TECHNOLOGY-ENHANCED LEARNING ENVIRONMENTS IN EDUCATION

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Technology-Enhanced Learning Environments in Education

Editors
Omid Noroozi, Associate Professor-Wageningen University & Research, The Netherlands
Ismail Sahin, Ph.D.-Iowa State University, United States

Cover Designed by
Mevlut Unal, Necmettin Erbakan University, Turkiye

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www.istes.org
istesoffice@gmail.com

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PREFACE

Welcome to the world of technology-enhanced learning, where the boundaries of education are continually expanding, reshaped by the dynamic interplay of pedagogy, learning theories, and cutting-edge technology. In an era characterized by rapid advancements in digital tools, rapid developments of AI, and the ever-evolving needs of learners, this book aims to explore the transformative potential of technology in education. The field of technology-enhanced learning is a captivating intersection where educators, instructional designers, technologists, and learners themselves come together to delves into the myriad ways in which technology is reshaping traditional educational paradigms, democratizing access to knowledge, and enhancing the learning experiences of learners. It has now become clear that technology is not merely a supplemental tool but an integral part of the learning ecosystem. It is important to remember that technology is a tool, a means to an end. The true power of technology-enhanced learning lies not in the devices themselves but in how we leverage them to inspire, engage, and empower learners. This book is a comprehensive exploration of the multifaceted world of technology-enhanced learning. From the rise of online learning platforms and the integration of artificial intelligence in education to the gamification of learning and the possibilities of virtual reality, each chapter offers a window into the transformative potential of technology. In this book, you will find insights, best practices, and case studies that will equip you to navigate the ever-changing landscape of education in the digital age.

The book starts with a chapter on developing graduate students' academic and workforce skills. In this chapter, a framework for designing a technology-supported graduate student peer and professional mentoring program is provided. This chapter defines the design of a model peer and professional mentoring program based on the Community of Inquiry Framework and provides a research-based, technology-enhanced framework for institutions seeking to design similar programs to support students academically and professionally. The second chapter titled "Students' Perception of Engagement with Technology during COVID-19 Emergency Remote Learning" is written by Lizeng Huang and Ching-hsuan Wu from United States. In this work, it is stated that technology is perceived to positively impact students' engagement during ERL by facilitating cognitive, social, and affective engagement. Professional development and support are essential for effective use of technology. The third chapter deals with new literacy instruction strategies in the light of higher education hybridization. It is mentioned that the development of e-learning and distance learning technologies

into education are the main trends in the the world. The next chapter is a literature review work on gender equality in online education in higher education. Gender equality in online higher learning and Gender discourses through online education are the main foci in the chapter. The fourth chapter of the book includes a chapter titled “Technology Enhanced Learning (TEL) Pedagogy for Quality Education: Insights and Prospects”. The chapter has highlighted studies influential in shaping the knowledge base of TEL and quality education since 2000. Another chapter reports effects of blended learning approach on English performance of students at primary level. The authors suggest that advanced technological tools must be used to advance the academic performance of the learners.

In the book, the next chapter focuses on using multi-stakeholder perspectives to enhance integration of mobile technology for students with communication needs. The authors give some recommendations for implementing and designing mobile apps for students with communication needs in educational settings. Another chapter int his book provides details on social constructivist learning principles for designing online learning environment. It is stated that these learning principles are useful for learning designers and those supporting students' active learning process in an online environment for personalized and inclusive learning experiences. The ninth chapter analyzes the impact of virtual flipped learning on gifted and non-gifted students’ motivation from L2 motivational self-system lens. It is mentioned that while gifted students mostly refer to ideal L2 self, non-gifted students refer to ought-to L2 self and L2 learning experience facets of motivation. The last chapter has a scoping review work on integration of mentimeter into the classroom. In the chapter, the numerous merits gained from integrating Mentimeter in educational settings are provided: 1) benefits not only to enriching student-centered pedagogy, but also encapsulating a diverse audience of cultural backgrounds and competencies; 2) providing immediate feedback for anonymous student responses; 3) enhancing student motivation; 4) engaging students’ active participation.

In the end, we would like to thank all the authors for their contribtuions to this book. We hope that this book will be useful for the readers and will contribute to advancement of all fields of education.

Omid Noroozi & Ismail Sahin

The Editors

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Chapter 1 - Developing Graduate Students' Academic and Workforce Skills: A Framework for Designing a Technology-Supported Graduate Student Peer and Professional Mentoring Program

Abby McGuire, **Revanthsai Gajula**

Chapter Highlights

- This chapter describes the design of a model peer and professional mentoring program based on the Community of Inquiry Framework and centered on academic and professional development for graduate students enrolled in online and hybrid courses in the Master of Science in Administration program at a regional comprehensive university.
- The peer and professional mentoring program framework is centered on the strategic integration of technology, specified in the program's design, goals, content, and evaluation plans. The framework is grounded in empirical research and informed by multiple sources of data and a needs analysis.
- Through technology-supported learning, along with the engagement and leadership of peer and professional mentors, the program centers on supporting and developing students by providing connections to enhance students' learning experiences, revealing the hidden curriculum, fostering academic support, and developing professional and workforce skills.
- The design and development of this program provides a research-based, technology-enhanced framework for institutions seeking to design similar programs to support students academically and professionally.

Introduction

Researchers in the field of higher education have consistently demonstrated the centrality of the learning community to the development of student discourse, learning, and achievement (Garrison & Arbaugh, 2007; Rourke et al., 2001). Also critical to student learning and professional development are effective support structures outside the classroom, including e-mentoring programs (Gafni-Lachte et al., 2021). For graduate students, technology-supported mentoring, which is both present-focused and future-focused, provides academic support as students navigate the realm of graduate school and future-focused as many students prepare to transition to professional roles post-degree.

Despite the benefits in supporting students academically and professionally through mentorship program with both peer and professional mentors, a gap exists in the literature in this area, as researchers found no model programs with a peer and professional combination in the literature. As such, the purpose of this research is to capitalize on this opportunity to fill the gap in the literature by developing a mentorship program to serve the academic and professional needs of students of graduate students enrolled in a Master of Science in Administration comprised of campus-based and online students with one of 14 different areas of concentration. The Community of Inquiry Framework (CoI) (Garrison, et al., 2000), a theory of online learning centered on connections stemming from the learning experience, provides the theoretical underpinnings of this chapter.

The Master of Science in Administration Program at Central Michigan University is a multimodal program offered in hybrid and online formats whose students come from diverse countries, backgrounds, and abilities, not unlike many programs serving diverse student populations. With a distance education legacy spanning nearly fifty years, this 36-credit program has over 40,000 alumni in leadership positions across the globe. In order to drive innovation in a competitive marketplace of master's degree programs, massive open online courses (MOOCs) and low-cost online certificate courses, such as the recently launched Grow with Google Program, the uniqueness of CMU's MSA program stands apart because of the authentic connections students form with faculty, staff, and students in the program.

To enhance opportunities for connectedness across time and distance, as well as provide additional academic support and professional development opportunities to MSA students,

the development of a technology-supported e-mentoring program would deepen student connections, provide support for students' academic and professional success, and showcase the uniqueness of the MSA program. This chapter provides a theoretical and research-based framework for this novel peer and professional mentoring program designed to support students in and beyond their program of study. The mentoring program framework, based on the CoI Framework, created in developing this e-mentoring program can inform academic leaders and faculty whose graduate programs serve diverse student populations at various institutions, providing a niche offering and strengthening points of connection for the students the programs serve.

Theoretical Framework

The Community of Inquiry (CoI) Framework is an established theory of online learning situated in the collaborative-constructivist paradigm and centered on the creation of meaningful connections (Garrison, 2000). The collaborative-constructivist approach, the framework's roots in describing connections inherent in technology-supported learning environments, as well as the centrality of the student learning experience positions the CoI as a relevant theoretical framework from which to position the examination of this study and its aims of developing a framework for creating a technology-supported peer and professional mentoring program for online and on-campus graduate students. At the core of the CoI Framework lies the student educational experience.

The student educational experience is affected by the degree and development of three presences: *social presence*, which is the ability of learners to present themselves and connect authentically with others through technology (Rourke et al., 2001), in other words, the student-to-student connection; *cognitive presence*, which is the ways in which learners connect meaning to course content (Garrison et al., 2001), in other words, the student-to-content connection; and *teaching presence*, which is the "design, facilitation, and cognitive direction of cognitive and social presences for the purpose of realizing personally meaningful and educational worthwhile learning outcomes" (Garrison et al., 2001), in other words the student-to-instructor connection. The CoI Framework is centered around the students' educational experience and the intersections of three presences: social, cognitive, and teaching (Garrison, 2021).

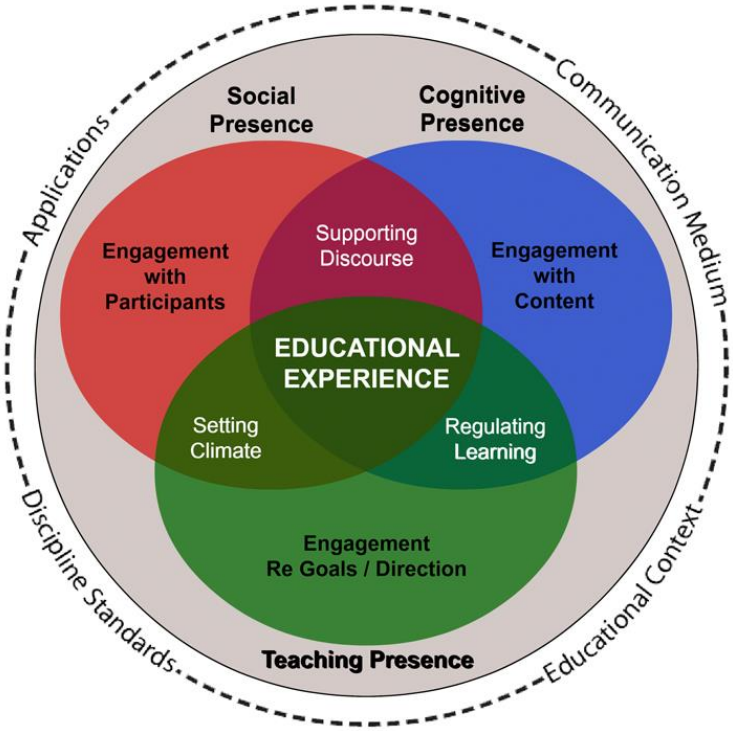

Figure 1. Community of Inquiry Framework

Literature Review

Mentorship for Graduate Students

The relationships students develop in graduate school can have a profound impact on their experience at the university and beyond. Mentoring has advantages for both new graduate students and current graduate students. Usually, a peer, a member of the faculty, or a professional in the student's field of study can serve as a mentor. Many successful professionals have multiple mentors, who may differ depending on the stage of their careers. Mentors and professional contacts are frequently essential in identifying and pursuing academic and professional objectives. Universities throughout the world are still focused on ensuring their students possess the endurance in finishing degrees. Lorenzetti (2020) indicated that the peer mentoring has positive impacts on creating a strong relationship and help on knowledge acquisition, skill development, and degree persistence. Success of students and alumni is more closely correlated with how they attended college than with where they attended. Students will succeed more in college and in their jobs if they have emotionally supportive relationships. According to researchers, these powerful connections can develop naturally, if enough time and effort is given to students (Livingston, 2018).

Graduate students seek more effective mentoring compared to other students, regardless of their racial or ethnic background, gender, sexual orientation, age, place of origin, academic area, or departmental affiliation. Good mentoring may help all students learn more efficiently, and that should be the major goal of any university. Advisors and personal tutors must possess a variety of abilities and traits, including good communication, empathy, knowledge of the subject, and teamwork (McGill et al., 2020). McGill contended an academic advisers must wear several hats to be able to read and understand students to support students in this fashion. They must be able to identify both the challenges students are presenting and those that are hidden from view. This procedure is an integrative art form. McGill's findings showed that caring for students, wanting to work with a varied group of students, dedication to student achievement, and service orientation are crucial traits that advising professionals should exhibit.

Academic Support through Peer Mentorship

According to the research of Lorenzetti et al. (2020), peer-mentoring interactions can improve knowledge acquisition, skill development, and support degree persistence. According to their study, graduate students who participated in the research reported that peer mentoring encouraged the growth of learning settings that prioritized community, collaboration, and shared purpose. Students felt that peer mentors helped them build academic and research abilities and reach significant academic milestones by making it easier for them to obtain critical procedural and disciplinary knowledge. The development of abilities was a recurring theme in the authors' research findings. Students participated in the research reported they were able to build three functional and interpersonal qualities through peer mentoring: which include developing research, relationship management, and honing career skills.

Sarker (2021) discussed the employment crisis. This study can be an effective tool to bring attention to educational institutions, policymakers, and students to emphasize more explicitly on building soft skills for job opportunities and professional development. Sarker noted that the lack of industry-academia collaboration is the primary cause of unemployment for graduates (Sarker et al., 2021). The purpose of this study was to better understand employability enhancement strategies for students and recent graduates, as well as the function mentorship plays in fostering employability. In addition, the objective of the study

was to improve the mentorship and career services already offered by the case organization to better address the many facets of employability. Using service design methodology, the development work was carried out as a service design process. The mentors, protégés, and the entire business can all profit from a carefully thought-out mentoring arrangement. A company culture that supports the development of its young workers will benefit from effective mentoring connections.

