efficient teachers.

e) Recommendations

It is not an easy task to become an effective teacher. In the interview session, one interviewee suggested that Bangladeshi Government should provide more teacher training (as it is inadequate), increase salary (as it is very low), and sometimes monitor teachers (to make sure teaching quality is high) for effective teaching. In Bangladeshi society, teachers do not get much respect from others. People differentiate public and private university teachers because there is a mindset that public university teachers are more highly qualified than private university teachers. Not only teachers but also private university students are marginalized by public university students. These are wrong ideas that people create in our society. All teachers and students need to be treated equally. Moreover, one male participant mentioned that Bangladeshi Government must improve teacher quality by providing training and equipping them with modern teaching aids, tools, and methodologies such as smart classrooms and digital course content. Taking proper and summative assessments will provide a better understanding of the child. Individual differences should be considered while preparing the evaluation tools for critical/higher-order thinking skills. The researcher thinks that the researcher should have the ability to support and understand their students' weaknesses. According to those weaknesses, teachers should take the necessary steps. In the next section, the researcher will draw a conclusion.

V. Conclusion

In concluding remarks, it can be said that teachers are an integral part of our society. Without effective teachers, students cannot make progress in their academic fields. In Bangladesh, most of the teachers are not skilled enough to teach their students properly. To become good teachers, they must achieve some prominent qualities. In the interview session, Bangladeshi tertiary-level students mentioned some important points on the qualities they expect from their respected teachers. Teachers should have quality of class and time management, show love towards their students, create a friendly environment for the students, and finally teachers should guide their students in a proper way. On the contrary, participants mentioned some negative qualities of teachers, for instance, demotivating their students, negative feedback, and a coaching-oriented mindset. Of this commercial mindset, students do not get authentic study materials and lag behind in their learning process. Therefore, students also suggested some ways through which students can become efficient teachers. Teaching needs to be considered as a prestigious profession in our society like other professions. Government should arrange enough training facilities and high wages for the

teachers. Moreover, effective teachers can create a positive impact on students' lives. Therefore, teachers need to have the quality to engage their students in class lectures so that students can increase their curiosity to learn new things.

Students who want to become future teachers should be highly qualified as well as they should have good personality which can help students to retain their attention in studies.

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Interview Questions

1. Please share your educational background.
2. Age:
3. University: A. Public B. Private
4. Medium of Instructions: A. Bangla B. English C. Both
5. Does your teacher effectively communicate with you? If your answer is "yes" can you explain how?
6. What are the important qualities of an effective teacher according to you?
7. Would you please share your thoughts about the *"teacher-student relationship"* inside the classroom?
8. Do you think that teachers should have *leadership quality?* If your answer is yes, can you explain why?
9. Would you please mention some *negative qualities* of a teacher?
10. What are the steps the *Bangladeshi Government* can take to make the teachers efficient for the students? Explain briefly.

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Effect of Teaching Quality on Students' Satisfaction in Nigerian Tertiary Institutions: The Moderating Role of E-Learning Amid COVID-19 Recovery

By Shuaib, Kabir Musa, Inusa, Auwalu, Bichi, Jazuli Muhammad & Abdulrazak, Madu Yuguda

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Abstract- Education enterprise has suffered severe setbacks worldwide during the COVID-19 pandemic due to lockdowns and other COVID-19 protocols. This study aims to examine the effect of teaching quality on student satisfaction in Nigerian tertiary institutions amid COVID-19 recovery with moderating role of e-learning. The study collected 279 survey data from students of two tertiary institutions in Kano state using a convenience sampling technique. The study finds that teaching quality is positively related to students' satisfaction. Similarly, the results indicate that e-learning positively and significantly affects students' satisfaction. Furthermore, the results show a positive but insignificant moderating effect of e-learning on the relationship between teaching quality and students' satisfaction. The study concludes that teaching quality characterized by effective interaction with students in training them through communication technology contributed significantly to their satisfaction.

Keywords: *covid-19, e-learning, education, student satisfaction, teaching quality.*

GJHSS-G Classification: *LCC code: LB1028*

Strictly as per the compliance and regulations of:

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Shuaib, Kabir Musa [α], Inusa, Auwalu [σ], Bichi, Jazuli Muhammad [ρ] & Abdulrazak, Madu Yuguda [ω]

Abstract- Education enterprise has suffered severe setbacks worldwide during the COVID-19 pandemic due to lockdowns and other COVID-19 protocols. This study aims to examine the effect of teaching quality on student satisfaction in Nigerian tertiary institutions amid COVID-19 recovery with moderating role of e-learning. The study collected 279 survey data from students of two tertiary institutions in Kano state using a convenience sampling technique. The study finds that teaching quality is positively related to students' satisfaction. Similarly, the results indicate that e-learning positively and significantly affects students' satisfaction. Furthermore, the results show a positive but insignificant moderating effect of e-learning on the relationship between teaching quality and students' satisfaction. The study concludes that teaching quality characterized by effective interaction with students in training them through communication technology contributed significantly to their satisfaction. It is also concluded that a lack of familiarity with and limited access to e-learning technology contributed to the absence of empirical evidence to support the moderating effect of e-learning on the relationship between teaching quality and students' satisfaction. The findings provide a fertile ground for policymakers in the education industry to develop new policies that could promote quality teaching and e-learning in Nigeria's institutions for better results.

Keywords: covid-19, e-learning, education, student satisfaction, teaching quality.

I. Introduction

The World Health Organization (WHO) declared COVID-19 a pandemic at the beginning of 2020, causing a global shutdown. Many countries worldwide adopted a lockdown strategy to halt the spread of the deadly virus, which claimed many lives and infected millions, including health workers. Measures were taken through cooperation and collaboration to find a solution to the nearly paralyzed global economy. The service industry is among the most severely affected sectors, including the education enterprise. Hence, the recovery era witnessed a service-oriented age for many countries. Although many developed economies resolved online academic activities, developing countries like Nigeria suffered a whole session without academic programs. With the education service industry expanding yearly, there is a growing gap in quality teaching services between countries. Many developing countries are yet to recover from the COVID-19 lockdowns. Moreover, the literation on education indicates that one of the major challenges that education service providers face is managing service quality to satisfy, retain, and create loyalty among their students (Ibojo & Asabi, 2015).

Literature on education management indicates that providing effective service and teaching are significant responsibilities of staff and teachers. Every institution of higher learning prioritizes improving the quality of teaching and learning, and the quality of teaching and learning is also among the government's critical agenda. Thus, tertiary institutions must develop a long-term culture of quality teaching and enhanced learning. (Suarman, 2015). According to Vogt (1984), quality teaching refers to providing instruction to students of different abilities while integrating instructional objectives and evaluating students' effective learning modes (Markley, 2004). Similarly, teaching quality has evolved to determine or influence effective teaching and learning procedures and resource allocation. That affects how institutions work internally and respond to external pressures to gain a competitive advantage. Therefore, the rate at which institutional goals are met is reflected in students' satisfaction. Satisfaction is a student's general attitude or behavior towards the gap between what they expect and what they get when fulfilling specific desires and demands (Hansemark & Albinsson, 2004; Singh, 2006). Students who are satisfied with the services offered are more likely to form a positive and friendly relationship with the school.

Literature reveals several studies that investigated the association between service quality and students' satisfaction in higher institutions over the years with inconsistent findings (Farooq, Khalil-Ur-Rehman & Tijjani et al., 2019; Pedro, Mendes & Lourenço, 2018; Yilmaz, Ari, & Gürbüz 2018; Weerasinghe & Fernando 2018). However, the challenges posed by the COVID-19 pandemic were occasioned by lockdowns, restrictions and other protocols to control the spread of the dreaded

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virus. Developed countries with internet access and connectivity maintain their academic programs online, resulting in a gap between poor and advanced countries, with many students missing an entire session. Thus, the current study introduced the moderating role of e-learning to strengthen the relationship between teaching quality and students' satisfaction. E-learning, if effectively implemented, will aid in sustaining academic programs and improving teaching quality to achieve student satisfaction.

Additionally, studies established that teaching quality is an antecedent of student satisfaction. Recent developments like COVID-19 that shut down academic programs worldwide require more studies to guide the management of education enterprises on how to fill the gap created by the unexpected closure of institutions. Moreover, Sekaran (2003) states that a moderator can be used when a relationship is contingent on a third variable, also called an intervening variable. In this study, the researchers firmly believe that the relationship between teaching quality and students satisfaction can be strengthened by good e-learning that aligns students' behavior with institutions' objectives to meet paradoxical demands for control and flexibility (Mubi Qadri, 2015). The dimensions on which scholars evaluate the quality of education provided are many; significant among the aspects of education is students' perspective; what is their perception of the quality of education they receive (Zaheer et al., 2015)? This is especially important when discussing e-Learning, where physical interaction between student and teacher is minimal or absent. Thus, physical distancing is a necessary COVID-19 protocol. Students can also continue their academic programs online with e-learning.

The primary aim of these online classes (e-learning) is to maintain communication with students, promote self-confidence, and enhance students' confidence in their ability during the recovery era of the COVID-19 pandemic (Yekefallah et al., 2021). Thus, improving teaching quality and students' satisfaction. Therefore, given the preceding, an essential research question that requires an answer is: what is the moderating effect of e-learning on the relationship between teaching quality and student satisfaction? Thus, this study aims to find the answer to the above research question to develop better insights and perspectives on the relationship that would help make meaningful managerial and theoretical contributions. This paper is structured into five sections: introduction, literature review and theoretical framework, methodology, results and discussion and conclusion. Similarly, directions for future research are presented based on the paper's findings.

II. Literature Review

a) *Concept of teaching quality*

According to Anderson & Burns (1991), teaching is an interpersonal interaction involving language which helps students to learn or modify their learning behavior. However, teaching is more than just explaining or implying inflexible instructional materials. Thus, instructors must create positive learning environments to reveal learning motivation and teach students how to learn independently by doing and doing by learning (Vermeulen & Schmidt, 2008). Deming & Edwards (1982) defined quality as the ability to cost-effectively produce the most valuable products on the market. According to White et al. (1987), clusters of behaviors strongly associated with student learning include student behavior, management of instructional time, instructional monitoring, instructional presentation and feedback.

Marsh (1990) opined that teaching and learning quality encompasses academic staff teaching effectiveness and good interaction between teachers and students, including how students are being entertained by their lecturers in the classroom, how information is being transferred from the institution's board to the students, or how they encourage students in learning activities. However, Groundwater-Smith & Mockler (2003) pointed out that the curriculum framework needs to contain a detailed description of skills, knowledge and outcome at every stage of the learning process. Again, the quantity and quality of student interaction should be the primary focus of the educator. Teaching quality is measured by the SERVQUAL model, like in many previous studies.

i. *SERVQUAL model*

Literature established that service industries, like tertiary institutions, spend considerable time and resources measuring and managing teaching quality and students' satisfaction. Thus, they regularly identify and measure essential students' service aspects against performance standards. The SERVQUAL model, designed by Parasuraman et al. (1988), is the most widely recognized and used model for measuring service quality in various industries. The SERVQUAL model presents a multidimensional construct of perceived service quality that uses tangibility, reliability, responsiveness, assurance, and empathy as measures for service quality (Zeithaml et al., 1990; Parasuraman et al., 1988). Despite criticisms attached to the SERVQUAL model in the literature (Johnston, 1995), it is the most commonly used model due to its confirmatory factor analyses in many cases. The SERVQUAL has thus far proven to be a cost-effective methodology for evaluating service quality in different service organizations and industries, including the education industry (McAlexander et al., 1994; Lymperopoulos et al., 2006;

Levesque & McDougall 1996; Newman & Cowling 1996; Sureshchandar et al., 2002; Paswan et al., 2004; Seth et al., 2005;).

b) Concept of students' satisfaction

Satisfaction refers to attitudes or feelings that a person has towards various factors influencing a specific situation (Bailey & Pearson, 1983). According to Kotler & Clarke (1987), a person feels satisfied when a performance or outcome meets his or her expectations. Satisfaction is a perception of performance based on the level of expectations. In addition, satisfaction is also defined as a deliberate action that brings about happiness (Malik et al., 2010). According to Sapri et al. (2009), customers are the lifeblood of any institution, whether public or private. Student satisfaction is critical in determining the accuracy and authenticity of the system. Student satisfaction is conceptualized as students' perceptions developed from the perceived value of education and experience acquired at an institution of learning (Astin, 1993).

User satisfaction means the extent of conformity between the information systems used by users and what they need (Cyert & March 1963). In recent years, satisfaction has been applied to education enterprises. Based on the minimal research available, student satisfaction appears to be a complex construct with several dimensions (Richardson, 2005; Marzo-Navarro et al., 2005). Elliott & Shin (2002) describe student satisfaction as "the favorability of a student's subjective judgment of the many outcomes and experiences involved with education", in line with Oliver & Desarbo's (1989) opinion. Thus, student satisfaction is shaped by repeated experiences within the school environment.

c) Concept of e-learning

Studies indicate that e-Learning involves delivering information through telecommunication technology to train and educate students. Thus, e-learning emerged as a new paradigm in today's educational system because of tremendous advancements in communication and information technology (Zaheer et al., 2015). The characteristics of e-learning contain all the modern learning requirements, and thus have higher demand among tertiary education institutes due to this special quality (Alshwaier et al., 2012). However, online learners must be well acquainted with the technology used (Belanger & Jordan, 1999). E-learning has gained popularity and emerged as a credible alternative to conventional classroom teaching. Because e-learning provides the benefits of low cost, broader access, and shared resources, conventional teaching education has also been preferred for distance learning courses in addition to traditional courses (Zaheer & Munir, 2020).

Moreover, the literature reveals that the economy's significant sectors severely affected by the pandemic are education, aviation, hospitality and tourism, and the financial system. For example, according to Sept & March (2020), the COVID-19 pandemic has caused panic in the education and financial system, resulting in high volatility in several markets. Thus, with e-learning, tertiary institutions in Nigeria can keep and sustain their academic activities online like their counterparts in developed countries.

III. Theoretical Background and Hypotheses Development

a) Expectation disconfirmation theory

The Expectation Disconfirmation Theory (Oliver, 1997), also referred to as the expectancy disconfirmation paradigm (EDP), is described by the previous studies as the dominant customer satisfaction model and is thus appropriate for this study. The theory explains the possible significant effect of teaching quality on students' satisfaction. The theory provides a solid theoretical foundation for the current model's depiction of the relationship between teaching quality and student satisfaction, with moderating role of e-learning. It is common sense that all students derive utility for their money when purchasing a product or service, which applies to teaching services.

There have been limitations to the preceding theories of consumer satisfaction. Thus, Oliver (1997) & Oliver (1980) presented the expectancy-disconfirmation paradigm as the most influential theoretical framework for assessing customer satisfaction. According to the theory, consumers always have some prepurchase expectations about how well products and services will perform. The level of expectation then serves as a yardstick against which the product is assessed. Thus, the outcome is compared to the customer's previous expectations after using the product or service. Confirmation exists when the performance or outcome matches the expectation. In contrast, disconfirmation exists when a mismatch occurs between performance and expectations. A positive or negative discrepancy between expectations and perceptions shows that a consumer is either satisfied or dissatisfied.

The current study reviewed relevant empirical studies and theories that explain the variables under study. Most articles reviewed reported the relationship between teaching quality and students' satisfaction. Moreover, the study pays attention to the current situation in Nigerian tertiary institutions occasioned by the COVID-19 pandemic and the recovery scenario. Similarly, as indicated earlier in the literature review, most studies used the SERVQUAL model to measure teaching quality, like the current study.

b) Hypotheses development

i. *Relationship between teaching quality and students' satisfaction*

Academic research has recently focused on teaching quality and student satisfaction. Many

researchers used a single-term scale to operationalize students' satisfaction, while others used multiple-item scales. The relationship between teaching quality and students satisfaction has been studied, and the findings indicate that the two constructs are independent but closely related, meaning that an increase in one is likely to increase the other (Sureshchandar et al., 2002b).

According to Groundwater-Smith & Mockler (2003), the curricular framework must include thorough descriptions of the knowledge, abilities, procedures, and results at each learning stage. Again, the quantity and quality of student interaction should be the primary focus of the educator. According to Guolla (1999), satisfaction evaluates consumer psychology after using a product or service. Thus, students' satisfaction with their learning program is considered a cumulative satisfaction of the entire program of their study. As a dependent variable, students are the institution's valuable clients; their interests and satisfaction must be prioritized.

There are empirical studies that used similar variables as the current study, which lay support to the current study's model and broaden the contributions to education enterprises worldwide. For example, Sun et al. (2016) developed and tested a structural model of satisfaction with university teaching and recommended that universities improve teaching satisfaction levels. Similarly, Astin (1993) claims high-quality interactions between students, their peers, and faculty about intellectually meaningful subjects produce the most productive learning outcomes. Kember (2004) opined that the exploration and assessment of the nature of teaching were teaching quality, and he described teaching quality as the gap between teaching plans and teaching activities as they were carried out.

However, studies also assumed that students with greater learning and satisfaction would have a corresponding greater quality interaction with the instructor and other students (Shea et al., 2001). Teachers can use various instructional strategies, resources, and media to guide student learning and teaching objectives and student characteristics to improve learning effects and learner satisfaction and achieve students' learning objectives (Dewar, 2002). Based on the preceding discussion, the study suggests the following hypothesis:

H1: Teaching quality (SERVQUAL) is significantly associated with students' satisfaction

ii. *Moderating role of e-learning between teaching quality and students' satisfaction*

Literature on information systems reveals that user satisfaction is one of the most significant aspects of determining system success (DeLone & McLean, 1992). Several factors, including teacher, student, course, system design, technology, and environmental aspects, affect user satisfaction in an e-learning environment (Arbaugh & Duray, 2002; Hong, 2002; Lewis, 2002; Stokes, 2001; Wang & Bagaka, 2002).

According to Powers & Rossman (1985), student-faculty interaction, peer interaction, and a sense of literary inspiration in both the student and the student's peers strongly influence student satisfaction. Similarly, these aspects of student satisfaction were also revealed in studies of online courses at the graduate and undergraduate levels (Bailie, 2015; Diekelmann & Mendias, 2005). Issues that have to do with timely and useful contact with the teacher, guidelines that are crystal clear regarding the expectations of the course, enrollment support, student assignments and requirements, and data security have all been mentioned by previous research studies on online courses. Consequently, these issues can raise student satisfaction (Choy et al., 2003; Hara & Kling, 1999; Vonderwell & Turner, 2005). The previous areas can be further broken down into those that focus mostly on the delivery and content of programs.

The availability of technology primarily drives student satisfaction with e-learning (Bower & Kamata, 2000). In general, those students are dissatisfied and frustrated while using technology in the course (Bonk & King, 2012; Hara & Kling, 1999). Thus, to successfully complete the course, online students must be conversant with the new technology being used (Belanger & Jordan, 1999). According to studies, e-learning is useful for meeting educational needs, particularly in developing countries, because it improves sustainable teaching quality and student satisfaction (Yekefallah et al., 2021). Similarly, universities and other tertiary institutions used digital media to make student education easier, uninterrupted and sustainable during the COVID-19 pandemic (Prober & Heath, 2012). From the preceding discussion, e-learning can boost the reaching quality and improve students' satisfaction. That suggests the next hypothesis:

H2: E-learning moderate the relationship between teaching quality and students' satisfaction

iii. *Research model*

Following the extensive literature reviewed and hypotheses developed, the study conceptualized the proposed model in figure 1. The model shows the relationship between teaching quality (independent variable) and students' satisfaction (dependent variable). Similarly, the model presents e-learning moderating the relationship between teaching quality and students' satisfaction. Furthermore, the SERVQUAL model is adopted to measure teaching quality.

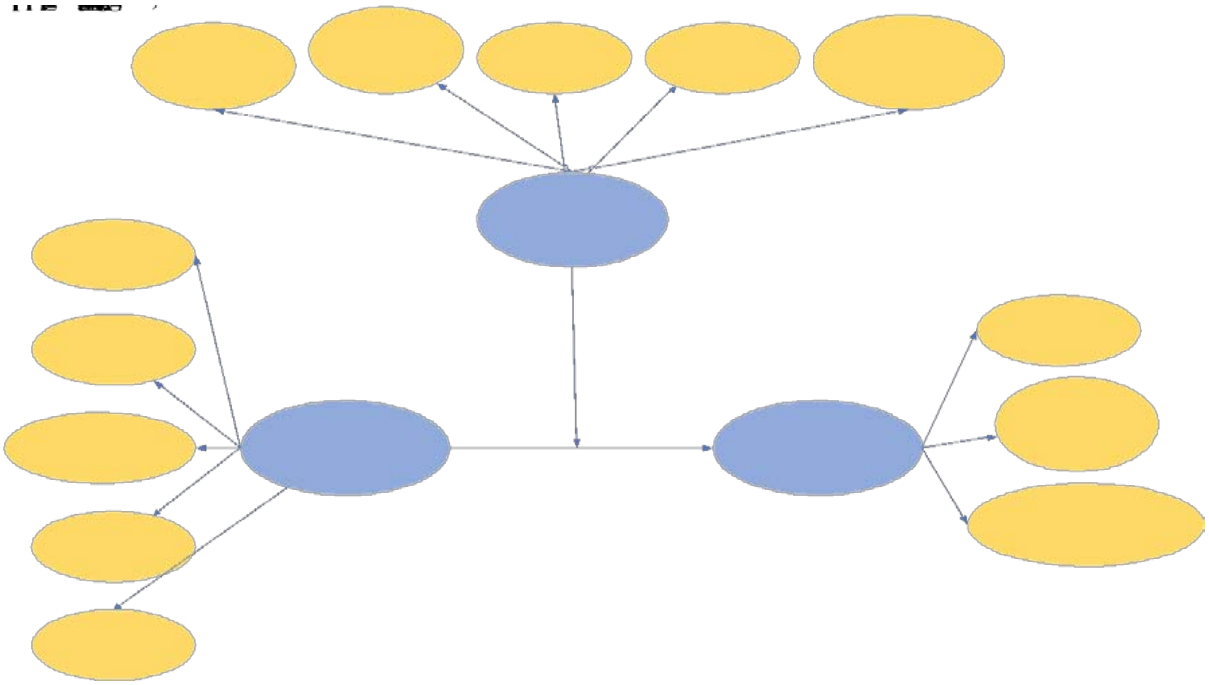

Figure 1: Research model

IV. Methodology

a) Research design, population, and sampling technique

The study's main objective is to measure the effect of teaching quality on students' satisfaction with moderating the role of e-learning. The study used a cross-sectional survey design to achieve the study's purpose. Similarly, survey data was collected using a questionnaire adapted from previous studies. The study used final-year students from two tertiary institutions in Kano state. The population for the study is 1,620. Using final-year students became necessary as they were the only students who remained in the institution at the beginning of the industrial action embarked on by the academic staff union of universities (ASUU). The study used Krejcie & Morgan's (1970) scientific table to determine sample size. From the population of 1,620, the sample size is 310.