Traditional mentoring relationships are unlikely to give students the psychosocial support they benefit from in peer mentoring relationships (Grant-Vallone & Ensher, 2000). According to research on peer mentoring, mentees are more prone to express vulnerability when dealing with peer mentors than when they do with traditional mentors (McManus and Russell 2008). According to a study by Rockinson-Szapkiw et al. (2019), racial and ethnic minority women mentees supported participation in virtual STEM peer mentoring was advantageous for fostering a sense of community, interest in STEM, STEM identity, fostering STEM self-efficacy, and, ultimately, fostering STEM persistence. Peer mentoring, which disregards conventional hierarchies, may be easier to reach for underrepresented groups, such as women and minorities (Cree-Green et al., 2020).

Student mental health is becoming an increasingly important concern on university campuses throughout the world. Peer mentorship enhances graduate education's social, psychological, intellectual, and professional aspects (Paolucci et al.,2021). According to Paolucci's study, peer mentoring connections provides mentees with emotional support, encouragement, and a feeling of community while also providing mentors with chances for personal growth and fulfillment. Mayo, & Le's (2021) study discovered that poor mentor connections and a lack of academic proficiency had an impact on the connection between perceived prejudice and mental health. Moreover, according to the study increased perceived prejudice specifically predicted lower mentorship support, a decline in academic self-concept, and worsened general mental health. The author's research suggests that reducing discriminatory encounters, expanding mentorship opportunities, and promoting a good academic self-concept may all be used as preventative approaches for mental health issues among college students.

Colvin and Ashman (2010) assert that the openness and empathy displayed by peer mentors and mentees creates a variety of essential support roles. Working closely and informally with

program participants, peer mentors can monitor mentee growth and inform faculty mentors of any issues. In this sense, the peer mentor serves as a link between the faculty and the participants.

e-Mentoring

Due to the growth of online graduate programs and, more recently, the higher education institutions' change to online interactions as a response of the COVID-19 crisis, graduate student mentoring is becoming increasingly prevalent online. The challenges, strategies, and outcomes associated with online mentoring of graduate students are of the utmost importance for the participants of a mentoring dyad as well as for universities that offer online or blended graduate education. Promoting cutting-edge teaching strategies requires a strong culture of community engagement and cooperation Voldsund & Bragelien (2022). Online mentoring can be just as successful and beneficial as traditional mentoring, serving the same purposes (Welch, 2017). Numerous research on students' experiences with peer groups and online mentoring have found that they are very satisfied with both (Jacobs et al., 2015). Online mentoring can be utilized to coach graduate students in their research as well as areas of professional development (Doyle et al., 2016). Online mentoring has the capacity to get over challenges of distance and time, which is one logistical advantage over traditional mentoring. Onat & Bertiz (2022) found the use of instant messaging apps in e-mentoring programs bridges distance and creates a sense of community,

E-mentoring is a method of creating a structured mentoring relationship through the internet or via digital mediums. With the means of e-mentoring, participants may communicate whenever it is convenient for them and across time zones thanks to technology, which removes the necessity that they be in the same physical location (Dikilitas et al., 2018). E-mentoring may maintain face-to-face engagement by using video conversation services like FaceTime, Google Hangouts, Skype, Zoom, Meets, etc. Online mentoring benefits professors by giving them chances for professional development and the improvement of their mentoring abilities, chances to learn from students' ideas, and opportunities to rediscover a passion for their areas of specialization (Broome et al., 2011). According to Lerman's (2020) research, face-to-face mentoring interactions are not always feasible owing to financial and geographic limitations. Moreover, virtual mentoring removes such obstacles while still providing a community learning opportunity. According to the study, online

learning is more effective than face-to-face learning in imparting crucial leadership qualities to students. Virtual gatherings also make it possible to reach disenfranchised groups who would not normally be present.

The fast spread of e-mentoring systems demonstrates several significant benefits to these programs. Ensher et al., (2003) highlighted five major advantages for e-mentoring which include (a) easier access to mentors since distance and time constraints are less of an issue with e-mentoring. (b) lower expenses for carrying out training, running the mentoring program, and generating materials. (c) Because the medium is less intimidating, status disparities or stark distinctions are diminished. (d) a lesser focus placed on demographics, as participants in e-mentoring programs sometimes lack a firm understanding of each other's age, ethnicity, or other physical traits at first. and (e) a conversation log.

Individuals can overcome personality hurdles such as low assertiveness, poor social skills, or simply shyness or fear of initiating contact with the help of e-mentoring. The electronic media can make these initial contacts far less dangerous than a face-to-face initiation. Ensher et al. (2003) contended with the support of e-mentoring, individuals may overcome personality barriers such as low assertiveness, weak social skills, or simply shyness or fear of starting contact. These early encounters can be significantly less harmful than face-to-face initiations thanks to electronic media.

Revealing the "Hidden Curriculum" for Graduate Students

The term "hidden curriculum" (HC) refers to spontaneous, ad hoc learning that takes place outside of the conventional, prescribed curriculum and has a significant impact on students' professional growth (Neve & Collett, 2017). Although this learning might be beneficial, it can be at odds with what is being taught in the official curriculum. While medical schools take several measures to minimize these detrimental consequences, students are frequently unaware of the concept's existence or what it entails (Neve & Collett, 2017). To thrive in graduate school and prepare for the next professional step, many students must master skills and methods that they did not learn during their undergraduate studies. These abilities include not just scientific writing and teaching, but also negotiating professional relationships and ethical issues. The "hidden academic curriculum" refers to methods for gaining the non-technical abilities and perceptions essential for success in graduate school.

Higher education's "hidden curriculum" supports colonialism and other repressive social norms by promoting unspoken expectations that exclude already marginalized populations. These unwritten standards are rarely openly articulated, especially within graduate education, making it difficult to navigate resources, translate academic jargon, and even understand expectations (Villanueva et al., 2018). Navigating these unwritten rules adds to an already heavy load, and juggling multiple responsibilities can make it harder to feel connected. Graduate students face unique challenges that most of their undergraduate counterparts do not, such as balancing their studies with a career and/or family responsibilities. Additionally, some graduate students may need to learn or re-learn the standards since they are returning to a postsecondary setting after a long absence (Erin, 2022).

Professional Development through Professional Mentorship

Akinla et al. (2018) define near-peer mentoring as a method of encouraging professional and personal growth. Many companies, including Google, Microsoft, IBM, and Apple, are including mentoring programs into their professional development strategies. According to Cooper and Miller (1998), the benefits of mentoring include faster more successful integration of new workers; retention of quality professionals; greater transfer of skills from one generation to the next; increases in productivity and performance; increased learning through professional development programs; enhanced communication, dedication, and motivation; and a stabilizing force during times of transition.

Mentoring substantially improves a person's capacity to reach their actual potential in their field of interest. Having a competent mentor may assist and assure a positive outcome in the highly competitive field of technology. One’s mentor can assist their mentee in effectively navigating the academics and advancing professionally by offering advice, support, and advocacy. A mentor's attention, knowledge, strategic guidance, and support, along with mentees own realistic goal setting and proactive engagement in one’s mentoring relationship, can give mentee compelling prospects for personal growth and professional progress. Mentoring relationships are a crucial part of professional growth in many industries, including education (Hansford et al., 2004). Such relationships can help with retention and work satisfaction (O'Meara, 2015). Traditional mentorship is good. Peer mentorship, on the other hand, may be a significantly more beneficial choice if done correctly. When workers

work together to support and encourage one another, the company creates strong teams and a strong culture. In companies when there aren't enough senior executives or workers to teach junior team members, peer mentoring can be very beneficial. As a result, pairing peers to mentor one another is a practical approach. Peer mentorship programs allow company staff to learn and grow from one another. This encourages newcomers to succeed while simultaneously giving a space for established employees to reflect.

Mentoring fosters a community in which skills are developed, issues are addressed, and growth occurs. One of the most significant advantages of peer mentoring is that it promotes professional growth. Mentees may expand their abilities and expertise, while mentors can take joy in assisting others and passing on their knowledge. It's a win-win situation for everyone. Peer mentorship can also help to build workplace community. Employees are more likely to be engaged and effective when they feel like they are a member of a team and have colleagues they can rely on. Peer mentorship programs foster an environment in which individuals may gather to share their experiences and support one another. Single and Single (2005) expand on these concepts by claiming that e-mentoring offers two additional distinct advantages: impartiality and interorganizational connections.

Method

Following a detailed literature review, our data collection methods consisted of the following: a landscape analysis of graduate student academic mentoring programs and professional mentoring programs; SWOT (strengths, weaknesses, opportunities, and threats) analysis of the MSA program; and document analysis of the 2022 MSA Program mission, goals, learning outcomes, and learning targets. We also developed a student survey for future distribution to MSA students to capture their interests in developing various academic and workforce skills.
In conducting the landscape analysis, institutions with graduate student mentorship opportunities were selected based on the description of the existence and type of these programs listed on the institutions' Web sites. Criteria for inclusion in the landscape analysis consisted of 1.) Existence of a peer or professional mentoring program or information about mentorship for graduate students. 2.) The source of the mentorship program or mentorship information was a U.S.-based graduate school. 3.) The goals of the program explicitly centered on the academic and/or professional development of students enrolled in the graduate program.

MSA faculty and administrators conducted the SWOT analysis in December of 2022 in collaboration with the MSA Advisory Committee, a committee of MSA alumni working in leadership roles in a variety of industries. The SWOT analysis provided strategic perspectives, revealing the strengths, weaknesses, opportunities, and threats facing the MSA Program. Of particular interest within the context of peer and professional mentorship were the strengths that could be capitalized on in the creation of the program, as well as the opportunities available for growth and deepening the student experience.

We also conducted a document analysis of the MSA program mission, goals, learning outcomes, and learning targets (MSA Mission & Vision, 2022), which program administrators and faculty recently drafted as they are in the process of completing program updates. We thematized the content of the document into four main themes: workforce skills, academic skills, content knowledge, and areas of growth. The purpose of analyzing the mission, goals, learning outcomes, and learning targets was to provide context within the direction and focus of the programs core documents related to the areas of focus for the program and for students enrolled in the program.

Finally, we created for future distribution, a 22-item survey in Qualtrics to disseminate to MSA students, comprised of closed-ended and open-ended questions and organized into three sections: a demographics section with questions about the individual, their concentration, and their future plans; an academic and professional skills section with questions related to students goals and competencies within a range of academic and professional skills (e.g., communication, presentation, leadership); and finally, a mentorship section to gauge their level of interest in a peer and professional mentorship program, preferred modality, and the qualities in a mentor they would find most beneficial.

Results

The results of the landscape analysis of graduate student academic mentoring programs and professional mentoring programs, SWOT analysis of the MSA program, document analysis of the 2022 MSA Program mission, goals, learning outcomes, and learning targets are detailed in this section. Collectively, this data revealed the unique opportunity a technology-supported peer and professional mentoring program has the potential to fill in helping students succeed academically and adjust to the rigor and expectations of graduate school, as

well as support students in transitioning to professional leadership roles within organizations upon completion of the program. The results have been used to develop the design of the framework described in the discussion section, which provides an effective model for the development of a technology-supported peer and professional mentoring program for graduate students enrolled online or on-campus in the Master of Science in Administration Program at Central Michigan University. Following the discussion section, the conclusions and recommendations sections restate the key findings of the study and discus next steps for the study and development of peer and professional mentoring programs in graduate education programs in a variety of disciplinary and institutional contexts.

Discussion

The results of the landscape analysis of graduate student academic mentoring programs and professional mentoring programs, SWOT (strengths, weaknesses, opportunities, and threats) analysis of the MSA program, document analysis of the 2022 MSA Program mission, goals, learning outcomes, and learning targets, have been used to develop the design of the framework described in this section. As such, this section provides an effective model for the development of a technology-supported peer and professional mentoring program for graduate students enrolled online or on-campus in the Master of Science in Administration Program at Central Michigan University.

The technology-supported peer and professional mentoring program is thus designed with several specific goals in mind grounded in the literature and derived from the study findings. Broadly, these goals are aimed at providing mentees with a rich and comprehensive educational experience centered on creating connections, in alignment with the CoI Framework, the theoretical perspective framing this study. This educational experience will help students build skills and knowledge that will ensure their success academically and professionally in the realm of leadership and management within specific sectors ranging from human resources administration to healthcare administration to project management to engineering management, among other fields. These connections will foster mentees' professional growth and development by providing opportunities for self-reflection, goal setting, and skill building.

Through interactions with experienced mentors, the program is designed to provide mentees

exposure to practices and real-life experiences to support their success in graduate school and to prepare them for success in a leadership role in a professional context. In addition, the peer and professional mentorship program seeks to create a supportive, inclusive community for graduate students studying administration, promoting peer-to-peer learning and collaboration, thereby increasing student support, and potentially enhancing retention and graduation rates. Additionally, we designed the program to enhance mentees' professional networks with potential employers and colleagues in a variety of professional sectors and roles and to help mentees develop a personal development plan. Furthermore, connections with professional mentors provide mentees support for achieving their goals and providing strategies for securing job opportunities to establish or advance their careers. Finally, we designed this mentorship program to promote diversity, equity, and inclusion for future administration professionals by offering mentorship to historically minoritized students, including the programs robust population of international students and first-generation college students.

To accomplish these goals, we designed the program around explicit goals and learning outcomes. The learning outcomes are connected to relevant knowledge in the field of administration and aligned with the program goals. The goals and learning outcomes represent the knowledge students should be able to demonstrate upon completion of the peer and professional mentorship program. Table 1 provides an overview of connected program goals and learning outcomes.

Table 1. Program Goals & Learning Outcomes

PROGRAM GOAL	LEARNİNG OUTCOME
PROVİDE MENTEES WİTH EXPOSURE TO ACADEMİC SKİLLS, ADMİNİSTRATİON PRACTİCES, AND REAL-LİFE EXPERİENCES THROUGH İNTERACTİON WİTH EXPERİENCED MENTORS.	Upon completion of the program, mentees will be able to articulate and apply key leadership and management theories, practices, and real-life experiences gained through their interactions with experienced mentors.
SUPPORT MENTEES İN DEVELOPİNG AND REFİNİNG	Upon completion of the program, mentees will be able to demonstrate improved leadership and

PROGRAM GOAL	LEARNİNG OUTCOME
THEİR LEADERSHİP AND PROFESSİONAL SKİLLS THROUGH PERSONALİZED FEEDBACK AND GUİDANCE.	management skills through personalized feedback and guidance from their mentors.
ENHANCE MENTEES' PROFESSİONAL NETWORKS AND CONNECT THEM WİTH POTENTİAL EMPLOYERS AND COLLEAGUES İN THE FİELD İN A VARİETY OF SECTORS RELATED TO MENTEES' CONCENTRATİON AREA.	Upon completion of the program, mentees will have established a professional network and established connections with potential employers and colleagues in the field of leadership and management.
FOSTER MENTEES' PROFESSİONAL GROWTH AND DEVELOPMENT BY PROVİDİNG OPPORTUNİTİES FOR SELF-REFLECTİON, GOAL SETTİNG, AND SKİLL BUİLDİNG.	Upon completion of the program, mentees will have engaged in self-reflection, goal setting, and skill building opportunities, leading to their professional growth and development.
CREATE A SUPPORTİVE AND İNCLUSİVE COMMUNİTY FOR GRADUATE STUDENTS WHİLE PROMOTİNG PEER-TO-PEER LEARNİNG AND COLLABORATİON AND PROFESSİONAL-TO-STUDENT COLLABORATİON.	Upon completion of the program, mentees will have participated in a supportive and inclusive community of graduate students in administration, promoting peer-to-peer learning, professional-to-student learning, and collaboration.
INCREASE THE RETENTİON AND GRADUATİON RATES OF GRADUATE STUDENTS İN THE MSA PROGRAM THROUGH THE PROVİSİON OF ONGOİNG SUPPORT AND GUİDANCE.	Upon completion of the program, mentees will have a higher rate of retention and graduation the MSA program, because of ongoing support and guidance received through the mentoring program.

PROGRAM GOAL	LEARNİNG OUTCOME
HELP MENTEES İDENTİFY THEİR CAREER GOALS AND DEVELOP A PERSONAL DEVELOPMENT PLAN FOR ACHİEVİNG THEM, İNCLUDİNG STRATEGİES FOR SECURİNG JOB OPPORTUNİTİES, AND ADVANCİNG THEİR CAREERS.	Upon completion of the program, mentees will have identified their career goals and developed a personal development plan for achieving them, including strategies for securing job opportunities, and advancing their careers.
PROMOTE DİVERSİTY, EQUİTY, AND İNCLUSİON WİTHİN THE FİELD OF ADMİNİSTRATİON BY OFFERİNG MENTORSHİP OPPORTUNİTİES TO UNDERREPRESENTED GROUPS.	Upon completion of the program, mentees will understand the importance of diversity, equity, and inclusion within the field of administration, and have participated in mentorship opportunities designed to support underrepresented groups.

Program Structure, Staffing, and Mentor-Matching

Structurally, the peer and professional mentoring program will bookend students' learning experience in the MSA program. During their first semester enrolled in the MSA program, mentees will be matched with an academic mentor, who is a second year MSA graduate assistant, who can orient them to academic expectations and to nuances of graduate school and of the MSA program. Throughout the students' tenure in the MSA program, student success seminars, led by the MSA administrative staff, will connect students to continuing lessons regarding academic and professional preparation and success. The professional mentorship piece will punctuate the student experience during their final semester of the MSA program.

The peer and professional mentoring program coordinator will solicit, hire, and train academic mentors who are MSA program graduate assistants. Academic mentors will engage with mentees up to one hour each week for a period of sixteen weeks. The peer and professional mentoring program coordinator will provide a digital credential to graduate student assistant mentors at the conclusion of the sixteen weeks to document their

participation in leading mentees.

The peer and professional mentoring program coordinator will also solicit volunteers from a pool of 3,467 members of MSA program alumni who are members of the Central Michigan University – MSA Program Students and Alumni group on LinkedIn. The mentoring program coordinator will develop a group of professional volunteers via the creation of a smaller LinkedIn group Central Michigan University – MSA Student Professional Mentors. To be enrolled in the group, the mentoring program coordinator will train and ensure volunteers are committed to engaging weekly with mentees for up to one hour per week for a period of sixteen weeks. The mentoring program coordinator will provide a digital credential to professional volunteers at the conclusion of the sixteen weeks to document their participation in leading mentees.

The mentoring program coordinator will also develop and enforce guidelines to ensure mentorship engagements are taking place each week and to ensure the matches are of high quality to mentors and mentees. The guidelines will include orientation, training sessions, and regular check-ins with academic and professional mentors. The mentoring program coordinator will adjust mentor/mentee matches, if necessary, and provide support, as needed, throughout the duration of the program to ensure mentors and mentees are receiving benefits from the match and the program. Finally, the mentoring program coordinator will offer structured and open opportunities for feedback and suggestions from mentors and mentees to ensure the continued success of the program. For a sample program budget, including staffing needs, see Appendix B: Sample Budget Template.

Program Content

The content in Tables 3 and 4 detail suggested program content for the academic and professional components of the peer and professional mentorship program. The program content is derived from the program goals and learning outcomes and provides a suggested weekly outline of mentorship topics. The mentorship coordinator will also use the program content to scaffold academic and professional mentor orientation and training.

Table 2. Academic Mentoring Component

WEEK	*ACADEMİC SKİLL*	*MENTOR FOCUS*	*MENTEE FOCUS*
1-2	Time Management	Discuss strategies for managing time effectively, including prioritizing tasks and reducing distractions.	Reflect on their current time management practices and identify areas for improvement.
3-4	Effective Reading	Discuss tips for effectively reading academic material, including skimming, summarizing, and taking notes.	Practice reading academic material using effective strategies and seek feedback from mentors.
5-6	Effective Writing	Discuss best practices for writing academic papers, including outlining, drafting, and revising.	Write an academic paper using effective writing strategies and seek feedback from mentors or peers.
7-8	Presentation Skills	Discuss strategies for delivering effective presentations, including preparing and practicing.	Deliver a presentation and seek feedback from mentors or peers.
9-10	Critical Thinking and Problem Solving	Discuss the importance of critical thinking and problem solving in academic and professional contexts.	Practice critical thinking and problem solving skills and seek feedback from mentors or peers.
11-12	Effective Study Habits	Discuss strategies for studying effectively, including creating a study schedule and seeking out help when needed.	Reflect on their current study habits and identify areas for improvement.
13-14	Research Methods	Discuss best practices for conducting academic research, including using library resources and avoiding plagiarism.	Conduct research using effective research methods and seek feedback from mentors or peers.
15-16	Exam Preparation and Test Taking	Discuss tips for preparing for and taking exams, including practicing time management, and reducing test anxiety.	Prepare for and take a mock exam, seeking feedback from mentors or peers on their performance.

Table 3. Professional Mentoring Component

Week	***Professional Topic***	***Mentor Focus***	***Mentee Focus***
1-4	Self-awareness and Personal Branding	Discuss the importance of understanding one's strengths, weaknesses, values, and brand.	Reflect on personal values, strengths, and weaknesses and consider how they will build their personal brand.
5-8	Communication and Interpersonal Skills	Address the various forms of communication, active listening, and conflict resolution.	Seek out opportunities to practice communication skills and work on resolving conflicts in a professional setting.
9-11	Diversity, Equity, Inclusion, and Emotional Intelligence	Discuss best practices for promoting diversity, equity, and inclusion in the workplace, and the importance of emotional intelligence in leadership.	Reflect on personal beliefs and biases and seek out resources on diversity, equity, inclusion, and emotional intelligence in the workplace.
12	Time Management and Productivity	Discuss tips for prioritizing tasks, setting, and achieving goals, and balancing work and personal life.	Consider using tools like calendars, to-do lists, and apps to help with time management and productivity.
13	Career Development	Address issues such as networking, resume writing, and job searching. Offer insights into finding job opportunities and reaching career goals.	Consider attending networking events, creating a professional online profile, and seeking out informational interviews.
14	Leadership and Team Management	Share best practices for leading and managing teams, including delegation, conflict resolution, and motivating employees.	Reflect on their leadership style and seek out opportunities to put their skills into practice.

Week	*Professional Topic*	*Mentor Focus*	*Mentee Focus*
15	Ethical Considerations	Discuss ethical considerations in the workplace, such as workplace harassment, and data privacy.	Reflect on personal ethical beliefs and seek out resources on ethical considerations in the workplace.
16	Continuous Learning and Growth	Discuss the importance of lifelong learning and professional development.	Identify areas of interest for continued learning and growth and set personal goals for professional development.

Technology-Supported Communication Best Practices

To appropriately convey the content and facilitate student learning for on-campus and online students, effective technology-supported communication is a crucial mentoring program component. Effective technology-supported communication will foster rapport and trust between mentors and mentees and ensure the development of beneficial professional relationships. In the peer and professional mentorship program, a variety of technology-supported communication tools will be utilized to support the development of the mentor/mentee relationship and to foster student learning, including possibly through email and video conferencing, and most explicitly through LinkedIn. The use of LinkedIn groups and LinkedIn messaging will provide the primary platform for sharing information and resources and as a point of connection for mentors and mentees. The program coordinator will develop and communicate guidelines for using these tools to ensure clarity is communicated about the frequency, duration, focus, format of communication, and best practices for communication in a virtual setting.

Technology-supported communication best practices should include the following:

- Clear guidelines about the frequency, duration, focus, and format of communication.
- Ensure focused attention occurs during virtual meetings by focusing only on the meeting/individuals at hand.
- Use a high-speed internet connection and ensure access to a quiet meeting area.
- Set specific goals for the purpose of asynchronous and synchronous communication to ensure program goals are met.

- Adhere to specific goals/program content for each meeting to ensure program goals are met.
- Adhere to the specified schedule/duration of interactions to ensure program goals are met.
- For mentors: be personable and supportive by sharing academic and/or professional experiences and stories as they relate to the content and goals of the interactions.
- For mentees: be professional and personal by practicing good listening and responsiveness skills, as well as by asking relevant questions.

Program Evaluation

To ensure the achievement of program goals and learning outcomes, a comprehensive program evaluation plan should be developed at the onset of the program and implemented by the mentoring program coordinator throughout the program. The program evaluation plan will reveal program successes and areas for improvement. To effectively assess the efficacy of the program, the mentoring program coordinator should design a variety of ongoing evaluation tools to collect data from academic mentors, professional mentors, and student mentees throughout the program. These tools should include surveys, focus groups, and ongoing individual assessments of mentor/mentee satisfaction. Individual assessments of mentor/mentee satisfaction will allow the mentoring program coordinator to track the quality of the mentor/mentee matches and to gauge the success of the mentors and mentees in meeting the program goals. Assessments should occur at least twice throughout each 16-week semester to provide real-time information about the efficacy of the matches and the development of the mentor/mentee relationship. The mentoring program coordinator may pair these assessments with check-in meetings with mentors/mentees for an in-depth discussion about their experiences, goals, and progress. In addition, surveys will be distributed at the conclusion of the academic mentoring semester (students' first semester in the MSA program) and at the conclusion of the professional mentoring semester (students' final semester in the MSA program. A sample survey can be found in Appendix A: Sample Survey for Program Evaluation. Data should be collected, analyzed, and reviewed to make data-driven changes and improvements to the program over time. Program coordinators will use the survey results to ensure program continues to meet the needs of mentors and mentees, as well as facilitate the achievement of the program goals and learning outcomes.

Recommendations

The implications for practice for administrators or faculty serving diverse students in online and on-campus graduate programs are described in this section. Administrators or faculty interested in utilizing this framework should take care to develop it to reflect the goals, learning outcomes, and nuances of their own programs and students, as well as ensure to program can be launched and maintained with adequate staffing and resources. To begin adapting this framework, administrators or faculty should begin by gathering data through a survey, or other data collection method(s) on their own campuses about the academic and professional skills students perceive they most need, as well as students' receptiveness to a proposed peer and professional mentoring program. The survey results can inform administrators and faculty as they work through the steps of the program framework that follows:

Adaptable Program Framework

This adaptable program framework can help administrators and faculty design and launch a peer and professional mentoring program for graduate students enrolled in a specific program in on-campus or online modalities.

Program Goals & Learning Outcomes

After collecting and analyzing survey data, administrators and faculty should use the data to help them defining the purpose and objectives of the mentoring program, which is a critical first step for the program's success. The goals and outcomes are aligned and aim to providing mentees with a rich, comprehensive educational experience that will help them build the skills and knowledge they need to succeed in the field of leadership and management.