Additionally, 10% was added to compensate for nonresponse Israel (1992) and improper filling of the instrument, raising the figure to 341. A convenience sampling technique was adopted during the data collection to enable the researchers to collect data from available and willing respondents to participate in the survey (Sekaran, 2003). Responses were recorded on a 05-point Likert scale ranging from strongly agree to strongly disagree. The study received 311 responses, but 32 surveys were eliminated because they were not completed correctly. Therefore, the study had 279 valid responses for further analysis. The response rate represented 82% of the total questionnaire administered, which was adequate for analysis.

b) Measurement of variables

The teaching quality (SERVQUAL) measures were adapted from (Parasuraman et al., 1988; Zeithaml et al., 1990), consisting of tangibility (TAN), reliability (REL), responsiveness (RES), assurance (ASSU), and empathy (EMP) represented by four, four, four, five, and five items. The students' satisfaction construct consisted of teaching (TCG), assessment (ASS), and generic skills and learning experience (GSLE) and was measured by six, five, and six items adapted from Fieger (2012). Finally, e-learning consists of content and educational materials (CEM), learning-teaching activities (LTA), feedback and evaluation (FE), flexibility (FXB) and infrastructure, technology and support (ITS). It was measured by five, six, five, six, and six items, each adapted from the study of (FATHI et al., 2011).

V. Data Analysis and Results

a) Reliability and Validity

This section presents the results of Cronbach's Alpha, outer loadings, composite reliability and AVE for evaluating the measurement model. The decision criterion for outer loading is 0.70, which implies that indicators with loadings below 0.70 would be deleted if the deletion could increase the reliability of the constructs (Hair et al., 2017). However, some scholars argued that loadings of 0.4 could also be considered reliable in some cases. As shown in figure 2, the AVE, composite reliability and Cronbach's Alpha values range from 0.531 to 0.969, indicating convergent validity.

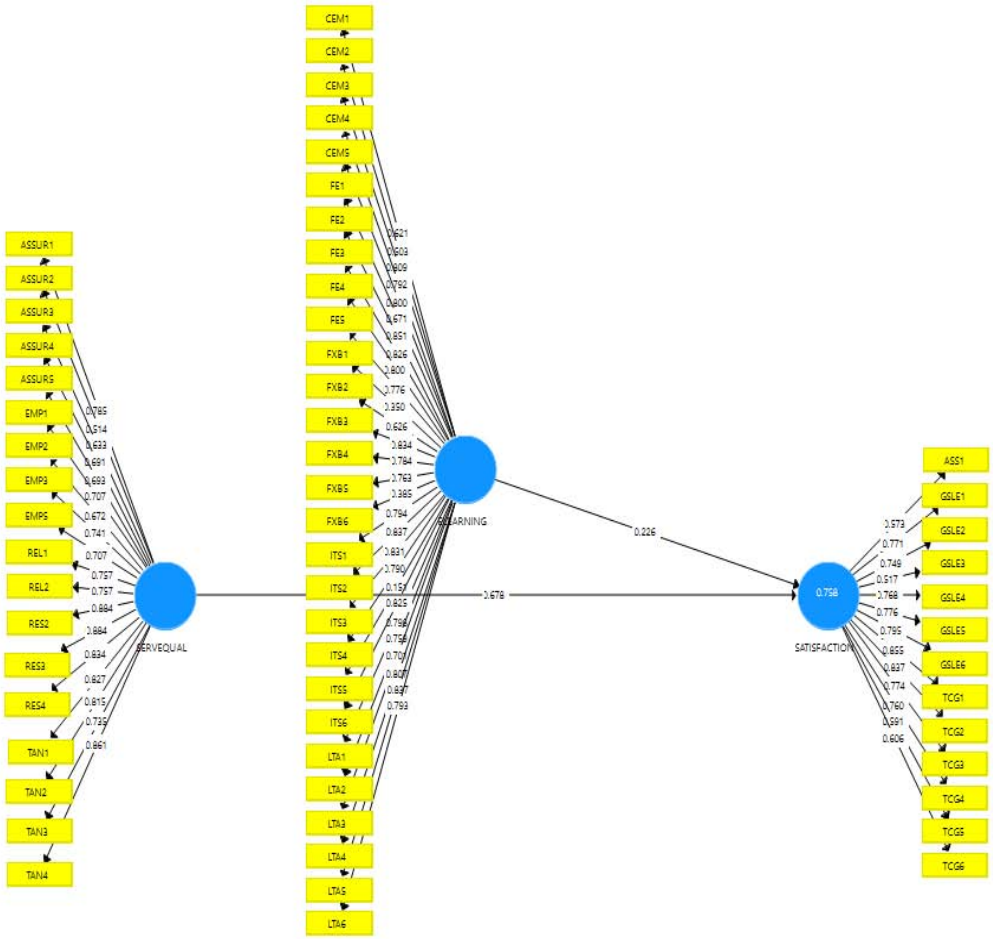

Figure 2: Measurement model

Figure 2 shows that two items (REL3 and REL4) from reliability, one item from responsiveness (RES1) and one item from empathy (EMP4) were deleted as dimensions of SERVEQUAL. Similarly, four items from the assessment (ASS2, ASS3, ASS4 and ASS5) were also deleted because their loadings fell below the acceptable threshold to enhance their reliabilities. All other items were retained because their loadings were in line with the minimum threshold. In the same vein, the HTMT criterion and cross-loading were used to assess the discriminant validity.

Table 1

HTMT criterion	E-learning	Satisfaction	Servequal
E-learning			
Satisfaction	0.786		
Servequal	0.817	0.879	

Note: Satisfaction stands for students' satisfaction, while serv-equal stands for teaching quality.

Table 1 shows the Heterotrait-monotrait (HTMT) ratio for all the latent variables. The HTMT compares the values to a predefined threshold. The HTMT ratio of correlation, according to Henseler et al. (2015), is a superior ratio than the Fornell-Lacker and the cross-loading criterion due to its higher specificity and sensitivity rate. As decision criteria, a value close to 1 indicates a lack of discriminant validity. Thus, some scholars (Gold et al., 2001; Kline, 2011) recommend a threshold of 0.85 and 0.90. For this study, the maximum threshold of 0.90 was used to decide the HTMT. Therefore, the values of 0.879 for this study are below the HTMT0.90 and indicate no multicollinearity among the variables, as Gold et al. (2001) argued.

b) Structural model evaluation

This section presents the results of the structural equation model testing the study's hypotheses. The p-value at a 5% level of significance was used to accept or reject the hypotheses, as shown in Table 2.

Table 2: Structural model results

	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision
ELEARN-> SAT	0.248	0.070	3.515	0.000	Supported
QUAL *ELEARN-> SAT	0.027	0.053	0.509	0.611	Not Supported
QUAL -> SAT	0.686	0.080	8.607	0.000	Supported

Note: Satisfaction stands for students' satisfaction, while serv-equal stands for teaching quality.

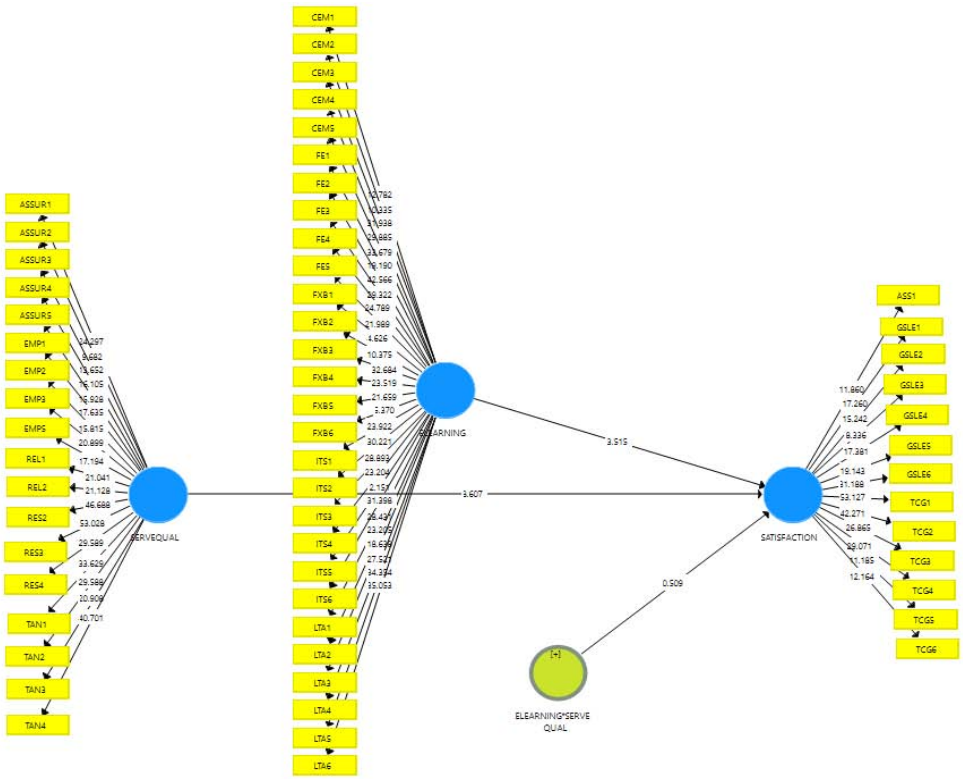

Figure 3: Structural model

As shown in both table II and figure 3, the relationship between e-learning and students' satisfaction is positive and significant, with a p-value of 0.000 and a beta value of 0.248. Also, teaching quality was found to have a positive and significant effect on satisfaction, with a p-value of 0.000 and a beta value of 0.686. This finding is consistent with previous findings (Shea et al., 2001; Sureshchandar, Rajendran & Anantharaman, 2002b; Sun, Yang & Jiang, 2016) found a positive and significant association between teaching service quality and students' satisfaction in different contexts. However, e-learning was found to have a positive but insignificant moderating effect on the relationship between teaching service quality and students' satisfaction, with a beta value of 0.027 and a p-value of 0.611. This clearly shows that no sufficient empirical evidence supports the moderating effect. This might be because students generally get dissatisfied or even frustrated using technology in learning, especially if unfamiliar with it, as Bonk & King (2012).

c) Coefficient of determination

At this point, assessing the coefficient of determination (R^2 value) is also essential. The R-square values of 0.25, 0.50 and 0.75 are considered small, medium and substantial, respectively (Hair et al., 2016; Chin, 1998). In some cases, however, Falk & Miller (1992) suggest that 0.10 could be considered as the minimum acceptable level of R^2 value. Table III shows the R^2 value of this study.

Table 3: Coefficient of determination

Construct	R-Squared
Students' satisfaction	0.758

The R-square value of this study's model, as shown in table 3, is 0.758. This suggests that teaching quality and its interaction with e-learning has explained 75.8% of the variance in students' satisfaction in Nigeria, while other factors not examined in this study explain the rest.

d) Effect size (f^2), VIF and Predictive relevance (Q^2)

The f^2 value provides an overview of an exogenous construct's effect on the endogenous latent variable. The values are 0.02, 0.15, and 0.35 for small, medium, and large effect sizes, respectively (Selya et al., 2012). The VIF indicates the absence or presence of multicollinearity.