Program Revenue & Budget

Following the development of program goals and learning outcomes, administrators and faculty must work to develop a program budget, that accounts for available revenue through tuition, grants, and donations, as well as expenses, including personnel, technology, certificates, marketing and promotion, mentor training, and administrative supplies. A sample

budget template can be found in Appendix B.

Mentor Selection and Training

Next, administrators and faculty should determine the processes they will use for mentor selection and training for academic mentors and professional mentors. Processes should include hiring, onboarding, and training to orient mentors to the goals and outcomes of the program, program content, and evaluation plans.

Mentee Selection and Orientation

After mapping out plans for mentor selection and training, administrators and faculty should develop a process for selecting or enrolling mentees. Depending on the resources available and the number of students the program will be able to serve, some programs may limit the number of students in the program by prioritizing acceptance to students who have been historically underrepresented in academia. Administrators and faculty will also determine processes for orienting mentees to the program and providing them with the necessary resources and support to get the most out of the mentoring experience.

Matching Process

Following the development of mentee selection and orientation processes, administrators will work to determine the matching process, which is a critical component of the program, as it determines the compatibility of mentors and mentees. Some programs may include processes that allow students to self-select their mentors based on their academic and professional interests. Other programs may find manual matching by the program coordinator to be a more effective or efficient process. While there are benefits of each method to consider, administrators and faculty developing the program must choose whichever method will be most suitable for their program and its administration.

Content

Next, administrators and faculty must work to develop content that is aligned with the program goals and learning outcomes by developing separate content calendars for peer

mentors and professional mentors. See the sample topic ideas and calendars shown previously in Tables 3 and 4 for examples, but keep in mind it is essential the content be derived directly from the program goals and learning outcomes of the specific program being developed. Also note, the program framework is designed to bookend students' learning experiences. The peer and professional mentoring program organized in such a way to provide graduate students with the academic peer mentoring content during their first semester they are enrolled in their graduate program and with professional mentorship from their professional mentor during their final semester of graduate school.

Technology-Enhanced Communication Tools

Administrators and faculty will also need to evaluate and select specific technology-mediated communication tools they expect mentors and mentees to rely on to engage with one another as part of the program. Email and video conferencing are effective choices, as are social media and messaging platforms like LinkedIn or WhatsApp. Whichever technologies are selected should be featured in the training and orientation materials for mentors and mentees to ensure proficiency and clarity of expectations.

Program Evaluation Methods

Finally, administrators and faculty must develop necessary plans to assess the program and its impact, as well as identify areas for improvement. These evaluation plans should be closely aligned with the program goals, learning outcomes, and content of the program. Surveys, focus groups, and short check-ins with mentors would support the evaluation of the program. The program evaluation plans should also be communicated to academic and professional mentors to ensure transparency and clarity of goals and measurements.

Conclusion

As this program framework demonstrates, the potential of a combination peer and professional mentoring program to enhance opportunities for connectedness across time and distance, potentially increase students' academic success and retention, and enhance student's professional development and professional networks. This chapter is provided a theoretically and research-based framework for a model peer and professional mentoring program

designed to support students in and beyond their program of study. The program framework, based on the CoI Framework, and the centrality of the student learning experience and importance of the intentional development of connections in a technology-mediated environment provides an intentionally designed program for online and on-campus students that similarly centers the student learning experience and connection development. This significance of this program framework is in the potential it provides in creating a unique, foundational structural program design that could be applied to similar graduate programs at other institutions serving diverse students across modalities.

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Appendix A. Sample Survey for Evaluation

Mentors/Mentees: Please complete this short survey to help MSA staff evaluate the technology-supported graduate student peer and professional mentoring program.

1. Overall, how satisfied are you with the mentor/mentee matching process?
A. Very dissatisfied
B. Dissatisfied
C. Neutral
D. Satisfied
E. Very satisfied

2. To what extent do you feel your mentor/mentee relationship has met your expectations?
A. Not at all
B. Somewhat
C. Moderately
D. Very much
E. Completely

3. How often do you communicate with your mentor/mentee?
A. Rarely
B. Once every couple months
C. Monthly
D. Weekly
E. Daily

4. How would you rate the quality of communication in your mentor/mentee relationship?
A. Poor
B. Fair
C. Good
D. Very good
E. Excellent

5. To what extent has the mentor/mentee relationship helped you grow and develop in your academic goals?
A. Not at all

B. Somewhat
C. Moderately
D. Very much
E. Completely

6. To what extent has the mentor/mentee relationship helped you grow and develop in your professional goals?
A. Not at all
B. Somewhat
C. Moderately
D. Very much
E. Completely

7. To what extent have the skills and knowledge you have gained from the mentor/mentee relationship been useful in your academic and professional life?
A. Not at all
B. Somewhat
C. Moderately
D. Very much
E. Completely

8. How satisfied are you with the resources and support provided to you by the program?
A. Very dissatisfied
B. Dissatisfied
C. Neutral
D. Satisfied
E. Very satisfied

9. What, if anything, have you learned from the program that is, or will be, valuable to your success? (Open-ended question)

10. Is there anything the program could have done better to support your mentor/mentee relationship? (Open-ended question)

11. What additional comments or suggestions would you like to share about the program? (Open-ended question)

Appendix B. Sample Budget Template

BUDGET CATEGORY	*DESCRIPTION*	*ESTIMATED COST*	*REVENUE SOURCES*
PERSONNEL	Salary/course release for program coordinator, Graduate assistant academic mentor hourly costs		Grants, donations, program budget, tuition revenue
CERTIFICATES	Credly certificates for professional mentors		
TECHNOLOGY	Software licenses/hardware		
MARKETING AND PROMOTION	Advertising, outreach, and marketing materials via institutional Website and social media		
MENTOR TRAINING	Cost for mentor and mentee training and orientation, including food, drinks, materials		
PROGRAM ADMINISTRATION	Office supplies, meeting costs, and other administrative expenses		
TOTAL	$		

Author Information

Abby McGuire
https://orcid.org/0000-0001-7031-9314
Central Michigan University
1200 S. Franklins St.
Rowe 225
Mount Pleasant, MI 48859
United States
Contact e-mail: *rohn1al@cmich.edu*

Revanthsai Gajula
https://orcid.org/0000-0001-6979-1400
Central Michigan University
1200 S. Franklins St.
Rowe 225
Mount Pleasant, MI 48859
United States

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Chapter 2 - Students' Perception of Engagement with Technology during COVID-19 Emergency Remote Learning

Lizeng Huang, Ching-Hsuan Wu

Chapter Highlights

- Technology was perceived to positively impact students' engagement during ERL by facilitating cognitive, social, and affective engagement.
- Technology can also negatively affect students' engagement by changing established learning strategies and causing distractions.
- Professional development is necessary for instructors in ERL planning to effectively use technology.
- Instructors need to incorporate technology to enhance collaboration and accommodate different student needs.
- Emotional support is needed during the transition from in-person to ERL.

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Introduction

With the unprecedented worldwide outbreak of COVID-19, most higher education institutions in the United States abruptly transitioned from traditional classrooms to emergency remote learning (ERL) classes in the middle of the 2020 spring semester. This was intended to reduce the risk of contracting the deadly virus within academic communities, making online learning a popular choice for allowing university students to continue their studies for the remainder of the academic year. The switch to ERL not only changed the learning setting from an in-person context to a virtual remote context, it also changed how students engaged in the classroom, as students were abruptly required to be in online learning settings with little or no proper preparation or technical support. This quick and somewhat chaotic transition was a substantial deviation from the norm, especially considering that a regular shift to online learning requires multidimensional preparations and adjustments (Redmond et al., 2018). The migration to online learning is ideally well-planned, and occurs prior to the start of the semester and has a well-structured curriculum design, resource support, technical assistance, etc. ERL, on the contrary, happens when online instruction needs to be implemented immediately and emerges in response to unpredictable "crisis circumstances" (Hodges et al., 2020).

Research has shown that students engage differently depending on whether they are in a traditional class, online class, or a blended class (Halverson & Graham, 2019). Factors that can affect student online engagement have been identified in many studies. Researchers have found that social presence (Louwrens & Hartnett, 2015), technology implementation (Chen et al., 2010), collaborative activities (Kim et al., 2015), curriculum design (Blakey & Major, 2019), digital literacy (McGuinness & Fulton, 2019), have played important roles in student online engagement. Among all the identified factors, educational technology, serves as a crucial component to online student engagement as online learning environments have become increasingly common with emerging new educational technologies (Beer et al., 2010). These new technologies facilitate online learning, as they help to create a collaborative online environment, provide teaching and learning resources, and connect instructors and students. Among educational technologies, Learning Management Systems (Beer et al., 2010), social media (Rutherford, 2010), web-based technology (Chen et al., 2010; Nadeem, 2019), mobile technology (Heflin et al., 2017), assessment technology (Han & Finkelstein, 2013; Nadeem, 2019), and collaborative technology (Blasco-Arcas et al., 2013; Heflin et al.,

2017) have caught most of the attention. Many have argued technology integration in online instruction has fostered an interactive, online learning environment and therefore enhanced student engagement. Ultimately, the use of technology in instruction is thought to "trigger more engagement" (Nadeem, 2019, p.73) and have a positive influence on students' learning outcome, personal competence, and personal and social development (Robinson & Hullinger, 2008; Chen et al., 2010; Stanley & Zhang, 2018).

However, in an emergency remote learning setting, the implementation of the appropriate technology proved to be challenging. Although attempting to make the transition as smoothly as possible, some instructors might have difficulty adopting technology and teaching. At the same time, with a rapid switch to an online setting, students' readiness to utilize technologies in their ERL was being tested as well. What role was technology playing in student online engagement during ERL? How did students perceive their engagement with technology use during ERL? These questions require further investigation. In this study, the definition of optimal student online engagement is threefold; it involves students' appropriate use of technology to create and maintain social interaction in the classroom, sustained participation in cognitive learning processes, and positive emotional reactions toward the learning environment during ERL. In light of the aforesaid, in this study we aim to:

- investigate students' perceptions on their social, cognitive, behavioral, and affective engagement with technology use during ERL of Chinese;
- provide practical implications for technology implementation in future ERL setting.

Literature Review

A Transition to Emergency Remote Learning

Today's rapidly changing communication technologies have enabled the possibility to move from traditional face-to-face classes to online classes (Wiesenberg & Stacey, 2008). Traditionally, in order to make a smooth transition from a face-to-face class to an online class successfully, instructors have to make sufficient preparations. These preparations can include learning how to use new technologies, implementing best practices for online teaching, making subject-specific adjustments, and collaborating with a more experienced person (Cochran & Benuto, 2016). Resources and technical support are often provided before the start of the course by institutions in the form of professional development or training sessions

(Zheng et al., 2018; Vilppu et al., 2019). Students, at the same time, are aware of the class structure ahead of time, usually before the course begins, and therefore have enough time to prepare for the upcoming online learning. Under this model, both instructors and students are expected to be ready to engage in an online class at the beginning of the course.

However, that is not the case for emergency remote learning. The main purpose of ERL is not to recreate a pre-emergency learning environment virtually, but rather to provide quick and reliable instruction to students during the emergency (Hodges et al, 2020; Van der Spoel et al., 2020). With that being said, emergency remote learning should not be easily equated to a regular online class. Hence, spring 2020's transition to ERL should not be seen as a mere transition from a face-to-face class to an online class. The instructors and administrators were unexpectedly and abruptly informed of this transition during spring break of 2020, and therefore they had "little forethought for its practicality or effectiveness and virtually no time for planning" (Schultz & DeMers, 2020, p.143). This rapid transition to ERL "required quickly redesigning what they had prepared in advance for the teaching semester" and adjusting their already-designed face-to-face curriculum for online learning (Green et al., 2020, p.907). Many challenges, such as learning new technologies and software, maintaining a normal laboratory experience, keeping academic integrity, and "Zoom fatigue", have been identified during this transition to ERL (Gares et al., 2020). For example, many instructors had to learn how to use Zoom or other communicational tools to teach online after ERL began. However, with so many technological features on Zoom, it was challenging for some instructors who have "taught in the classroom their entire career and has not employed technological tools and pedagogies conducive to the virtual environment" (Schultz & DeMers, 2020, p.144). Because multiple factors contribute to student online engagement.one can hypothesize that major deviations from the typical online learning format, such as ERL, will introduce new features that need to be considered for a robust understanding of student online engagement.

Student Engagement Framework during ERL

Classroom engagement as a "multidimensional construct" (p.73) has "distinct, though interrelated" (p.73) aspects (Nadeem, 2019), and many researchers have been trying to identify these possible aspects (Fredricks et al., 2004; Reeve & Tseng, 2011; Redmond et al., 2018; Halverson & Graham, 2019). Fredricks et al. (2004) propose a 3-component model

featuring behavioral engagement, emotional engagement, and cognitive engagement. According to Halverson and Graham's comprehensive literature review (2019) on models of engagement, many researchers have adopted this tripartite model and used it as the foundation of their new frameworks. In order to systematically analyze student engagement in ERL setting, an interdisciplinary conceptual engagement framework (Fredricks et al., 2016) has been adopted in this study. In this framework, four crucial components for effective student engagement have been identified: social engagement, cognitive engagement, behavioral engagement, and affective engagement. This framework was utilized to guide the interview to collect the data in this study and then analysis the interview data.