Table 4: Effect size (f^2), VIF and Predictive relevance (Q^2)

Constructs	f^2 B-Perf	Effect Size	
Servequal	0.664	Large	
E-learning	0.074	Small	
VIF			
Servequal	2.862		
E-learning	2.862		
Predictive Relevance			
Indicator	SSO	SSE	Q^2 (=1-SSE/SSO)
E-learning	7812	7812	
E-learning*Servequal	279	279	
Satisfaction	3627	2230.49	0.385
Servequal	5022	5022	

From table 4, SERVQUAL has a large effect, while e-learning has a small effect on students' satisfaction. The VIF for the two constructs indicates no multicollinearity problem, as none has a value greater than 5. The Q^2 value, which shows the predictive relevance of the model, is greater than zero, as suggested by Duarte & Raposo (2010).

e) Importance performance map (IPMA) analysis

This study further conducted the importance-performance map analysis (IPMA) of the exogenous variables to the dependent variable, and the result is shown in figure 4:

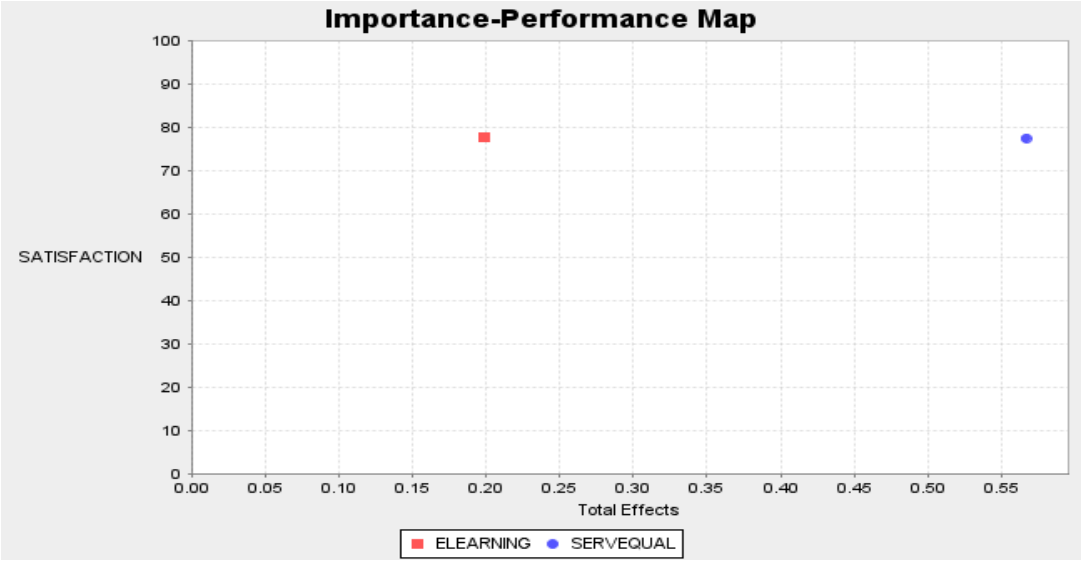

Figure 4: IPMA analysis

From figure 4, the red (e-learning) and blue dots (servequal) show higher performance (77.612 and 77.506). However, e-learning has shown lower importance (0.199), while teaching quality has moderate importance (0.566). This suggests that lower priority should be attached to e-learning, but higher attention should be paid to teaching quality towards better improvement of students' satisfaction. It also suggests that for managerial actions, no reasonable investments should be made on e-learning despite its high performance because it would have little impact in improving students' satisfaction.

f) Implications

This study aimed to test whether e-learning moderates the relationship between students' perceptions of teaching quality and student satisfaction. It was found that teaching quality is positively related to students' satisfaction. This suggests that teaching quality characterized by teaching effectiveness on the part of teachers, good and effective interaction with students, entertaining students in the classroom, and encouraging students in learning activities could bring students' satisfaction. It also implies that a curriculum designed to contain detailed information and description of processes, knowledge, skills and outcomes at every learning stage facilitates students' satisfaction with the teaching quality. This is in line with Groundwater-Smith & Mockler (2003). Additionally, the findings suggest that instructors must create conducive learning environments to expose students' learning motivation and teach how to learn freely by doing to boost their satisfaction. This research suggests that high-quality teaching is required to achieve high student satisfaction.

Similarly, the study has found that e-learning positively and significantly affects students' satisfaction. The finding indicates that those teachers who embraced the delivery of information via telecommunication technology to educate and train students were able to drive their students' satisfaction upward. However, the increase in satisfaction resulting from e-learning resulted from acquaintance with the technology used by the students. It was also found that those who embraced E-learning could gain the benefits of lower cost and broader access much more than those who did not embrace e-learning. This corroborates previous studies (Choy et al., 2003; Vonderwell & Turner, 2005) on effective e-learning on students' satisfaction.

Furthermore, the results show a positive but insignificant moderating effect of e-learning on the relationship between teaching quality and students' satisfaction. Although the study reveals insufficient empirical evidence to support the moderating effect of e-learning, it shows that e-learning significantly affects students' satisfaction. However, the insignificant moderating effect could be due to students' lack of familiarity with the new technology, which sometimes makes them dissatisfied and frustrated. As previous studies established, familiarity with technology plays a key role in influencing the impact of e-learning on students' satisfaction (Belanger & Jordan, 1999).

Finally, the findings and contributions provide insights and critical practical implications for managers of higher institutions in the country. The current study has provided useful theoretical grounds and practical implications to the growing body of knowledge on students' satisfaction and teaching quality. Furthermore, the study made a significant contribution to practice by confirming the linkage between teaching quality and students' satisfaction via interaction with e-learning. Therefore, the findings provide a fertile ground for policymakers in the education industry to develop new policies that promote effective quality teaching and e-learning in Nigeria's institutions.

VI. Conclusion and Limitations

The study concludes that teaching quality characterized by effective interaction with students and training them through communication technology contributed significantly to their satisfaction. We conclude that teaching quality is an essential predictor of students' satisfaction regarding learning. Similarly, it is concluded that learning via information and technology tools has facilitated students' satisfaction in institutions of higher learning in Nigeria, especially during the Covid-19 pandemic. However, we conclude that insufficient empirical evidence supports the interaction between teaching quality and e-learning in improving students' satisfaction. The study concludes that lack of familiarity with and limited access to the e-learning technology contributed to the absence of empirical evidence to support the moderating effect of e-learning on the relationship between teaching quality and students' satisfaction.

The study was limited to Kano metropolitan area, which limits the extent to which findings could be generalized, especially to other states and even beyond Nigeria. Thus, future researchers can extend the sample to include additional states or even cover the entire country to give room for generalization. Additionally, the study assessed the effect of teaching quality on students' satisfaction with the moderating effect of e-learning. The dimensions of all the constructs were merged and analyzed collectively in the PLS software. Future studies can replicate the study analyzing the dimensions individually to ascertain their individual effects on the outcome variable.

Declarations

Competing interest statement
The authors declare no potential conflict of interest.

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Effect of teaching quality on students' satisfaction in Nigerian tertiary institutions: The moderating role of e-learning amid COVID-19 recovery

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Enhancing Speaking Fluency Trough Content and Language Integrated Learning (CLIL): A Case Study of High School Students in Kerman Province

By Sara Khosravi
Bahonar University

Abstract- This study examines the impact of content and language integrated learning (CLIL), a popular method for teaching English, on the development of speaking skills among high school students. Speaking skills are emphasized as crucial among the four language skills due to their effectiveness in communication. The paper discusses the techniques employed by teachers in teaching speaking, focusing on a sample of 100 intermediate students from a high school in the Yazd province. To gather research data, an Oxford Placement Test (OPT) was initially conducted to ensure homogeneity among the students, followed by an IELTS test as a posttest for both groups to assess the influence of CLIL on speaking fluency. Statistical analysis was performed using SPSS-26 software package. The findings demonstrate the effectiveness of CLIL in enhancing learners' speaking skills, with a T-test used as the statistical test to answer the research question.

Keywords: content and language integrated learning (CLIL), speaking skill, speaking fluency, language learning methodology.

GJHSS-G Classification: LCC: LB1028.43

Strictly as per the compliance and regulations of:

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Sara Khosravi

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I. Introduction

Developing effective speaking skills in English is of paramount importance due to its vital role in communication. Speaking is not only a means of expressing thoughts and ideas, but it also enables individuals to actively engage in social interactions and contribute to meaningful conversations (Vygotsky, 1978). According to Warschauer and Healey (1998), speaking is considered the most fundamental and practical language skill as it allows learners to convey their intentions, negotiate meaning, and build interpersonal relationships.

Furthermore, the significance of teaching English speaking skills extends beyond basic communication. In today's globalized world, proficiency in spoken English is often a prerequisite for academic and professional success (Gupta, 2011). Many educational institutions and employers require individuals to demonstrate competence in oral communication to participate effectively in academic discussions, presentations, interviews, and collaborative projects (Brown, 2007). The ability to express oneself fluently and coherently in spoken English opens doors to diverse opportunities, enhances cultural exchange, and fosters international understanding.

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By prioritizing the teaching of speaking skills, educators can empower learners to become confident and competent communicators in English. Providing ample opportunities for practice, incorporating authentic and interactive tasks, and integrating technology can facilitate the development of fluency, accuracy, and communicative competence in speaking (Richards & Renandya, 2002). Effective instruction in speaking skills equips learners with the tools necessary to express their ideas, engage in meaningful interactions, and thrive in various personal, academic, and professional contexts.

CLIL is an instructional approach that integrates the teaching of content subjects with language learning objectives. It involves teaching academic subjects, such as science or history, through a foreign language, in this case, English. CLIL has gained significant attention and popularity in ELT due to its potential to enhance language proficiency while simultaneously developing students' subject knowledge and skills.

The use of CLIL in ELT has several benefits. Firstly, it provides students with authentic and meaningful language use by immersing them in real-life contexts and subject matter. This approach allows students to develop both their language skills and their understanding of specific content areas. Secondly, CLIL promotes active learning, critical thinking, and problem-solving skills as students engage with complex topics and language simultaneously. By using English as the medium of instruction, students are challenged to express their thoughts and ideas effectively, leading to improved speaking fluency.

Research studies have shown positive outcomes regarding the impact of CLIL on speaking fluency. For example, a study by Smith and Fortune (2010) found that CLIL students demonstrated greater fluency in spoken English compared to students who received traditional language instruction. Similarly, Coyle et al. (2010) reported that CLIL programs enhanced students' oral communication skills, enabling them to engage in extended discourse and express themselves more confidently.

In recent years, there has been a growing emphasis on communication methods in English language teaching. However, the use of CLIL methodology remains relatively unnoticed. Additionally, speaking, which is a crucial aspect of English as a Foreign Language (EFL) learning, has not received

adequate attention in schools in Iran. Therefore, this study aims to address these two issues by investigating the application of CLIL in developing speaking fluency among high school students in Kerman, a representative sample of schools in Iran. This article presents findings on the effectiveness of implementing CLIL in a communicative classroom setting to enhance speaking skills for students in the province of Kerman.

To examine the above-mentioned issues, the following research question is addressed:

RQ: Does CLIL have any influence on speaking fluency in Iranian high school students?

II. Literature Review

Speaking is considered as "The most basic means of human communication" (Celce-Murcia, 2003, p. 103).Speaking fluently is an essential aspect of language acquisition, particularly in the realm of English as a Foreign Language (EFL). It encompasses the capacity to communicate ideas and engage in conversations effortlessly, coherently, and accurately. Speaking fluently in EFL requires the appropriate use of vocabulary, grammar, pronunciation, and intonation to effectively express oneself and interact with others (Richards & Renandya, 2002).

Among the various teaching methods that aim to enhance speaking fluency, Content and Language Integrated Learning (CLIL) emerges as a promising approach. CLIL integrates content subjects with language instruction, offering learners authentic and meaningful language use opportunities (Marsh, 2002).

Numerous studies have investigated the impact of CLIL on speaking fluency, yielding valuable insights into its effectiveness. In a study conducted by Johnson (2018), it was found that CLIL significantly improved students' speaking fluency compared to traditional language instruction. The use of authentic content in CLIL lessons created a communicative environment, enhancing students' oral proficiency and fluency.

Furthermore, Smith and Brown (2019) conducted a meta-analysis of multiple studies on CLIL and speaking fluency. They found consistent evidence that CLIL positively influenced students' speaking skills. The immersive nature of CLIL, with its emphasis on using the target language for meaningful communication, contributed to enhanced fluency and linguistic accuracy.

A study by Garcia et al. (2020) investigated the long-term effects of CLIL on speaking fluency. The researchers followed a group of CLIL learners for two years and found that their speaking fluency continued to improve significantly over time. This indicates that CLIL instruction has a lasting impact on students' oral proficiency and fluency development.

Additionally, research by Lee (2021) focused on the role of CLIL in promoting spontaneous speaking skills. The findings revealed that CLIL learners demonstrated greater spontaneity in their oral production compared to non-CLIL learners. The exposure to content-based instruction in CLIL classrooms facilitated the development of spontaneous speech production and increased confidence in using the target language.