Social Engagement

Social engagement refers to the development of relationships through social interactions between students and their peers and instructors in both academic and non-academic settings (Pittaway & Moss, 2014; Redmond et al., 2018). Social interactions among students and faculty, in both formal and informal contexts, are of great importance in both face-to-face learning and online learning (Chen et al., 2010). Through social interactions, students can create "purposeful relationships" with their classmates or professors (Redmond et al., 2018, p. 191). They are critical for building student engagement through developing the student's sense of belonging in the classroom community (Lear et al., 2010). Educational technology offers numerous opportunities for social interaction within the online learning community (Lear et al., 2010). Hong and Gardner (2019) argue that technology, such as SNS, has played a big part in socializing and facilitating students' peer learning. Students who utilized technology in their learning have reported higher personal and social development (Chen et al., 2010).

Cognitive Engagement

Cognitive engagement refers to students actively involved in the learning process, working to comprehend complex ideas and then build necessary skills (Fredricks et al., 2004). This process relates to what students do and think to promote learning, which involves intentional or active–intellectual effort and integrating new information into prior knowledge (Greene, 2015; Redmond et al., 2018; Blakey & Major, 2019). Different levels of cognitive engagement manifest in various way. For example, shallow cognitive engagement involves

"rote processing" (Greene, 2015, p.15) such as repeating ideas without clarification and agreeing on arguments without explanation. On the other hand, justifying and integrating ideas with multiple sources (such as exchanging ideas), providing new judgments to support ideas (such as giving constructive feedback) would be considered deep cognitive engagement (Redmond et al., 2018). Studies have shown that technology plays a part in a student's cognitive processing. Chen et al. (2010) suggest that students who utilize technology in their learning "are more likely to make use of deep approaches of learning like higher order thinking, reflective learning, and integrative learning in their study" (p.1230).

Behavioral Engagement

Behavioral engagement is generally related to students' class attendance (Mahatmya et al., 2012), adherence to the rules, meeting teachers' and schools' expectations, and participation in extra-curricular activities (Fredericks et al., 2004). In order to be behaviorally engaged, students have to be willing to exert the effort to build the engagement (Blakey & Major, 2019). "Showing up", defined as attending classes and turning in assignments on time, is argued by Blakey & Major (2019) to be a key indicator of behavioral engagement, and is therefore critical for students to be engaged in learning. On the other hand, to keep students behaviorally engaged, instructors should put forward clear expectations, rules, and learning routines for students and allow students to participate in developing the expectations, rules, and routines (Fredericks et al., 2011).

Affective Engagement

According to Fredricks et al. (2004, 2011) and Redmond et al. (2018), affective engagement refers to a student's wide range of affective reactions towards school, teacher, and learning activities, both positive and negative. Although both negative and positive emotions can contribute to the activation of students' affective engagement, positive emotions have an advantage in promoting engagement over negative emotions (Sinatra et al., 2015). Moreover, negative emotions, such as boredom, frustration, and anxiety, can be associated with technology-enhanced learning (Halverson & Graham, 2019). For example, technology issues related to hardware or software often cause frustration, which can then cause learners to be unable to keep pace with the course (Bambara, 2009). Heflin et al. (2017) have studied the impact of mobile technology on student engagement, and they suggest technology sometimes

can lead to students' distractions because of a lack of face-to-face interactions.

Researcher argue that these four elements of this multidimensional construct need not merely be explored as isolated processes (Fredricks et al., 2004; Redmond et al., 2018). That is to say, different features of online engagement can correlate with or affect one another other within this conceptual framework. For example, overlapped engagement indicators, such as effort and persistence, have been found within cognitive and behavioral engagement (Halverson & Graham, 2019). Fredricks et al. (2004) have found a correlation between social environment and student's emotional and cognitive engagement. They also mention that lack of behavioral engagement can lead to emotional withdrawal and less sense of belonging in the academic community (Fredricks et al. 2004). In addition, "if students are not emotionally engaged, cognitive, behavioral, and social engagement will also be lacking" (Malan, 2020, p.326).

The literature has shown that there are certain connections between technology use and student engagement. However, Chen et al. (2010) points out that the precise nature of the relationship between technology and student engagement should be further explored. In addition, the abrupt transition to an ERL environment is another important factor which should be taken into consideration when investigating student engagement with technology use during ERL.

Methodology

Participants

The participants in this study were six college students purposefully sampled to yield the most diverse information (Tashakkori & Teddlie, 2008). Upon the Institutional Review Board (IRB) approval, recruitment letters were sent out to recruit students to participate in this study from five different universities in the U.S. Six students responded to our recruitment letter and agreed to participate in this study. Among the participants, five were male and one was female. In terms of ethnicity, four of the participants were white students, one was an Asian American student and one was an African American student. In regard to student status, there was one second year student, one third year student, two fourth year students and two recently graduated students. Their ages ranged from 20-25. Each student was a major in a different discipline: Physics, Cyber Security, International Studies, Biology, Chinese or

Chemistry. These six participants are from four different types of U.S universities. These universities were either state research-focused (n=2), state teaching-oriented (n=1), private research-focused (n=1), or private liberal arts institutions (n=1). A small size sample approach was adapted for this study and it was focused on Chinese language student's perceptions only. Table 1 shows the overall characteristics of six participants.

Despite their differences in background, all participants participated in online learning during COVID-19 ERL in the spring semester of 2020. Although some of the participants had experience in an online class or a hybrid class before, it was their first time in an ERL environment. All participants had experience in using technological tools or strategies to assist their Chinese learning, and their views toward technology implementation were different. All six participants had the ERL experience, yet from different institutes with different backgrounds. These criteria had enabled this study to yield relatively meaningful results with a small sample size.

Table 1. Characteristics of Participants

	Race	**Age**	**Gender**	**College Year**	**Major**	**Types of university**	**Years of studying Chinese**
A	Asian American	20	Male	Second year	Physics	private research-focused	Two years
B	African American	22	Male	Fourth year	Cyber Security / Chinese	state teaching-oriented	Four years
C	White	21	Female	Third year	International Studies	state research-focused	Five years
D	White	21	Male	Fourth year	Biology / Chinese	private liberal arts	Three years
E	White	22	Male	Recently graduated	Chinese	state research-focused	Five years
F	White	25	Male	Recently graduated	Chemistry	state research-focused	One year and half

Date Collection

The major form of data collection in this study was open-ended, semi-structured interviews.

The interview guide and questions were constructed based on the engagement framework (Fredricks et al., 2016). The interview guide was sent to participants before the interview to familiarize participants with the purpose of this study, as well as general questions they would be asked during the interview. For safety reasons during the COVID-19 pandemic, the interviews were only conducted virtually via a video conference software. Each interview lasted between 60 minutes to 100 minutes and was automatically recorded by this software. The interview consisted of background information questions and open-ended questions about students' perceptions of their four different engagements with technology use; it also asked students to assess their Chinese language learning experience during the ERL setting.

Data Analysis

A total of six interviews were recorded by a video conference software. About 8.3 hours of recorded interview data were collected. After conducting and recording the interviews, the interviews were transcribed by the interviewer and the transcripts were member checked before the coding process. Students were given pseudonyms in the interview transcripts and their personal information were deleted from the transcripts before the coding process. Three coders participated in the coding process. All coders hold foreign language teaching positions from three different American universities. After each coding round, coders had a meeting to check the accuracy of the coding process to increase the inter-rater reliability.

The transcripts were coded using Saldaña's (2009) first and second coding cycles. Each coding cycle has two rounds of coding. Structural coding process was applied during the first coding cycle. The structure of coding in the first round of coding was based on the theoretical proposition of this study, which was the engagement framework (Fredricks et al., 2016). Based on this framework and the research questions of this study, engagement indicators, technology implementation, and transition to ERL were used as the initial codes within individual interviews for the first round of coding. Analytic memos were also used during the first round of coding to gather thoughts and opinions from the data sets and then to identify different code sub-categories. The second round of coding analyzed the students' perceptions of their engagement with technology implementation, and the transition to ERL within an individual data set. The pattern coding process was applied during the second coding cycle. The third round of coding cross-examined six different data sets to look for repeated and focused themes and topics. At this stage, similarities and differences in students' perceptions

towards the technology use and engagement in an ERL setting were found within six data sets. The final round of coding analyzed the connections between the four engagement elements and themes found in the third coding round, then analyzed interactions among thematic sub-data sets and synthesized them.

Findings

The data analysis uncovered four major themes in relation to technology use under the four main conceptual constructs of social engagement, cognitive engagement, behavioral engagement, and affective engagement during ERL.

Transition to ERL

The data analysis first presented us with general background information of the six participants regarding their technology use during ERL. In a timely response to the pandemic, their Chinese classes shifted from face-to-face classes to online classes at some point in March 2020. As a result, all six participants' Chinese course structures changed. Everything went online. For instance, dictation, which is very common and important in a foreign language class, was moved from handwritten to type on a computer. Exams, both written and oral, were restructured to be completed online, some of which were made to be open-book. The Learning Management System (LMS) played a critical role in this transition. Instead of handing in their handwritten homework, dictation, and tests, participants had the option to either submit it electronically through LMS or handwrite, scan, and upload it to LMS. They might also email their homework or exams directly to their professors.

Other than LMS, the six participants had all used educational technology to support their Chinese learning during ERL. Mobile phone apps (e.g., Pleco, Quizlet, Tinycards), online translators (e.g., Google translation, WeChat translation), Chinese podcasts and news (e.g., Learning Chinese through Stories), communication tools (e.g., Zoom, Facetime, Facebook Messenger) were the most used technologies. All participants reported their competence with and knowledge of technology were adequate during ERL, especially their ability to quickly learn how to use a new technology required by their Chinese professors, regardless of whether they had an online class before or not.

The data analysis revealed that students tend to be quite technologically savvy when it comes to learning online, perhaps more so than one might think. Participants seemed to react actively and positively to the need to learn new technologies during this rapid transition to ERL. On the contrary, their professors needed assistance in adapting to the use of new technologies. According to the participants, their professors seemed to have a larger "learning curve" when adapting to the new technologies than the students. The unfamiliarity with how to use new technologies by professors, however, was largely tolerated and forgiven by students (Gares et al., 2020). Thus, in future planning for ERL practice, it might be important to give more attention to providing resources and support for instructor rather than for students. This can take the form of professional development workshop sessions so that faculty can fasten their competence with implementing new technologies. Based on the data, this competence is not something that students lack to the degree that professors do.

Student Engagement with Technology during ERL

Based on the engagement framework proposed by Fredricks et al. (2016), our interview questions were associated with four different types of engagement and how technology use interplays with each of them in an ERL environment. The data analysis revealed each engagement as follows.

Social Engagement

During this ERL setting, various educational technologies were instrumental in building, maintaining, and enhancing relationships established before ERL between the six participants, their classmates, and their professors. In their online classes, participants were utilizing Zoom, Learning Management Systems and other communications tools to keep connecting with their classmates and professors. Outside of class, social media and chatting apps became the common tools to stay in touch with classmates.

Participants' Chinese professors had taken the initiative to use technological tools and strategies to keep students socially engaged and connected, as suggested by Nadeem (2019). In order to achieve a social and supportive online learning environment, professors had different engagement strategies. The most common strategy was to split a large class into smaller groups by using breakout rooms or breakout sessions feature from Zoom or other

communication tools. Many participants liked because they were able to interact with their classmates more personally. However, participants A claimed the Zoom breakout room was ineffective and was "nothing like the in-class group." In addition, professors kept students attentive by frequently calling on students and asking them questions, encouraging conversations between themselves and students. Another strategy was requiring students to turn on their cameras and audio in order to hold them accountable for their participation.

Building a sense of belonging within a learning community is another indicator of promoting social engagement (Redmond et al., 2018). Participants had differing reflections on how this ERL environment impacted their sense of belonging in their classes. Those who believed that their sense of belonging was enhanced explained that constant encouragement from professors and the breakout room/sessions played positive roles in bringing students closer to each other. Students realized they were all going through a shared experience, and therefore, they were somehow deeply connected.

Those who claimed a loss or diminished sense of belonging had different perspectives as well. For example, participant A described his experience,

> Online learning makes people depersonalized. When you learn online, you start to separate your personal identity from yourself as a student. People…just go online, go on Zoom, they just turn off their camera whenever they are in the class. There's not much sense of belonging because it doesn't really feel the class is real.

Participant B, who double majored in Cyber Security and Chinese, believed their sense of belonging connects with the level of Chinese class the student was taking and their personal study preferences.

> When you have reached a higher level of Chinese, you can't say that the sense of belonging comes from, at least in my university, the relationship between you and your classmates. My focus on learning Chinese is how to keep studying with professors and how to use the resources my professor has given to me rather than how to keep a good relationship with my classmates.

Distinct from other participants, this participant was majoring in Chinese. Thus, it was quite different from taking a Chinese course as a general language requirement or an elective. Because the student was likely familiar with the department, the content, and the other

students, his sense of belonging might have been impacted by his discipline. In future research, it will be also helpful to study how students' disciplines affect their engagement.

Furthermore, participants identified several drawbacks of ERL class that kept them from being socially engaged. First of all, the online class was not personal, even described as "antisocial" because "you can't see all the classmates at once and lose connection with them after class." Whereas, in a traditional face-to-face class, "you would learn [about] someone better". Second, it was more difficult to take note of communicative social cues such as body language and expressions in an online class than in a face-to-face class. Lastly, it was hard to keep social interactions natural within the ERL classroom, leading to lower student participation; this is juxtaposed with the traditional classroom where one can interact with classmates and professors naturally by raising hands or asking questions directly. Participant D raised his concern as below:

> It was hard to answer questions over online because, you know, when [you are] in a class, you can kind of speak out and everyone can talk to each other, but online you can't, it's not as natural as just say[ing] something, because people get confused and [are] not sure who [said] what. And you feel like you are stopping the class, and then everyone has to wait. And you say something, [and] people talk over each other, like interrupt sometimes, which is difficult.