Moreover, a study conducted by Martinez and Sanchez (2019) investigated the effects of CLIL on the fluency development of young learners. The results demonstrated that CLIL instruction positively influenced speaking fluency among young students. The integration of content subjects with language learning enhanced their oral communication skills, allowing for more fluid and coherent speech.

Despite the substantial volume of articles regarding the positive impact of this method on speaking fluency, to the best of my knowledge, this research has not been conducted in Iranian schools. Considering the less emphasis placed on speaking skills in language classrooms and the curriculum's failure to select topics of interest or subjects in which students possess adequate knowledge for speaking practice, there appears to be a particular neglect of this language skill. If this research yields positive results, it can be used for the preparation and development of materials and course syllabi. Thus, it would be valuable for teachers, trainers, and textbook authors.

III. Methodology

a) *Participants*

The participants of this study were selected from two high schools in the Yazd province, Iran. A total of 100 intermediate-level male and female students, with an average age of 17, studying at 11th grade of high school participated in the research. The selection criteria included students who had previous educational experiences in English language learning. The participants were randomly assigned to two groups: a control group and an experimental group, each consisting of 50 students. The random assignment ensured that the groups were comparable and minimized potential biases.

b) *Instrumentation*

Two instruments were utilized in this study to measure the speaking fluency of the participants. Firstly, the Oxford Placement Test (OPT) was administered to assess the proficiency level of the students ensuring that all of them are mostly at the same level. The OPT is a widely recognized and validated test for evaluating language proficiency. Secondly, the International English Language Testing System (IELTS) speaking test was administered as a pretext and posttest to both groups to determine the influence of the CLIL method on students' speaking fluency ensuring that the difference in the results is only the consequence of

implementation of CLIL method. The IELTS test is a well-established assessment tool for evaluating English language proficiency.

c) Procedures

The whole process of this research took 2 months to get completed. Evey week, each group participated in two classes, the first class lasted for 2 hours and the second one for 1 hour. Therefore, a total number of 21 hours of instruction was taken place.

i. *Data Collection Procedures*

The data collection process took place during the first semester of 2022. Initially, the researcher administered the OPT to all participants to determine their baseline proficiency level in speaking fluency. Based on the results, which indicated an intermediate level, the control and experimental groups were formed. A proficiency speaking test of IELTS was then conducted as a pretest for both groups to establish a baseline and ensure that any differences in the results were solely attributed to the implementation of the CLIL method.

For the experimental group, English language instruction was delivered using the CLIL approach. The implementation of the CLIL method included integrating content subjects with language instruction, providing meaningful and authentic language use opportunities. The control group received English language instruction through the traditional non-CLIL method, following the curriculum and instructional materials prescribed by the school.

At the end of the instructional period, both groups were asked to take the IELTS speaking test as a posttest to measure their speaking fluency. The control group was kept isolated from any influence of the experimental group to ensure the validity of the results.

ii. *Data Analysis Procedures*

The collected data from the pretest and posttest were scored and entered into statistical software (e.g., SPSS) for analysis. Descriptive statistics, such as means and standard deviations, were calculated to summarize the data. To determine whether there was a significant difference in speaking fluency between the control and experimental groups, an independent sample t-test was employed as the statistical analysis technique. This test allowed for the comparison of mean scores between the two groups, providing insights into the effectiveness of the CLIL method in enhancing speaking fluency.

IV. Results and Discussion

The results as indicated by the tables below, showed that according to the hypothesis, CLIL method improves the speaking fluency of students. The result of T test showed that the students who were taught English by CLIL methodology received higher scores from the independent scores.

Tests of Normality

	Groping	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
pretest	control	.104	50	.200*	.950	50	.033
	experiment	.117	50	.082	.958	50	.070
posttest	control	.080	50	.200*	.957	50	.064
	experiment	.191	50	.000	.906	50	.001

Group Statistics

	Groping	N	Mean	Std. Deviation	Std. Error Mean
posttest	control	50	89.36	12.647	1.789
	experiment	50	109.04	8.538	1.207

Mean of control learners' posttest is 89.36 (SD= 12.67) and that of experimental ones is 109.04 (SD= 8.538). Due to the amount of skewness and Kurtosis (+2 to -2) and also based on the value of Kolmogorov-Smirnova and Shapiro-Wilk test (sig> 0. 05), the data have a normal distribution.

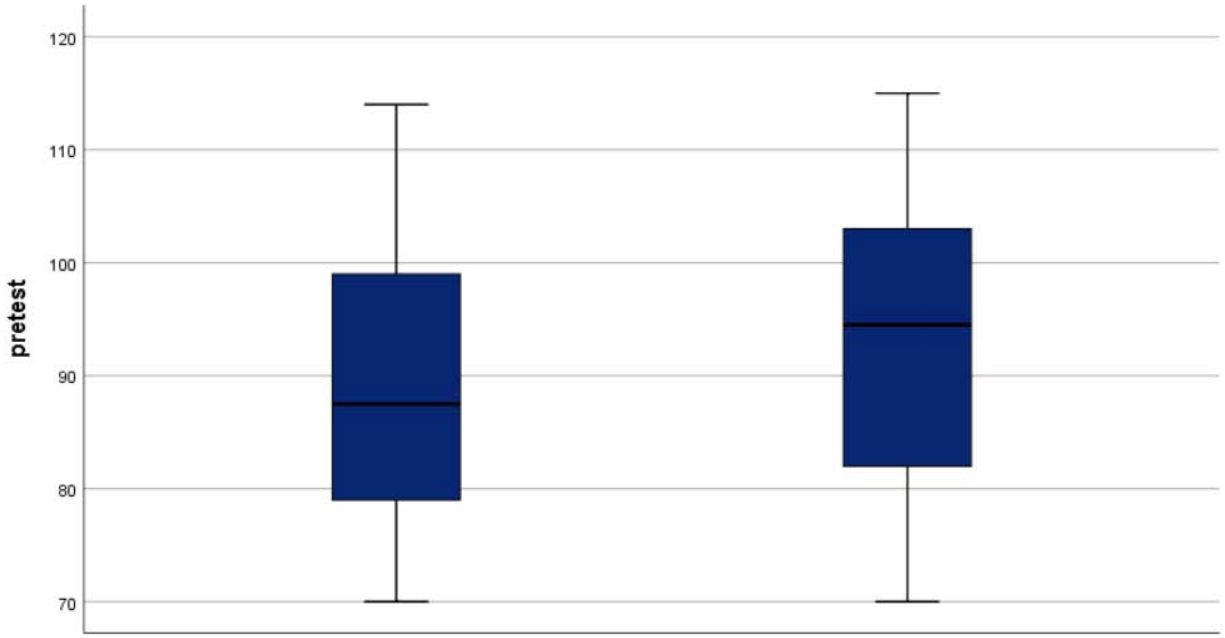
Therefore, we can use the independent- sample t-test to evaluate the mean of the two groups (experimental group and control group).

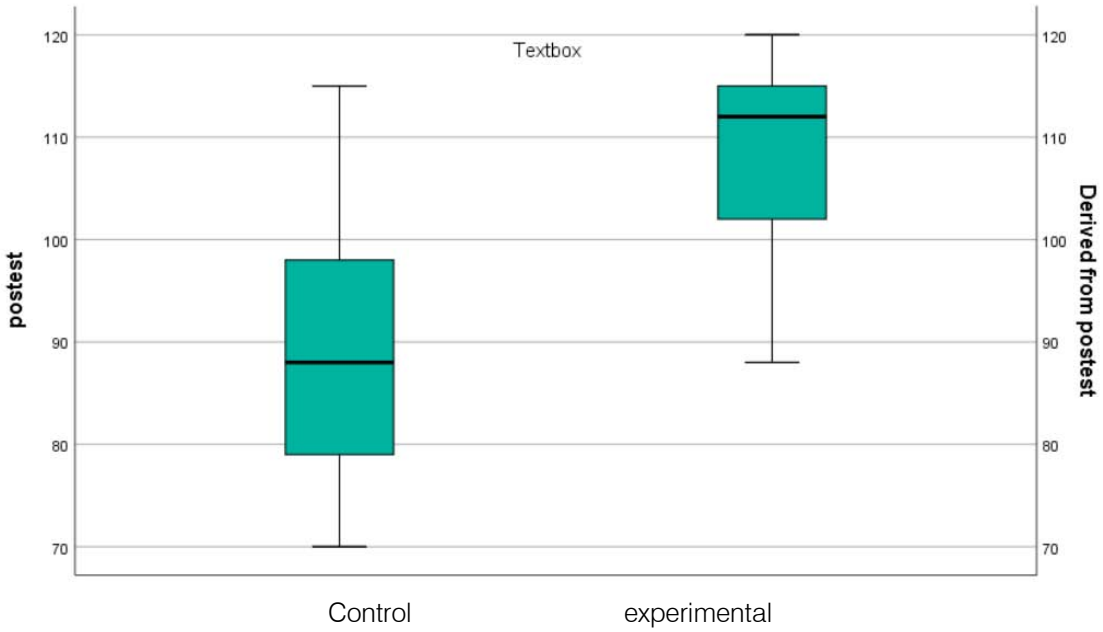
The results in the above table show that there is a significant difference between control and experimental groups' performance in speech fluency. It indicates the experimental group outperformed control group.

Independent Samples Test

		Levine's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
posttest	Equal variances assumed	9.298	.003	-9.120	98	.000	-19.680	2.158	-23.962	-15.398
	Equal variances not assumed			-9.120	85.982	.000	-19.680	2.158	-23.970	-15.390

According to Levine test (.003), two variables didn't have Equal variances. Value in the Sig field. (2-tailed) is less than 0.05, which means that there is a significant difference between the IELTS number of control and experiment group. Therefore, CLIL method is effective.





V. Conclusion

The findings of this study provide valuable insights into the impact of Content and Language Integrated Learning (CLIL) on the development of speaking fluency among high school students in Kerman's Province, Iran. The research question aimed to investigate whether CLIL has any influence on speaking fluency in Iranian high school students. Through the implementation of CLIL methodology and the comparison of results between the experimental group and the control group, the study yielded significant findings.

The results of the study indicate that the implementation of CLIL methodology positively influenced the speaking fluency of the experimental group. The experimental group, which received English language instruction through the CLIL approach, demonstrated higher scores in the posttest, as assessed by the IELTS speaking test, compared to the control group. These findings suggest that CLIL provides an effective means of enhancing speaking fluency among high school students.

The statistical analysis, using the independent sample t-test, further supported the effectiveness of CLIL in developing speaking fluency. The significant difference between the control and experimental groups' performance in speech fluency indicates that the experimental group outperformed the control group. The data analysis confirmed that the experimental group, which received instruction through the CLIL approach, exhibited higher levels of speaking fluency compared to the control group.

These findings align with previous research on the positive impact of CLIL on speaking fluency. Similar studies have shown that CLIL instruction enhances students' oral communication skills, facilitating greater fluency, linguistic accuracy, and spontaneous speech production (Pérez-Cañado & Lancaster, 2017; Martínez, 2019; Várkuti, 2010). The immersive nature of CLIL, which combines content subjects with language learning, provides students with meaningful language use opportunities and fosters critical thinking and problem-solving skills.

The present study contributes to the existing literature by addressing the underutilization of CLIL methodology in Iranian schools and the lack of emphasis on speaking skills in language classrooms. By demonstrating the effectiveness of CLIL in developing speaking fluency among Iranian high school students, this research highlights the potential for integrating CLIL principles into language teaching practices in Iran.

The implications of these findings are significant for teachers, trainers, and textbook authors who can utilize the results to inform the preparation and development of materials and course syllabi. By incorporating CLIL techniques and principles, educators can create a communicative classroom environment that enhances students' speaking skills, confidence, and competence in English. Furthermore, policymakers and curriculum developers can consider the integration of CLIL methodologies within the educational system to promote a more holistic approach to language learning, integrating language instruction with subject content.