In this case, video conference platform, as a medium to keep participants connected with classmates and professors during ERL, did not make the connections socially appropriate and brought a social awkwardness to the participant.

Cognitive Engagement

As Fredricks et al. (2004) have identified, cognitive engagement is the most fundamental form of engagement. The data analysis assessed six participants' cognitive engagement in regard to different aspects of their Chinese learning process and analyzed how technology use participated in students' cognitive engagement during ERL.

Cognitive engagement occurs when students are actively involved in their learning process (Reeve & Tseng, 2011; Redmond et al.,2018; Blakey & Major, 2019). Most of the participants stated their Chinese learning process, including planning, previewing, studying,

and reviewing, were not that much different than pre-ERL. Technology had been already integrated into their Chinese learning before ERL, such as Pleco for learning Chinese characters, Google translate for learning Chinese grammar. However, with ERL, new technology and strategies were put in place. Participant D described typical ways to improve his Chinese listening skills during ERL:

> My professor gives us recordings of textbooks which she recorded herself. I listen to these over and over to see if I understood without looking at characters. That's very helpful, having recordings of our textbooks.

Besides textbooks, they relied heavily on other electronic learning materials, such as slides, website links, and recordings provided by their Chinese professors on LMS. LMS served as a platform where students could actively acquire new learning materials to start their learning process. LMS was also where students submitted their homework and exams for their professors to grade. Since most Chinese classes require a lot of handwriting, especially Chinese characters, the use of LMS changed participants' writing of Chinese characters from hand-written to typed. According to participant A, this was less "worrisome" but gave students fewer opportunities to practice hand-writing their characters:

> [I would prefer to] do the test and quizzes in written format again. And submitting it as a scan rather than online. Because now we don't have to do any character writing, so I never got to practice my character writing. That's just weird because usually, we do write characters.

Hence, technology might change their already established strategies or habits for learning Chinese. In future planning for ERL Chinese language instruction, instructors should aim to address and accommodate different students' needs to the best of their ability. The instructor could send out a survey or meet with students individually, if possible, to discuss what expectation students have for successful online learning. For example, in this case, the instructor could ask students who would like to practice handwriting Chinese to handwrite their homework and scan to upload to LMS.

During ERL, technologies were also being utilized to exchange opinions, receive and provide feedback, and understand complex learning materials among the six participants. Despite the limitation of the online environment, participants all suggested they were able to share their opinions with others over many communication tools (e.g., Zoom, LMS group chat), which

made them cognitively engaged to different extents. Their Chinese professors were able to provide immediate oral feedback over online meetings and written feedback via LMS or email. Participants did not usually get constructive feedback from their classmates, often just encouragement. Yet participant B, in an advanced level Chinese class, mentioned that they provided constructive written feedback as part of their course requirement:

> In class, we have to write a reflection on one student's video presentation. In this reflection, we would first write how we feel about this presentation, and then put forward some questions and we would discuss it with them in next week's online meeting.

By providing, receiving feedback, and initializing the corrective process, participates felt that they are more cognitively engaged. This finding corresponded with what Louwrens and Hartnett (2015) have proposed: "Cognitive engagement was enhanced by feedback processes built into the online activities" (Louwrens & Hartnett, 2015, p.38). Technology, then, also played a relatively positive role in supporting students' cognitive engagement by conveying their opinions or feedback to each other. In future ERL, instructors could incorporate educational technologies in curriculum or lesson plans to help students express, exchange their ideas and provide feedback to their peers. Possible ways are peer reviewing essays through Google Docs, leaving comments on Padlet, and using the Zoom chat box to provide feedback.

Participants' strategies for acquiring new learning materials to supplement their Chinese learning process and understanding relied tremendously on technology. Four participants referred to online search engines such as Google or Baidu to find supplementary learning materials. When they had difficulty understanding the materials that had been provided by their instructors, the strategy they employed first was referring to either a search engine or mobile phone app such as Pleco or Padlet. If they still did not understand, they would go to their Chinese professors or TAs using virtual communication tools (Email, Text, Zoom meeting, WeChat, Skype). As technology became more of a necessary tool for their learning strategies during ERL, all of the participants stated that they plan to continue to integrate technology in future learning. Therefore, the new technology, by actively being implemented in the Chinese learning process during ERL, had an impact on students' learning strategies, such as how they integrate ideas and solve problems, which are some key indicators of cognitive engagement (Redmond et al.,2018; Blakey & Major, 2019; Nadeem, 2019).

Behavioral Engagement

According to the six participants, despite a few students who could not attend the class due to a variety of personal reasons (e.g., different time zone, poor internet connection, etc.), their class attendance rate was relatively high. The reasons are twofold: first, the attendance portion of their grade had been raised by their Chinese professors to account for grades omitted from the previously designed curriculum. Second, some of the participants believed the online learning environment provided more accountability for students than a face-to-face class. Participant D reported,

> I would say it's easier to skip class when it's in person because if you don't feel like going, you just don't. When it's online class, it's like, what else are you doing? You are at home!

This comment corresponded with participant C's comment,

> If I have a solid excuse, I could be late for the class before ERL. However, one week after we began online class, your excuse like, 'my internet connection is bad', won't work anymore. All you have to do is to leave your couch and walk to your computer to take the online class. You can't really make up any excuses for not attending the class.

Clearly, the convenience and ease of attending online classes made participants realize that it would be irresponsible for them to not attend the classes. Therefore, this special learning environment made participants more behaviorally engaged since the accountability provided by this environment was somewhat more pressing than it was when in face-to-face class.

Besides attending class on time, most of the participants also mentioned they were able to submit all the assignments on time. LMS, which displays all the deadlines in one place and has "straightforward instructions" about the assignments, made it easier for students to submit their assignments on time. Therefore, it will be important for students to have access to a platform that clearly displays deadlines and instructions because their access to professors or other resources is limited.

As important as punctuality, student concentration during ERL also contributed to positive behavioral engagement. Though most of the participants stated they were able to stay focused in the online class, there were distracting factors that inhibited some students from concentrating. Distractions were both internal and external. For example, some participants

reported personal emotions such as anxiety, a lack of accountability, and potential embarrassment from making mistakes could distract them from focusing. Conversely, external factors, such as background noise, family, or pets also led to loss of concentration. Technology, though enhancing other types of engagement, was also a distraction, as most of the participants reported mobile phones and computers were two significant distractions. This finding corresponded well with the idea of mobile technology distracting students from engaging when face-to-face interactions are not available, which has been suggested by Heflin et al. (2017). Poor internet connection on either their part or the professor was reported as the second most significant distraction.

Positive behavioral engagement also occurs when students participate in extra-curricular or non-academic activities (Fredericks et al., 2004). Though Chinese classes were going on during ERL, all Chinese extra-curricular activities, which were designed to keep students engaged out of classroom, such as Chinese corner, Chinese table, and meeting with Chinese friends were all canceled within the six participants' Chinese programs. The cancellation was caused by the rapid switch to ERL; there were not enough resources or support for these Chinese programs to move online immediately. However, for future ERL planning, as suggested by some of the participants, Chinese programs could host extra-curricular activities online to help students to be more behaviorally engaged outside of class. Institutions or programs need to take ERL into their extra-curricular activity's preparation, reserve resource and support for emergency online extra-curricular activities or make backup plans for emergency situations like COVID-19 pandemic.

Canceled extra-curricular activities did not necessarily bring more spare time for participants. In fact, the investigation revealed that the time and effort the six participants had put in Chinese learning during ERL varied. Those who spent more time on their Chinese learning claimed it was due to their fondness of learning Chinese, stating studying at home allowed them more time to study Chinese and advance beyond their classes. However, those who felt they had to put more effort into their Chinese learning to keep up with the class suggested more negative reasons. Some complained that during ERL they had to do more preparation for their classes, and they claimed that the online environment caused them to be less motivated to study. Those who put less effort into their studies also reflected negatively. Two participants mentioned that because of the use of LMS, their effort was less because they did not have to practice and write Chinese characters. For future ERL planning, instructors need

to put a careful eye on how to balance the amount of assignments in order to respond to the rapid switching to ERL. According to the suggestion from the participants, instructors can reduce homework or class preparation to keep students motived. It is also possible for instructor to set up a channel, such as a survey to collect feedback, to hear individual students' needs and make relevant accommodations for these students.

Affective Engagement

Affective engagement occurs when students positively react to their learning environment on an emotional level (Louwrens & Hartnett, 2015; Blakey & Major, 2019). From this investigation, all participants stated they enjoyed their Chinese class during ERL. When discussing how they felt about their classes, positive emotions like relaxed, happy, excited were identified by the participants. In addition, participants felt satisfied with their final grade in Chinese language class, as they used "very well, good, confident, satisfied, or awesome" to describe their feelings toward their final grade. The data analysis revealed that participants perceived their positive emotions to be associated with the effort their professor put into the class, the classmates they met with everyday online, the opportunities to study during the pandemic, a satisfying final grade, and the convenience integrating technology brought to their ERL.

Despite the presence of positive emotions, negative emotions should be considered in investigations of emotional engagement as well (Mahatmya et al., 2012; Halverson & Graham, 2019). With the abrupt transition to online learning, participants all indicated negatives emotions at the beginning of the transition. The investigation revealed a wide range of negative emotions, including confusion, disappointment, astonishment, sadness, anxiety, stress, and anger. According to the participants, those negative emotions were associated with concerns about the upcoming ERL, the inability to be socially engaged with their peers, and concerns about paying too much tuition for the online classes. Participant A reacted:

> I was completely appalled. I couldn't believe that there was a global pandemic that was happening . . . Then I got really, really sad because that meant I could never see my friends, couldn't go to any sort of social gatherings. It almost felt like I was in a nightmare. In terms of Chinese class, I was very confused. I was thinking, how the hell is Chinese class going to work? If there is any class in the world that needs to be in person, it's Chinese class. Literally, any other class could be online except Chinese

class. I was just confused; how could we ever learn language online?

Negative emotions were mostly reported by the participants at the beginning stage of ERL. As ERL continued, participants' emotions improved and stabilized as they gradually adapted to the new class structure and received more support from their Chinese professors and teaching assistants (TAs).

Even though participants all stressed that their technology competence was beyond adequate during ERL, technology had become one of the factors which led to participants' frustration and anxiety. Participants reported that poor or unstable internet connection either from professors or students could lead to low video quality with a blurry image on the screen, intermittent voice, and frozen moments which could delay class. Another participant raised the concern that technology, especially Zoom, did alleviate some stress but it still could not simulate the in-person class environment. All of these resulted in negative emotions on different levels. This result can be supported by the finding from the study of Bambara (2009), in which the technology issues related to hardware or software often caused negative emotions such as frustration.

Negative emotion brought by technology suggested that despite the convenience from technology, it is also important to pay attention to how technology negatively impacts students' mental health during ERL. Findings in this study shows poor internet connection and the inability for the online learning environment to simulate real-life learning situations yielded negative emotions from the participants. Therefore, in order to keep students positively emotionally engaged in class, future planning for ERL needs to consider two questions. First, institutions need to consider how to provide effective and sufficient support in ensuring all students have a stable online connection when they suddenly switch to ERL. Second, instructors need to consider how they can create an online learning environment that closely approximates an in-person learning experience. In other words, are there possible technological tools or strategies that could be implemented during ERL to ensure a less frustrated online learning experience?

Discussion

Guided by an engagement framework proposed by Fredricks et al. (2016), this qualitative study investigated four categories of student engagement: cognitive engagement, behavioral

engagement, affective engagement, and social engagement during the COVID-19 pandemic emergency remote learning (ERL), and what were students' perceptions on these four engagements with technology use. Participants included six Chinese language students with different demographic backgrounds from five different universities. All participants had a Chinese language learning experience during ERL and used technology to assist their Chinese learning. Participants offered diverse perspectives regarding on their engagement with technology use during ERL.

The first goal of this study was to investigate students' perceptions on their cognitive, behavioral, affective, and social engagement with technology use during ERL of Chinese. Results of this study show that technology was perceived to contribute to students' cognitive engagement by making students acquire new learning materials and convey their opinions or feedback to each other. However, it could also change students' established learning strategies or habits. In terms of social engagement, technology was perceived to facilitate the social interactions within the learning communities and helped students to build a sense of belonging, making them socially engaged during ERL. It also was perceived to assist their collaborations within their learning communities. For affective engagement, technology was perceived to bring positive affective reactions to students during ERL. On the other hand, in terms of students' behavioral and affective engagement, technology sometimes prevented students from focusing in class, which might lead to negative affective reactions. Thus, students' behavioral engagement and effective engagement could be adversely affected by technology. Technology was also perceived to change students' learning strategies and, according to some participants, limited the ways of collaborating within the learning community.

The second goal of this study was to bring implications for future planning for ERL. Results of this study provide reflections on different aspects in terms of how future planning for ERL looks like, on both instructor and institution levels. Implications for future ERL practice and research are discussed as below.

Implications for Future Practice

Results of this study provide reflections on different aspects in terms of how future planning for ERL looks like, on both institution and instructor levels. For institution, in response to

rapid switch to ERL, professional development, such as learning new technology tools and adopting online teaching pedagogy need to be provided in order for instructors to build a "deep learning experience for their students" (Schultz and DeMers, 2020). Findings in this study show that, compared to students, instructors were less tech-savvy when learning new technological tools. They needed to quickly implement appropriate technology to maintain social interactions among the learning community in a completely different learning setting. The present study identified important areas for future ERL planning on the part of instructors. These included incorporating technology to enhance students' collaboration, idea and feedback exchanging, taking advantage of different features from LMS, and setting up communication channel to learn different students' needs and then accommodate them. It is also suggested by this study that during the transition from in-person class to ERL, emotional support is needed from institution and instructors to help student get through the abrupt transition.

Implications for Future Research

The findings of this study also suggest directions for future research. First, more research is needed on instructor's perception about student engagement with technology use during ERL. It would be useful to learn from different perspectives and compare the differences between students and instructors to get a comprehensive understanding of how technology impacts student engagement during ERL. Second, it would be also important for future research to quantitively address more on how the different engagements correlate with each other within the context of ERL. For example, does low emotional engagement caused by technology issues lead to low cognitive and social engagement? Third, in this study, several suggestions for instructors were proposed in order to better prepare them for future ERL instruction. More research on how to prepare students for ERL would be needed as well.

Limitations

This study has two limitations that must be acknowledged. First, although the participants represented a good mix of demographic characteristics, such as different majors, different college years, different ages and so on, the sample size is limited (n=6). Second, the data collection focuses on Chinese language students' perceptions of engagement with technology use in an ERL setting. Therefore, caution should be used in generalizing the result to other

populations and disciplines. However, as with many other qualitative studies, these limitations do not render the findings meaningless. This is especially true when a case study is conducted through a strict data collection and analysis process, as was presented in this study. As a qualitative case study, it was intended to probe and understand what students' perception on engagement with technology use during a special learning setting. It helps to inform the use of technology in future ERL planning in language instruction.

Conclusion

This study aimed to explore students' perceptions about their engagement with technology under a structured engagement framework (Fredricks et al., 2016) during this unusual online learning environment. The result of this study has important implications for technology implementation in future ERL where online learning is not students' first choice but is required by institutions in a response to an abrupt change such as the COVID-19 pandemic. However, the implication must be interpreted within this study itself given the limited number of participants. While the study only focused on the ERL environment and had a small sample size, it has the value of understanding what role technology may play in student engagement in the emerging online classroom environment. Future research is needed to further investigate technology implementation and student engagement across a wider discipline with a larger sample size.

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Author Information

Lizeng Huang
https://orcid.org/0000-0002-1001-8162
The Ohio State University
29 W Woodruff Ave
Columbus, OH, 43210
United States
Contact e-mail: *huang.4295@osu.edu*

Ching-Hsuan Wu
https://orcid.org/0000-0002-1604-1013
Case Western Reserve University
11112 Bellflower Rd
Cleveland, OH, 44106
United States

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Chapter 3 - New Literacy Instruction Strategies in the Light of Higher Education Hybridization

Cristina Dumitru

Chapter Highlights

- The development of e-learning and the massive introduction of distance learning technologies into the educational process are the main trends in the development of education throughout the world.
- The widespread utilization of digital tools tries to harmonize the educational process by improving the means of planning and organizing the educational process, extending the use of active learning methods and the transition to a personalized and a more effective organization of the educational process.
- Digitalization is an opportunity for all actors that are participating in the educational process to become co-creators of the educational content.
- Teachers in the new educational format should have (1) scientific and methodological knowledge to implement educational programs by using distance learning technologies; (2) practical skills to adapt the educational content to the distance teaching, and (3) organizational and technical abilities to connect and interact with students.
- The amount of content uploaded online every minute is immense, far exceeding the ability of a regular student to process it. The challenge is to practice one's literacy skills to help navigate through this great amount of informational content, to benefit from it and not to be overwhelmed. It is equally important to be able to prevent its dangerous and harmful effects.

Introduction

Higher education is evolving dynamically worldwide. Attitudes of teachers and students to distance learning and e-learning are changing as well, embracing the fact that technology revolutionized the way learning happens. Technologically-mediated learning and research represent the latest achievements of mankind. Despite this divergence of opinion, distance education is gaining momentum, not only in prestigious and world-wide recognized universities, that already for a few decades are posting high-quality courses online to the large audience, but in small universities as well. Today, due to strong digitized services, students can attend courses of well-known lecturers and one teacher can impact a very large audience of students. The development of engineering and technology has led to the expansion of the use of distance courses by universities around the world, to a change in both the learning process and the methods of assessing the acquired knowledge, and access to the necessary educational materials.

The chapter focuses on how digital literacy is modeled in higher education, how new literacy should help students navigate in the rapid-changing contexts such as medical crises, economic and social insecurity, fast-paced changing labor-work demands. All these factors push faculty and higher education to shift to a totally digital environment and create appropriate conditions to utilize digital technologies and strengthen students and teachers' digital literacy. The chapter discusses higher education pathways to incorporate open educational resources, to provide open access to educational and research content through electronic libraries and databases, and to ensure appropriate support in distance learning. Developing and expanding of the literacy concept have become crucial in the digital era at least from the perspective of gaining knowledge and skills that will allow students and teachers to navigate and use the great amount of existing information. Moreover, they are getting acquainted with the process of incorporating communication technologies and innovative pedagogical tools in their teaching activities and (re)viving education and improving the interactions between faculty, students, librarians and labor-market. The widespread utilization of digital tools tries to harmonize the educational process by improving the means of planning and organizing the educational process, extending the use of active learning methods and the transition to a personalized and a more effective organization of the educational process.

Thus, digitalization is an opportunity for all actors, participating in the educational process, to become co-creators of the educational content. Higher education must be considered from the perspective of the development of new and innovative technologies, the penetration in the academic life of the variety of possibilities of existing and prospective information and communication technologies (ICT), as well as innovative pedagogical methods based on the use of ICT. Therefore, the issue of the elaboration of effective systems of professional development and training of teachers based on competence models (Dumitru, 2019), as well as developing mechanisms for improving the interaction of teachers and librarians to meet the requirements of inclusive knowledge societies in the context of the widespread use of digital technology is an imperative step to be taken for the 21st century education.

The digital transformation of education requires re(thinking) and mapping out educational results, the content of education, methods and organizational forms of educational activities, as well as the assessment of the educational results achieved in a rapidly developing digital environment. However, attention to their use in education is dynamically evolving worldwide. Digital technologies are increasingly spreading and updating, opening unlimited opportunities for access to digital tools, information and services. Learners and educators gain unprecedented control over their information space and its sharing (Barrot et al., 2021). Their opportunities for self- and mutual education, for motivating learners and engaging in meaningful learning experiences are increasing. Virtual reality (VR) technologies are rapidly merging with artificial intelligence (AI) technologies, but methodological developments for their use in education are progressing slowly. It is necessary to develop a new class of methodological solutions that will use new pedagogical possibilities. In the environment of the digital learning the challenge is to harmonize the educational process by (1) mastery of pre-selected content by students; (2) achievement by students of educational goals and (3) support and development of students' ability to learn, creation of their educational independence and development of their personal identity in the process of mastering both socially assigned and self-selected content.

Massive digitalization and innovation in higher education has been the primary trend since the medical crises of Covid-19 (de Obesso et al., 2023). However, the process of digitization has been challenging for several small universities, steadily increasing inequalities in higher education across several countries (Clark, 2023). Studies report regional inequalities of higher education development across China (Han et al., 2023), Norway (Mustafa et al., 2022)

and even across European Union (Nikolaidis, 2021) where educational services despite the fact that are provided by the state, implies several costs with finances for accommodation, medical services, books and internet fees. The digitalization of education is recognized as essential and of massive economic value, according to the European Commission's Digital Education Action Plan 2021–2027 (European Commission 2021). Digitalization of education has its power to provide a formal educational reform and empower higher education institutions in this "unequal pedagogical reality" (Armila et al., 2022).

(Re)Framing Literacy Instruction

Technological development changed the way learning happens and education is delivered. Educational systems worldwide have been modernized through the introduction of innovative technological tools and advanced pedagogical technological-mediated strategies adopted to better respond to the requirements of the knowledge society. Digitalization leads to qualitative changes in the sphere of production and in global markets, affecting equally the education sector. The technological revolution not only poses new challenges for education, but also provides digital technology to help solve them. Digital technologies create the conditions to face the challenges by improving the means of planning and organizing the educational process, by using widely various active learning methods and by transitioning to a more personalized and inclusive educational process. The digital transformation of education cannot be done fast, it requires time. Mostly, because it affects all levels of education and it is impossible without the active participation of students, teachers and all stakeholders, including parents, employers, politicians and members of the society. This digitalization can be divided into three large interconnected groups of action:

- Development of digital education infrastructure;
- Development of digital teaching and learning materials, tools and services, including digital techniques for assessment and evaluation;
- Development and promotion of new formats and models of how to organize effectively and efficiently the educational process.

All this requires a qualitative update of the existing practices based on strong pedagogical research, turning all these practices and evidence-based decisions into a tool for scientific and methodological support for the digital transformation of education.

It is worldwide accepted that the core aim of education is to develop literacy and more precisely functional literacy (Kirsch & Guthrie, 1977). This term encompasses the quality of general educational competence, which is largely observed by taking into account Educational Standards of all levels of education. The definitions of literacy have evolved over time. The term "literacy" was introduced in 1956 by UNESCO (Simon, 1956), and first it comprised a set of skills, including reading and writing, that are needed to be applied for social integration and development. Generally speaking, literacy represents the ability to read and write fluently, and use it appropriately in social contexts (UNESCO, 2013). Literacy is the level of proficiency in reading and writing, dealing with the printed word. For providing a working definition for the Program for International Student Assessment (PISA), OECD defined literacy as "the ability to understand, use, and reflect on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate effectively in society" (OECD, 2001, p.21). Today the term expanded its meaning to „a means of identification, understanding, interpretation, creation, and communication in an increasingly digital, text-mediated, information-rich and fast-changing world" (UNESCO, 2018). The definition and the measurements of literacy changed over time, as the society and the environment are changing, and the level of literacy determines the full activity of a person in a social environment. Functional literacy focuses commonly on competences to solve everyday problems (Mukan & Fuchyla, 2016).

The development of functional literacy of students is influenced by several factors: (i) educational content (educational standards, curricula); (ii) educational forms and methods of teaching; (iii) a system for diagnosing and evaluating educational institutions; (iv) nonformal educational programs; (v) the presence of a friendly educational environment based on interests, achieved with all interested parties and (vi) the active role of parents in the process of education and upbringing of children (Ilomäki & Lakkala, 2018). (Re)framing literacy instruction is inextricably linked to:

- Clarification of learning objectives and learning outcomes (what to teach);
- Developing new pedagogical tools (pedagogical design, methods and techniques of pedagogical support and educational activities and tasks, improving the management of educational organizations, etc.);
- Updating pedagogical practices using digital technologies (how to teach).

"Literacy in higher education will require complex skills to understand and use the information in academic texts, to summarize, to understand abstract and complex concepts, to finish and hand in on time academic assignments, to be able to identify appropriate references, to navigate through the database of articles, etc." (Dumitru, 2022, p. 2). A wide use of the need to (re)think literacy, based on the globalization and informatization of the educational process and the use of ICT in professional training, was confirmed by several literature reviews (Pangrazio et al., 2020; Shi et al., 2021).

Living in an advanced digital culture means that this advanced digital environment will shape individuals to engage and work with different digital systems and tools, and work and study in different contexts. It implies the ability to work with information, use practical tools and technologies, including specialized ones that relate to individual subject areas, as well as general user ones that every literate person should own. Digital opportunities and digital experience are important for learners' development and formation as a full-fledged individual. It would help to expand their digital literacy by working on different operating systems, with different programs, software, platforms and devices.

Information Literacy in Digital Era

Digitalization is overtaking several sectors, education including. The digital economy requires that every student masters the competencies of the 21st century, such as critical thinking, learning to learn skills, digital skills, team-work, creativity and the ability to apply existing knowledge in a rapidly developing digital environment. In the light of the digital economy, higher education students should be able to manage their own learning (Koulianou & Samartzi, 2018; Syaharuddin et al., 2022). To better respond to these demands, universities should transform and (re)invent themselves (Mohamed Hashim et al., 2022). Digital transformation in the economy is proven to increase labor productivity, while the use of digital technologies in education is expected to enhance learning efficiency (Armila et al., 2022). The digital transformation of education is affecting the educational content, organization of instructional and research activities, as well as the assessment of the results achieved in this new digital environment.

The digital transformation of education is a challenging process. It affects all levels of education and it is impossible without the active participation of all the actors: students,

teachers, managers and all stakeholders, including parents and employers, politicians and members of the society. All this requires a qualitative update of the existing practice of pedagogical research, turning them into a tool for scientific and methodological support and sustenance for the processes of digital transformation of education.

Literacy Instruction Strategies

All spheres of life were transformed since the world wide web. Today, there is no need to buy expensive tablets, laptops or computers, sometimes all you need is a mobile phone. Blended learning develops rapidly, a variety of information educational systems and platforms (for example, LMS, edX, Coursera, Udacity, Moodle) are available already in many universities, providing access to digital learning resources (Figure 1), various educational formats, different types of tasks, and technologically mediated space for exchange and discussions (Marín & Castaneda, 2023). Teachers understand today that flexibility is a strong asset of online education. Therefore, a modular system of organizing educational content is very convenient and it is becoming a dominant way of organizing educational activity.