It is important to acknowledge the limitations of this study. The research was conducted in a specific region of Iran, and the sample size was limited to high school students in Kerman's Province. Therefore, the generalizability of the findings to other contexts or age groups should be done with caution. Future research

can expand on this study by including a larger and more diverse sample and exploring the long-term effects of CLIL on speaking fluency.

In conclusion, this research provides evidence that the implementation of CLIL methodology positively influences the development of speaking fluency among Iranian high school students. By integrating content subjects with language instruction, CLIL offers an effective approach for enhancing students' speaking skills, promoting authentic language use, critical thinking, and problem-solving abilities. These findings contribute to the body of knowledge on CLIL and highlight its potential as a pedagogical tool in the context of English language teaching in Iran and beyond.

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Appendix

4 Placement Test (OPT)

1. Hello. My name is [interviewer's name]. I'd like to ask you some questions. Are you ready? / OK?
2. What's your name?
3. Can I have your email address?
4. Sorry, can you repeat that, please? / Can you say it again?
5. Do you like [hip-hop/rock/classical/jazz] music?
6. What kind of music do you like?
7. What's your favorite movie? What's your favorite TV show?
8. Do you have any brothers or sisters? How old are they?
9. What color is [my shirt, or a nearby classroom object]?
10. What time do you [get up/go to bed/go to work/go to class]?
11. What do you do first in the morning? Then what do you do?
12. What's your home like?

13. Is there a [post office/restaurant/drugstore] near here? Is it far?
14. How often do you buy [magazines/newspapers/candy/gum]?
15. What do you usually have for [breakfast/lunch/dinner]? Do you eat [many vegetables/much fruit]?
16. What's your favorite food? What's in it?
17. What did you do last night?
18. What are you doing this weekend?

Pretest, Posttest:

IELTS Speaking

Topic: Media & News.

1. How do most people get their news in your country?
2. How do you think people will get their news in the future?
3. Do you believe everything you read in the newspapers?
4. How has TV changed people's lives?
5. What do you think of children watching TV?

Describe an advertisement that persuaded you to buy a product. You should say

* What advertisement it was
* Was it shown on TV, radio or newspaper
* What was good about that advertisement

Explain why you think that advertisement made the product seem attractive.

Talk about a painting you would like to have in your home. You should say:

*what is it
* how you know about it
* how much it would cost you

and explain why you want to have it in your home.
Talk about a book you are reading now or have read recently. You should say:

* How and why you got it
* How long you it took you to read it or how long you have been reading it
* What kind of book it is

And say if you would like to read something else similar or not, and why?
Describe a small business you want to start. You should say:

* what business it would be
* when you want to start it
* why you have not you started it yet

and explain why you want to start this business.
Describe a positive change in your life. You should say:

* what the change was about
* when it happened
* describe details of the change happened

and describe how it affected you later in life

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Opportunities and Challenges Facing the Profession of Translator in Africa

By Dr. Servais Martial Akpaca
University of Abomey-Calavi

Abstract- In many African countries, for historical reasons, European languages including English, French, Spanish, and Portuguese are used in schools, churches, public and private institutions. Therefore, translation from and into these languages is frequently done during international conferences as well as for international organisations and projects located in the African region. The purpose of this paper is to discuss the opportunities and challenges of this linguistic situation for translators across Africa. So far, translation has played a major role in the progress of humanity and should continue to do so, especially in Africa, a continent that heavily depends on the wealth of knowledge and information available, especially, in English and in a few other languages. History reveals that medicine, which was originally practiced by the Arabs, was introduced through translation into Western universities in the 8th century. Nowadays, thanks to the globalisation process, translations are increasingly done by multinationals into many languages even in Africa.

Keywords: *freelance translator, translation technology, market demands, africa, professional ethics.*

GJHSS-G Classification: *LCC code: P306*

Opportunities and Challenges Facing the Profession of Translator in Africa

Dr. Servais Martial Akpaca

Abstract- In many African countries, for historical reasons, European languages including English, French, Spanish, and Portuguese are used in schools, churches, public and private institutions. Therefore, translation from and into these languages is frequently done during international conferences as well as for international organisations and projects located in the African region. The purpose of this paper is to discuss the opportunities and challenges of this linguistic situation for translators across Africa. So far, translation has played a major role in the progress of humanity and should continue to do so, especially in Africa, a continent that heavily depends on the wealth of knowledge and information available, especially, in English and in a few other languages. History reveals that medicine, which was originally practiced by the Arabs, was introduced through translation into Western universities in the 8th century. Nowadays, thanks to the globalisation process, translations are increasingly done by multinationals into many languages even in Africa.

The methodology of the paper is both descriptive and explanatory. The findings of the paper include the following challenges and opportunities: a limited number of institutions employ translators in Africa, therefore job opportunities are not plenty in this profession; translation studies fail to attract many students because of the limited number of opportunities provided by the labour market; there are few schools of translators in African countries; small corporations complain about the high cost of translations and expect every translator to excel in both their mother tongue and their second or third language instead of employing more than one translator; translators in Africa also play the role of terminologists because of the lack of terminology databases in most institutions; freelance translators find it difficult to cope with this situation, especially when their working relationship with these institutions date back to a recent past; the use of European languages is a challenge for many student translators and practising translators; there is a need for translators to have a noticeable web presence in order to attract clients from all over the world; they also need to create an instrument (i.e. a journal or a newsbulletin) to express their opinions and concerns; last but not least, national translators' associations need to register and effectively defend their members' interests.

Keywords: freelance translator, translation technology, market demands, africa, professional ethics.

I. Introduction

Translation has rendered valuable services to humanity from time immemorial. It not only disseminates knowledge from one language to another, but it also brings people together and promotes friendly relations and international understanding. Remember that from the 8th century, medicine was introduced to Western universities by the Arabs through translation. Toledo, the erstwhile capital city of Spain, became a "beehive of translation", i.e. a busy place where translations were done on a large scale. That is what Berschin (1986, pp. 163-168) recalls when he notes that:

> En effet, Tolède, la capitale de l'Espagne à l'époque, est devenue un centre de traduction à la suite de la conquête musulmane en 711. L'École de Traducteurs de Tolède a été créée au XIIème siècle par l'archevêque de Tolède: don Raimundo. À partir de la seconde moitié du Xème siècle, Huesca, Tarazona, León, Pampelune, Segovie et Barcelone ont suivi l'exemple. Tolède est devenue un centre culturel qui exportait le savoir à toute l'Europe chrétienne. Des traductions étaient effectuées de l'arabe au latin. Plus tard, au XIIIème siècle, Alphonse X dit Le Sage a continué à traduire des livres de philosophie, d'astronomie, de médecine, de littérature, etc., de l'arabe vers le grec, le castillan et le latin.

Indeed, this conference provides an opportunity to recall the contribution of translation to civilisation and to discuss practical aspects of the profession in Africa. It is a fact that the practice of this profession in Africa faces opportunities and challenges, which need to be discussed in a bid to improve translators' working conditions and status.

This paper shows that the demand for translation is increasing across the world, and Africa needs to find ways and means to get a share of the market. In other words, African translators need collective strategies to seize the opportunities available in the national, regional and international translation markets. To this end, issues pertaining to training and curriculum, regulating access to the profession, education of work providers, translation technology, official registration of translators' associations, tariffs, ethics, etc., are discussed.

The paper hinges on practical ideas developed by Gouadec (2007) and takes into account the current market trends highlighted by Victoria Nicol (2018). Aspects relating to translation technology, i.e. Neural Machine Translation and translation memories, are dealt with using papers published by Doucet (2022), Kook (2022), and Martikainen (2022). Professional aspects of the topic are discussed using the regulations of a number of translators' associations from Africa and overseas.

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The initial part of the paper presents the methodology which is mixed. Subsequently, the results are indicated. The last part of the paper discusses the findings and makes some recommendations.

II. Methodology

This paper has used both quantitative and qualitative methods to describe the practice of the profession of freelance translator in Africa. A great proportion of the paper is made up of practical ideas developed by professional translators. Statistics and figures have been collected from publications by translation agencies and the United Nations.

The objective of the paper is to highlight the challenges and opportunities facing the profession of a translator in Africa in a bid to chart a way forward and highlight the main areas in which action needs to be taken to improve translators' status and working conditions.

The instruments used to carry out this research include the Internet, books, an interview, academic congress materials, and the regulations of translators' associations.

The data include statistics on global translation market share, the percentage of Neural Machine Translation and of Automatic Machine Translation in the global translation output, and the information obtained from translators' associations' regulations.

Assumptions are made regarding the future of the profession in connection with the advances in translation technology boosted by the development of artificial intelligence.

The variables in this research include Africa's share in the distribution of Global Language Services Market, the spread of the Internet, and the rate of CAT Tools usage by translators in Africa.

The outcomes of this research include but are not limited to the following results:

III. Results

3.1 The profession of a translator in most African countries needs to be regulated when it comes to issues pertaining to access to the profession, required qualifications, and tariffs.

3.2 African translators have no share in the global language services market.

3.3 African freelance translators need to team up and ensure an effective web presence to attract more clients at the national and international levels.

3.4 Mobility on the employment front is a fact because work opportunities come here and there.

3.5 The use of CAT Tools and Neural Machine Translation (NMT) has become necessary to increase productivity and keep pace with the rest of the work.

3.6 Translator training is an issue of main concern and translation curricula should include topics such as language and linguistics, website translations, medical/ healthcare translations, e-commerce, finance, legal services, manufacturing industry, business, e-learning programmes/online certifications, media, collaborations tools, software translation and localisation, marketing, advertising, PR.

IV. Discussion

a) An Overview of a Translator's Job

In presenting an overview of the translator's job, Gouadec (2007, p.13) mentions three stages in the translation process:

The activities involved in providing a translation service are organised into three phases: 1. Pre-translation; 2. Translation; 3. Post-translation.

Pre-translation includes anything that takes place up to the moment the translator actually receives the material for translation: everything that has to do with getting the job, writing out estimates, negotiating, getting the specifications right, and contracting.

As far as the pre-translation phase is concerned, the translator does job hunting by calling and visiting companies and institutions likely to employ translators. It is recommended to drop a curriculum vitae and to insist to see a senior officer including the Human Resources Officer or any officer in charge of (local) purchase orders and contracts. Physical contact is particularly important because it can make a difference if the translator is articulate, well-dressed, and gives a good impression of himself or herself. The knowledge of the service provision rates applied in several local companies and institutions is equally important because most of the time, the officers provide some information on their companies' official rates. If the rates are lower than the market rates, there is always room for bargaining. Job hunting should be done vigorously and continuously.

There is also a need to constantly look for calls for tender in newspapers and on websites. Examples of international websites providing information on job opportunities include cDiscussion.com, ProZ.com, Gengo.com, OneHourTranslation.com, Unbabel.com, TextMaster.com, TranslatorsCafe.com, and jobs.ilo.org. In countries where there are translators' associations, the members normally share information on job opportunities. Finally, when a translator gets a call or an e-mail from a prospective client for work, s/he should make sure that a contract is duly signed with the work provider. The contract normally specifies the number of pages or words to be translated, the price, and the delivery date.

When the work provider sends the translation kit to the translator, the translation stage begins. On this score, Gouadec (2007) indicates that:

Translation in turn is divided into three stages: 1. Pre-transfer; 2. Transfer; 3. Post-transfer.

Pre-transfer includes all operations leading up to the actual 'translating', including preparation of the material, documentary searches, alignment, memory consolidation, terminology mining, deciding on options, etc. The transfer is the well-known core activity of shifting to another language-culture combination; Post-transfer covers anything that has to be done to meet the quality requirements and criteria before delivery of the translated material. It mostly pertains to quality control and upgrading. It also includes formatting and various preparations for delivery. (Ibid)

Indeed, the translator analyses the material, clarifies ambiguities, and retrieves necessary information including dictionaries, memories, templates, and terminology databases. S/he is free to get back to the work provider to ask important questions regarding company terminology and policy documents. Existing publications in both source language and target language are very helpful. It is important to visit the company's website if there is one. It is equally important to relate to a contact person in the company that can provide some useful information on the company's policies, procedures, terminology, and others. Depending on the size and nature of every material, the translator can even train on specific aspects of the work. When the translation is completed, it is imperative to proofread and revise it.

At the post-translation stage, the finished translation is validated. Thereafter, it is formatted, integrated, or embedded and set up on a relevant medium. Furthermore, the need to operate and update a translation memory cannot be overemphasized. After delivering the translation, the translator follows up on the payment after issuing a bill.

Post-translation covers all activities that follow the delivery of the translated material. These include possible integration of the translated material (as in the simulation of subtitles, layout prior to publishing, integration in a Web site or an international soundtrack, etc.) but also, of course, all the "administrative" business of getting paid, setting up an archive of the project, consolidating the terminology for future uses, and much more. (Ibid)

Some work providers give feedback on the quality of translated materials. This is a welcome development that enables the translator to take note of the company's remarks on the errors found in the translation. These remarks are most of the time related to issues pertaining to terminology, interpretation, acronyms, etc. Indeed, when I was working for the African Airlines Association (AFRAA) in Nairobi, Kenya as a consultant, the Secretary-General instructed the secretariat to always show me all the corrections made in my translations to ensure that the same errors were not repeated in subsequent translations.

After this overview of the translator's job, Gouadec describes freelance translators.

b) Freelance translators

Gouadec (2007) describes freelance translators as follows:

> Freelance translators, or so-called 'independent' translators, are self-employed, meaning they are not in any legal sense 'bound' to their clients or work providers. They either work for 'direct' clients (whom they invoice directly) or for agencies (or brokerage firms) that actually get the contracts and subcontract them to the freelancers. (Ibid, p. 99)

Furthermore, he states that freelance translators are expected to pay all mandatory taxes and social security contributions. However, in several African countries, many self-employed professionals and informal sector workers do not pay taxes because the income tax policies are lax and most of these workers are not registered. In several countries, especially in West Africa, some freelance translators manage to avoid taxes by refraining from opening translation bureaux. Given that they are very mobile because of the nature of their work, tax offices find it difficult to spot them. Having said that, there are bona fide translators and interpreters who do pay taxes even if they fail to declare all their incomes. In any case, it is important to stress that health insurance and occupational pension schemes are vital matters that every freelance translator needs to subscribe to. On this same score, Gouadec explains that freelance translators enter into voluntary contractual relationships with their clients. In some African countries, there is no actual legal framework for freelancing and individual translators as well as the few existing translators' associations are not registered. However, some translators' associations are making an effort to register and claim status for their members.

Some of the opportunities of the profession include flexibility and the freedom to decide the working hours and places.

By contrast, the challenges include uncertain and irregular income, fierce competition, the tendency of some translators to charge very low tariffs, unfamiliarity with their clients' terminology and policies, especially at the beginning of the working relationship, etc. A freelance translator confessed one day at the end of a five-day conference that he had no social security scheme. Therefore, he normally spent most of the money he earned during conferences to buy plots of land hoping that in the future, the plots would generate enough income to sustain his life. It is a bet. In this particular case, it may be recommended to subscribe to a national social security and pension scheme even though in some countries private social security schemes are rather problematic. Given that freelance translators are very mobile, whenever they decide to terminate or transfer the schemes to another country, they lose a lot of money.

In mentioning another challenge facing freelance translators, one of them said that sometimes, he did not get any work for more than six months and tended to forget that he had a profession. This situation of inactivity was exacerbated particularly during the COVID-19 pandemic characterised by lockdowns and company closures. In addition, freelancing is not a viable activity in several African cities where businesses and diplomatic activities are scarce.

The next issue to be discussed is the prerequisites and conditions for becoming a freelance translator.

c) *Prerequisites and conditions*

As far as the prerequisites are concerned, Gouadec (2007) notes that from an administrative and legal point of view, in most counties, everybody can work as a professional translator. People come to translation from two opposing sectors, i.e. the language sector and the world of industry and technique. Those coming from the language sector are linguists, while those from the world of industry have a commercial, legal, accounting, engineering, or any other technical background. This is the background of translators in France.

In West Africa, some translators have a linguistic, legal or economic background. Technical translators are very few. This is probably due to the labour market which provides few translation opportunities in the technical areas. Unlike France, which is a developed and industrialised country, west African countries do not have enough industries to provide technical translations. At Université Lumière Lyon 2 where I trained in France, for example, students specialise in medical translation because there are many chemical laboratories and medical research institutes in that country.

At this stage, an issue of particular importance is the need to regulate access to the profession. Regarding this issue, the following questions were put to François, a freelance translator in Cotonou:

What are some of the challenges facing freelance translators in Benin and in the West African sub-region?

Answer:

Lack of qualified translators and interpreters. Many people with linguistic backgrounds enter the profession with a BA and compete with us. Somebody needs to regulate access to the profession.

Some translators offer very low tariffs because they want to get all the contracts everywhere. It is important for registered translators' associations (if any) to fix the tariffs.

Is there a bright future for this profession in West Africa?

Answer:

It is not easy to predict what the future has in store for us. Translation technologies may take our jobs away. In addition, many companies and institutions employ Bilingual Executive Secretaries who perform many functions including translation.

What advice do you have to give people practicing this profession in Africa as a whole?

Answer:

Freelance translators need professionalism and a sense of ethics. As far as professionalism is concerned, it is important to stress that in every profession there must be rules. One of the rules is the need to avoid applying very low tariffs. Another one is the need to be humble and meet the clients' expectations in terms of quality and deadline.

François has raised important questions related to the need to regulate the profession by checking the credentials of translators. Can somebody who has a BA in English or French call himself a translator? This is a question an assembly like AITCO can address. The opinion of my own association, i.e. ATRAD – Association des Traducteurs Diplômés du Bénin – is that to qualify as a translator, you need to have at least a MA in Translation Studies. This is both a policy and a legal issue.

On this same issue, the following is the position of the Ghana Association of Translators and Interpreters.

Articles of Association

Chapter One

Status, Membership, and Objectives

Article 2: Membership

Membership of the Association shall be open to qualified Ghanaian and non-Ghanaian Translators and Interpreters.

Categories of Membership

Membership of the Association shall be open to the following categories of Ghanaian and non-Ghanaian Translators and Interpreters:

1. *Honorary members:* Shall have contributed, or have the capacity to make a meaningful contribution to the advancement of the profession;
2. *Full members:* Shall have at least one of the minimum qualifications listed below, plus at least three years of working experience, and be approved by the vetting committee:

(a) Bachelor's degree or Diploma in Translation and/or Conference Interpreting from a recognised training institution.

(b) Bachelor's degree in any Modern Language with three years' proven experience, and vetted by the Vetting Committee.

3. *Associate members:* Shall have a minimum qualification of a first degree in any academic discipline with any two international languages and

be recommended by three full members and vetted by the vetting committee. Members in this category shall not hold office. (2017, p.2)

In a similar vein, Gouadec says that good translators should share the following qualities and competencies:

1. Absolutely perfect mastery of the languages used, and especially the target language;
2. Multi-cultural competence, either by upbringing or by education – 'culture' being meant here to include culture in its widest sense, but also technical culture, business culture, corporate culture, etc.
3. Perfect familiarity with the domains they specialise in (either through their initial education and training, or – more probably – through self-tuition;
4. An absolute knowledge of what translation means, what it requires, and what it implies;
5. No interest in proving that they are better translators than the next person: they are simply interested in doing their job as professionally as possible. (p. 150).

Indeed, a competent translator must have a good command of his or her working languages and should be familiar with several cultures. Translation is not only a lexical transfer but it is also a cultural transfer. The knowledge of the cultural realities of the target language is critically important. A translator who does not know the cultural realities of the target language is not likely to do an accurate job. Of course, this is a functionalist approach to translation. An example of cultural realities in translation was given by Kpogue (2021) in her MA Dissertation entitled: ETUDE DES POSSIBILITIES DE TRADUCTION DES TERMES ET LEXIES TIRES DES ACTES DE L'ETAT CIVIL ET DES DIPLOMES. In this dissertation, she describes the plight of a translator who was requested by two students to translate into English a degree called Baccalauréat. One of the students was traveling to Ghana to further his studies while the other one was going to attend a tertiary education programme in South Africa. The translator used the term A'Levels as an equivalent of Baccalauréat in both cases. This was a mistake because the National Senior Certificate seems to be the best equivalent of Baccalauréat in the South African educational system, while the West African Senior Secondary Certificate of Examination (WASSCE) seems to be the best equivalent of Baccalauréat in Ghana (Kpoguè 2020, p.41). As we all know, A' Levels are a college or sixth form leaving qualification offered in England, Wales, and Northern Ireland. As a result, the terms used in the various countries are different and the translator should be aware of these. Therefore, there is a need for translators to have multicultural competence.

The question of specialisation is equally important in translation. Quite often, freelance translators move from one conference to another though the issues discussed in these conferences are different and technical. Given that most conferences are attended by experts who make presentations on scientific and technical topics and issues, it is necessary for translators to specialise and/or read widely on these issues to understand the technical terms and concepts. Having said that, it is important to note that in the African context, a translator who sticks to his or her area of specialisation may not earn enough money. Given that the industries are not developed in most African countries, they are unlikely to provide enough opportunities to translators who decide to work exclusively in these industries.

Should translators work alone or in a team whether they specialise or not?

Working alone or in a team

A translator working alone receives the document, carries out research on key terms, concepts, and phraseology, translates, and revises it. This situation is prevalent in many small companies in Africa where there is only one translator who translates from and into two languages. The translator is both a reviser and a self-reviser. This means that s/he revises translations done by independent translators and revises his or her own translations. It is not an ideal situation because errors may find their way in the translations but the translator may not see them. Translation is teamwork.

Gouadec notes that "Teamwork is now gradually becoming the norm in translation companies and is also becoming more widespread among freelance translator networks." (Ibid, p. 106) The author uses the term 'Assembly-line translation' to refer to a situation where various tasks and functions are allotted to different specialist operators including someone who is in charge of preparing the document (separating text from code, extracting the terminology, extracting the graphics, etc.), a terminologist and phraseologist, a translator, an information supplier (who supplies the scientific and technical language-specific information), a keyboard operator, proof-readers and quality controllers, testers and someone who is in charge of readying the document for delivery or publication.

Another issue of importance is what it takes to set up shop as a freelance translator.

Setting up shop as a freelance translator

The materials and equipment listed by Gouadec to start freelance translators off include a comfortable or ergonomic seat, phone, scanner, computer, dedicated hard disc for backup, sound equipment, software that reads PDF files, software for word counts and invoicing, search engines, backup Internet access providers, spreadsheets, http://www.google.com/google-d-s/tour1.html highly recommended to create and share online glossaries, a database management software, a firewall and anti-virus, a software for file zipping and unzipping,

full CAT software (translation memory, terminology management, tag editing, aligner), Web page editors, a terminology-mining tool, a terminology-management software, a project-management software and a personal portal from which to link with useful sites.

After setting up shop as a freelancer, what invoicing modes are suggested?

d) Invoicing modes

Gouadec suggests that translators charge their clients on a word count basis, an hourly or per diem basis depending on how the clients are used to being charged. Alternative suggestions made by the author include levying a minimum flat rate service charge for any translation, working out the cost on the basis of specific rates for all the different operations or tasks in the overall translation process (documentation, terminography, quality checks, layout, etc.), counting as additional work any task undertaken over and above those related to the translation process proper (e.g. correcting the source material, having another translator proof-read the translation, aligning texts and translations, setting up a translation memory, etc.).

Some work providers pay a flat rate per page. The point is that some pages are full while others are almost empty. Organisations such as ECOWAS, ITUC-Africa, and BOAD used to have a fixed rate that they paid per page.

While the average cost of professional translation services can range as low as $0.08 to $0.28 per word, the final cost will be based on the number of services required for the project.

Below are the UN daily rates for free-lance translators, effective 1 July 2020, based on the 2013 CEB/AITC Agreement.

Daily Rates as of 01/07/2020 (in US Dollars)

Daily Rates in US Dollars

UN Rate/Step	World	
	With social security	No social security
T-1/P-1/1	309	293
T-2/P-2/1	391	370
T-3/P-3/1	471	447
T-4/P-4/1	569	539
T-5/P-5/1	682	646

This UN daily rate should be a reference for all translators and employers in Africa.

Equally important in this discussion is the issue of translation technology.

e) Translation technology

i. *CAT Tools*

Nowadays translation involves the use of technologies such as word processing, desktop-publishing software, translation memory management systems, search engines, computer-assisted translation (CAT) tools, text aligners, Web site design tools, Web editors, and many more.

Gouadec says that translators need to be familiar with different computer environments and platforms and their resumes should mention several skills with a list of IT tools and techniques.

In addition to the traditional translation softwares and translation memories such as TRADOS, memoQ, and Concordance, Neural Machine Translation (NMT) has been developed since 2017 in collaboration with Google. NMT has drastically improved the quality, syntax, fluency, and accuracy of machine translation. It translates at high speed and is user-friendly. It uses an artificial neural network, i.e. artificial intelligence. No human intervention is needed in NMT.

In connection with this technological breakthrough, Isabelle Doucet of Université Laval in Canada published a paper titled « Quelle place pour le numérique dans la formation en traduction? » in nouvelles.ulaval.ca on May 19th, 2022. In this paper, she poses the following critical question on neural machine translation:

> Est-ce que l'IA mettra les spécialistes de la traduction au chômage? Doit-on initier les futurs traducteurs aux outils numériques dès leurs premières années de formation? Ces questions au cœur du colloque La formation en traduction à l'ère du numérique, tenu dans le cadre du 89e Congrès de l'Acfas, sont cruciales. Car des technologies comme la traduction automatique neuronale (TAN) font maintenant partie intégrante du marché et ne disparaîtront pas de sitôt.

It emerges from this quotation that neural machine translation is here to stay and there is a need to train students in the area of translation technologies from the very first years.

Other papers presented at the colloquium include:

– « Former les futur(e)s traducteurs/trices à la traduction automatique: pourquoi, quand et comment ? » by Rudy Look of Université de Lille, France. In this paper, Look discusses several issues including the introduction of Machine Translation and Neural Machine Translation in translators training curricula, the use of translation technologies by students when they do their homework and assignments, and the development of future translation professionals' MT literacy.

– « Apprivoiser l'outil technologique grâce à l'apprentissage expérientiel » by Hanna Martikainen (École Supérieure d'Interprètes et de Traducteurs (ESIT), Université Sorbonne Nouvelle - Paris 3). This presentation focuses on collaborative learning in the area of machine translation and post-editing, the difference between translated texts and post-edited texts and feeding a translation engine with new terms.

On the question of CAT Tools, Sega Faye, chairman of the Senegalse Translators' Association (ASTRA) gave his opinion in a newspaper article published in La Gazette on December 16-23, 2021.

L'intelligence artificielle ne menace-t-elle pas le métier de traducteur ?

La traduction est avant tout une activité humaine, un acte de communication humaine qui requiert la présence de l'homme en amont et en aval du processus.

Le traducteur moderne ne voit pas les outils informatiques comme une menace mais plutôt comme un atout incomparable dont il doit savoir se servir. En effet, un bon traducteur doit savoir manier les outils d'aide à la traduction.

Comme leur nom l'indique, ils aident le traducteur dans l'exécution de son projet, mais c'est le traducteur qui effectue le travail de traduction.

Ces outils sont plutôt des mémoires de traduction qui stockent les traductions déjà faites et les mettent à la disposition du traducteur chaque fois que celui-ci en fait la demande. L'intérêt est qu'il y a une harmonisation de la terminologie pour le client et que le traducteur passe moins de temps sur un projet qui présente des similarités avec un projet précédent.

C'est là toute la différence entre un traducteur formé et un traducteur non formé : savoir utiliser ces outils à bon escient. C'est pourquoi toutes les formations modernes dans ce domaine prévoient des modules sur l'utilisation des outils d'aide à la traduction

These are various academic and professional opinions on the use of translation technology in this digital era.

On this same issue, Victoria Nicol, the founder of My Language Connection Ltd (MLC), explains that previously, machine translation systems used software to first translate, and a human translator works on the result and manually fixes all the errors. However, the current conversation about Machine Translation is centered on adopting a hybrid solution, where both human translators and software work simultaneously on translation projects to produce excellent translations. This is essentially the future of Machine translation post-editing (MTPE) services. In 2020, Statistical Machine Translation (SMT) alone contributed to more than 65% of the overall global translation market revenue. Concerning business usage of machine translation, CSA Research in 2020 found that the percentage of projects for end-clients using machine translations climbed from 13% in 2019 to 24% in 2020.

Having said that, Nicol thinks that machine translation has a bad reputation for poor accuracy and lack of localisation. Her answer to the following question: "Are businesses able to get the same quality from Machine translation output as they would with a professional, human linguist?" is that Machine translation quality remains flawed and significantly inferior to any professional human linguist. (My Language Connection, London office, e-mail: london@ mylanguageconnection.com – London, England).

Translation technologies include not only the above-mentioned tools but also the world wide web.

ii. *Web presence*

Translators need to be present on the world wide web because the world has become a global village. What this means for translators is that they may live in Benin or Kenya and attract clients from any country in the world. Indeed, some translators have blogs that enable them to market themselves and to work from a distance.

This is another area where African translators need to show a strong presence. Highly powered and qualified translators need to get together to develop websites in order to attract work providers from overseas. This is necessary because currently, the share of Africa in the international translation services market is nil.

iii. *The impact of information technology*

Gouadec stresses that information technology is creating a rift between those who can use it and those who are not. More specifically, some translators just use the basic combination of 'word processor + translation memory + terminology management system + Internet', while others go the extra mile to offer more elaborate services and process specific types of materials and media, by using more sophisticated software systems (including subtitling applications, localisation applications, translation project management systems). The latter make more money and are in a much better position to keep up with the pace of technological advances.

Looking back at a more or less recent past when translators used pen and paper and later on computers to do their work, it is obvious that the advent of the Internet, translation memories and Neural Machine Translation has drastically enhanced productivity, accuracy, and translators' visibility.

Although the developments in translation technology have drastically enhanced productivity, Africa is lagging behind in the distribution of the global language services market.

Translation market and demands

According to Nicol, the 'Distribution of Global Language Services Market' by region in June 2018 is as follows:

Source: https://www.statista.com/statistics/190486/global-language-services-market-share-by-continent/

The lesson that these figures teach us is that Africa has currently no share in the global language services market. This is due to several reasons, including the lack of major companies and the absence of African businesses in the process of globalisation. The few institutions and companies that employ some translators and provide work to freelance translators include government ministries, especially the ministries of Foreign Affairs, development projects, international conferences, few regional and international banks.

More specifically in the West African region, the national, regional, and international institutions employing translators include NGOs, ministries, development projects, UN agencies, EBID (bank), WAEMU, BCEAO (bank), AfDB (bank), and quite recently the African Continental Free Trade Area (AfCFTA), however, the latter is a nascent organisation.

The implications of these social, economic, and professional realities are that African translators need to look beyond national borders. Mobility on the employment front, networking, and an effective web presence should be envisaged. The main question is: how do we get a share of the international translation market?

Furthermore, Nicol indicates that the translation industry is one of few global industries to experience continued growth despite the harsh impact of the pandemic hitting in 2020 and continuing to cause disruption throughout 2021. According to her, there is a growing demand for translation services industry in the following areas: website translations, medical/ healthcare translations, e-commerce, finance, legal services, manufacturing industry, business, e-learning programmes/online certifications, media, collaborations tools, software translation and localisation, marketing, advertising, PR.

These are indications that translator trainers need to take into account and incorporate into translation curricula.

Apart from curricular issues, work provider education should also be part of freelance translators' agenda.

Educating the work provider

Gouadec states that work providers need to be educated because some of them do not know how complex the translation process is. They think that translation is just a matter of knowing languages; they feel it takes far too long and is terribly expensive.

Indeed, work providers have many wrong assumptions about translation. One day, a work provider, a female manager in a large company, said that if she knew that translation paid so well, she would have trained to become a translator instead.

Below is a series of advice given to freelancers by Gouadec to educate work providers:

- Demonstrate that translation is, in fact, a complex process, by identifying and explaining the different stages,
- show, through an example, how any important translation requires no end of checking and counter-checking,
- explain how long each stage in the translation process takes, and why,
- stop using word count as the basis for estimates and invoices, and opt for a set rate or an hourly or daily rate (as in other standard business practices),
- refuse to lower rates, by arguing that basic costs and overheads cannot be reduced,
- refuse to be underpaid for any translation work, on any grounds whatsoever,
- use a simple but useful battery of ordinary business instruments (i.e. delivery forms, quality control forms, standard agreements, general conditions of sale, etc.) to show that translation is just as serious as any other business. (op cit, p. 221)

Work providers' education and professional ethics should go hand in hand.

Professional ethics

Gouadec, the author of Translation as a Profession, proposes the following basic rules:

Professional translators shall: (1) never undertake any action or engage in any practice liable to throw the profession or professionals into disrepute; (2) always show respect for other people and their opinions, especially when writing to mailing lists and Web forums; (3) always comply with the laws and regulations relating to tax and social security or other mandatory contributions in force at the place of work; (4) always make available and use all resources needed to carry out the agreed or contractual tasks in compliance with the required standards;(5) never knowingly cheat a

client (in particular, by concealing the fact that a source document is already available in translation); (6) always resist any attempt to restrict their intellectual freedom and any pressures designed to make them knowingly produce a deliberately distorted, or inaccurate, or misleading translation; (6) be prepared to admit full liability for any deficiencies, errors or failings in the translation, unless such deficiencies, errors or failings be the result of deficiencies, errors or failings in the source material, or of failure on the part of the work provider to carry out his contractual or commonly accepted obligations or duties.

V. Conclusion

This paper has attempted to discuss some of the challenges and opportunities facing the profession of translator in Africa. It has noted among other things that challenges include the need to regulate the profession and to strive to get a share of the global language services market. The new translation technologies are both a challenge and an opportunity.

Translation brings people together, promotes international understanding, and disseminates knowledge. Humanity has immensely benefited from the fruits of translation. However, in Africa, there are not many recognised schools of translators.

African freelance translators need to work together to overcome the current challenges and those lying ahead. This discussion needs to be carried on in forthcoming papers.

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Certificate, LoR and Momento **2** discounted publishing/year **Gradation** of Research **10** research contacts/day **1 GB** Cloud Storage **GJ** Community Access	**Certificate,** LoR and Momento **Unlimited** discounted publishing/year **Gradation** of Research **Unlimited** research contacts/day **5 GB** Cloud Storage **Online Presense** Assistance **GJ** Community Access	**Certificates,** LoRs and Momentos **Unlimited** free publishing/year **Gradation** of Research **Unlimited** research contacts/day **Unlimited** Cloud Storage **Online Presense** Assistance **GJ** Community Access	**GJ** Community Access

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct,* along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

Policy on Plagiarism

Plagiarism is not acceptable in Global Journals submissions at all.

Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
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- Graphs
- Illustrations
- Lectures

- Printed material
- Graphic representations
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- Electronic material
- Any other original work

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1. Substantial contributions to the conception and acquisition of data, analysis, and interpretation of findings.
2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

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Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

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Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Social Science Research Paper

Techniques for writing a good quality homan social science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of homan social science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.
Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

19. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

20. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

21. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

22. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

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Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

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Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
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References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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