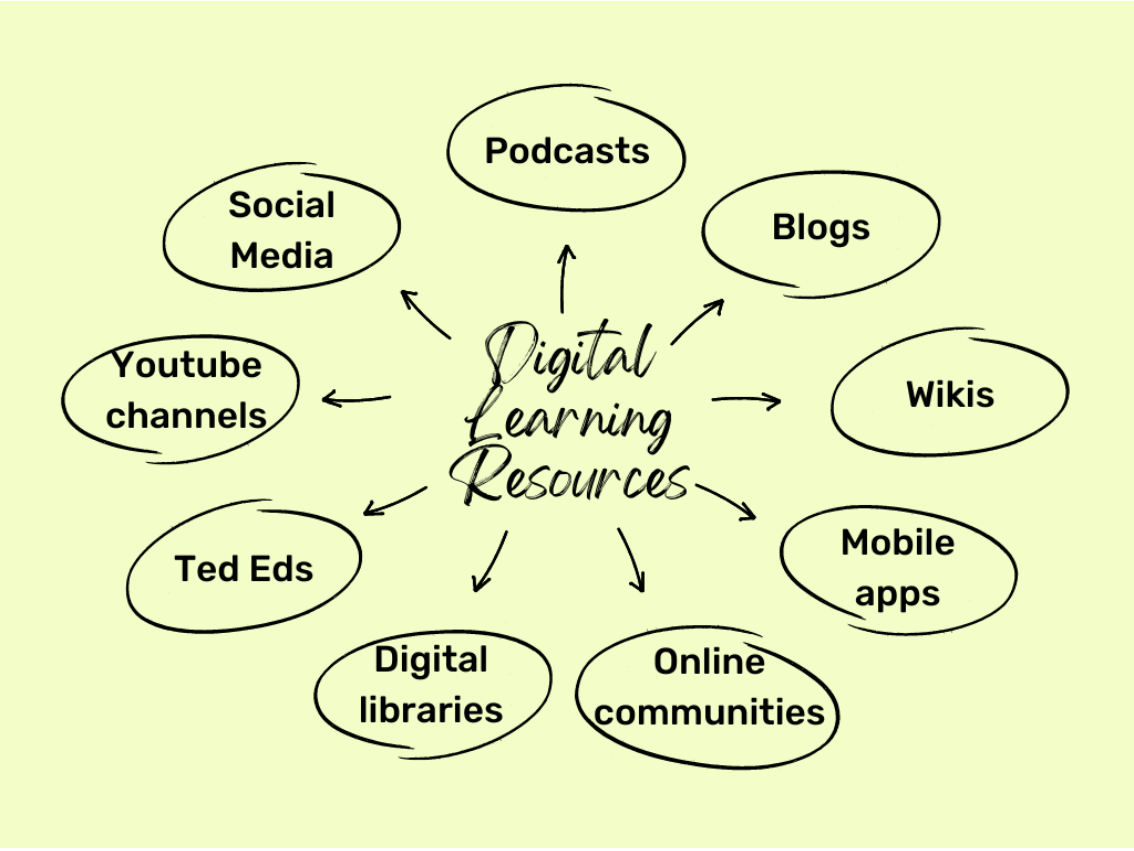

Figure 1. Digital Learning Resources

The new digital era renewed the principle of "knowledge for life" with the principle of "knowledge throughout life", which gave impetus to the development of various learning systems such as massive open online courses (MOOCs), that can support learners to improve their knowledge throughout life. MOOCs represent a promising direction in the development of information technology for distance learning of university students:

- Mass, that is the immense number of students worldwide, with different educational and professional backgrounds;
- Open, vast majority of the courses are free and have no prerequisite requirements;
- Online, the course can be followed outside the classroom, via online platforms (this requires a device);
- Course, with a curriculum, deadline for handing it the assignments, and evaluation criteria.

According to experts (Kennedy, 2014), the concept of MOOCs is based on connectivism as a learning principle (a variety of approaches, understanding of learning as a process of network formation and decision-making, learning and cognition as a dynamic process). MOOCs are courses provided online (based on pedagogical and methodological design), consisting of video lectures, handouts, homework assignments, tests and final exams to create a personal educational environment for each student. There are also such advantages of MOOCs as accessibility, a high level of self-organization, a multimedia form of presenting material (scripts for reading, video and online forums, webinars, interactive tasks in the form of puzzles, simulation laboratories and many others).

Digital learning, including open online learning materials, is changing the learning experience. Changes are outlined in the access to various learning experiences and opportunities, the widespread use of digital formats, online simulators, and digital laboratories.

Changing Access to Information

The library in an educational institution and the textbook have ceased to be the main source of knowledge. Search engines, Wikipedia, libraries of digital learning materials, specialized tools, abstract collections, professional community portals, digital books, and numerous

online publications, provide students and teachers with rapid and continuous access to any educational material.

Online Communities of Learners

Traditional pedagogy has viewed students as separate individuals who come together for study or for leisure. In the digital era, students and teachers often discuss issues of interest to them in online communities, at local level (during classes at university), and at global level. In the online settings, they build up learners' communities where they receive advice, they can exchange ideas, discuss assignments, engage in joint projects, and co-create educational materials. Their learning environment is qualitatively enriched.

Advantages of Digital Learning Environments

Digital learning environments offer flexible educational settings and increase academic independence, various training facilities, time and space flexibility. In order to increase the effectiveness of online learning, digital educational materials, tools and services should have several characteristics:

(i) adaptability (information is presented depending on the student's learning behaviors, knowledge and other characteristics);

(ii) feedback (the students receive instant feedback on the quality of their learning process about how it can be improved);

(iii) free choice (students have a choice of what and how to master, which allows them to regulate their learning);

(iv) non-linear access to information (in a random order, using hypertext, which is different from its traditional linear representation);

(v) interconnected presentation of information (for example, voice messages, printed texts, diagrams, videos and interactive models);

(vi) the use of various means of communication (for example, orally, written, drawing images, etc., which makes it possible to activate learning);

(vii) online networking (students can communicate both with teachers and peers and with various experts using e-mail, webinars, chats, multimedia communication tools for individualized and collaborative learning, tutoring, consultations and crowdsourcing) (Kuzminov & Frumin, 2019).

Distinctive features of the currently emerging new digital information tools were presented by Kerr (2005), and can be found in Figure 2.

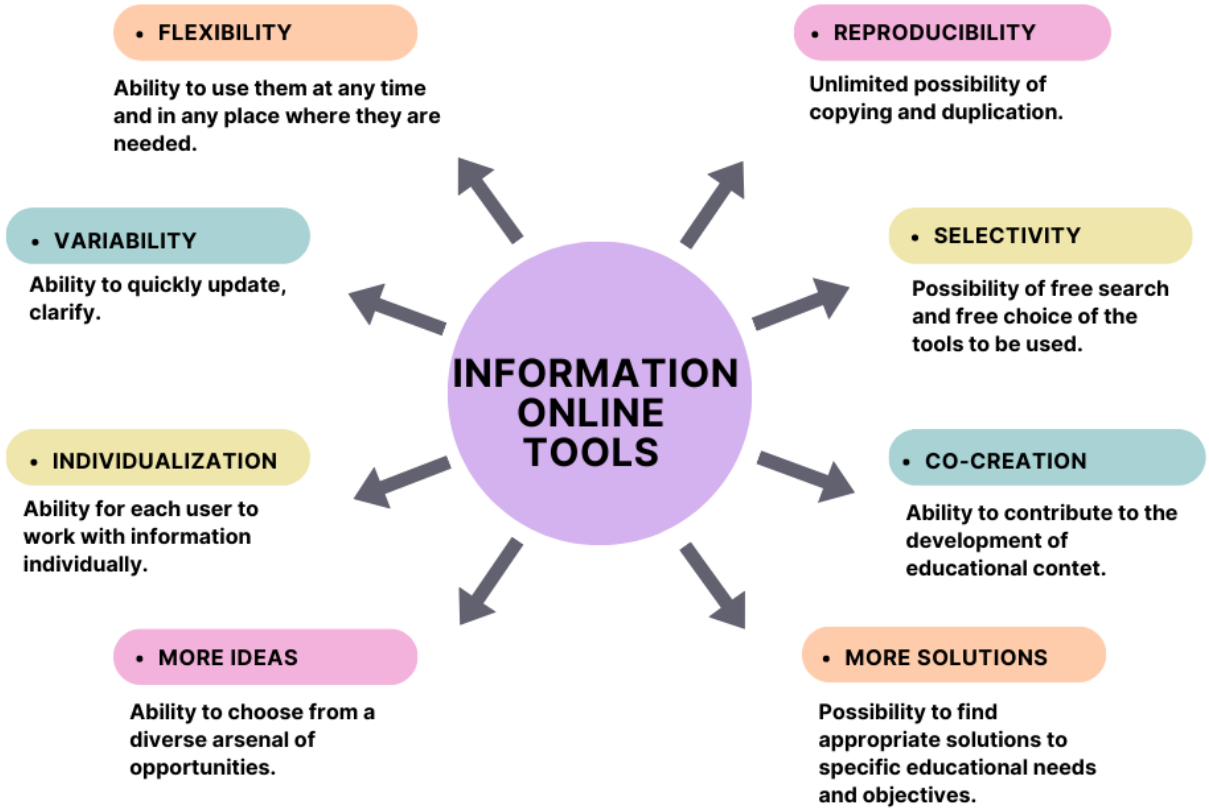

Figure 2. Characteristics of Online Tools (Kerr, 2005)

Information online tools should

(i) ensure confidentiality and flexible settings of accessing information;

(ii) create and update individual learners' profiles, regarding their actions with digital educational content, tools and services;

(iii) provide access to educational activities

(iv) cover all the necessary educational and methodological materials for lectures and laboratory activities, etc., and

(v) provide instant feedback.

A good educational tool provides students with information about the progress and results of their learning; provide teachers with information on the progress of students' educational outcomes for the purpose of guiding, monitoring and further planning. In designing appropriate educational digital tools, it is important first to become acquainted with learners' personal profile: (i) their learning behaviors and routines, (ii) their successes and difficulties

(to know students potential, resources, but also to identify knowledge gaps), (iii) what motivates the learners, their interests and aspirations, (iv) educational goals (and moreover to guide learners to identify and describe their educational goals, how to monitor their achievements and assist them in moving towards the intended goals) and (v) feedback (how often and how should the learners be informed about their progress). Digital tools assist learners and their teachers in measuring individual progress, in order to make it easier for the learner to move on to mastering new material. Personal learning path provides visibility and enhances the relevance of the educational process.

Digital Literacy Competence

What does digital literacy mean? We encountered this term lately, and we can easily presume its meaning. However, there is a lot of confusion around it. In fact, digital literacy comprises a set of skills to navigate in the digital space, but also to transfer them to the real life. Researchers (Kalantzis & Cope, 1997; Pangrazio et al., 2020) connect digital literacy with new literacies, considering it as a system of cognitive, social and technical skills essential to navigation in the information environment. However, digital literacy is today viewed as a more complex concept (Boronenko et al., 2019), which consists of several complex components, such as

(1) *computer literacy*, the ability to effectively use electronic devices and software;

(2) *information literacy*, the ability to independently search, analyze and critically understand information data;

(3) *technical skills*, competent use of social media and use of network technologies with an understanding of the basics of network security and ethical standards.

According to Van Deursen & Van Dijk (2014), digital literacy depends on the development of three types of skills:

- Ability to interact efficiently with an electronic device, go online and create digital artifacts;
- Ability to interact with the software, which implies the knowledge and skills to work with the content;
- Universal skills in working with digital technologies, including design, development of a digital online or offline environment.

Digital literacy competence is crucial in the new digital environment. Today, one is now not only a consumer, but also an author of content and can share their opinion worldwide. Studies (Leguina et al., 2021; Yin & Choi, 2022) shows that the informatization of education helps to reduce inequality in obtaining quality education due to the following conditions:

- Providing trainees with equal access to high-quality open digital educational resources and teaching materials, as well as to experts;
- Improvement of educational content and organization of distance learning due to distance learning technologies;
- Greater opportunities and dissemination of educational programs to continue education in online settings;
- Provision of more individualized and personalized learning paths more appropriate to individual educational needs of learners.

Digital competence consists of the structural aspect, which refers to the comprehension process of the availability and the utilization of digital tools and sources in order to create something new, something useful and necessary based on their potential and practicalities. Communicative aspect of digital competence is the comprehension of the purpose of digital networks and communications, and their role in the development of personal digital literacy. The knowledge of how communication is carried out between various digital devices (including mobile and stationary computing devices, as well as their peripheral equipment) is an essential element of digital competence. When developing digital competence, it is crucial to build up confidence in the use of digital equipment and tools. A confident user of digital technologies is capable of introspection, understands the difference between the analog and digital world (Kuzminov & Frumin, 2019). A learner with digital competence should be able to:

- Analyze and critically evaluate one's own digital competence;
- Benefit from the digital experience and continuously maintain one's digital environment;
- Actively participate (create, maintain, and use) in online communities that help the learner to develop, master, and use new digital tools and equipment;
- Understand the principles, processes, procedures and systems on which digital opportunities are built on;
- Master individual techniques of using software and hardware;

- Monitor the digital environment;
- Skillfully organize and control digital materials.

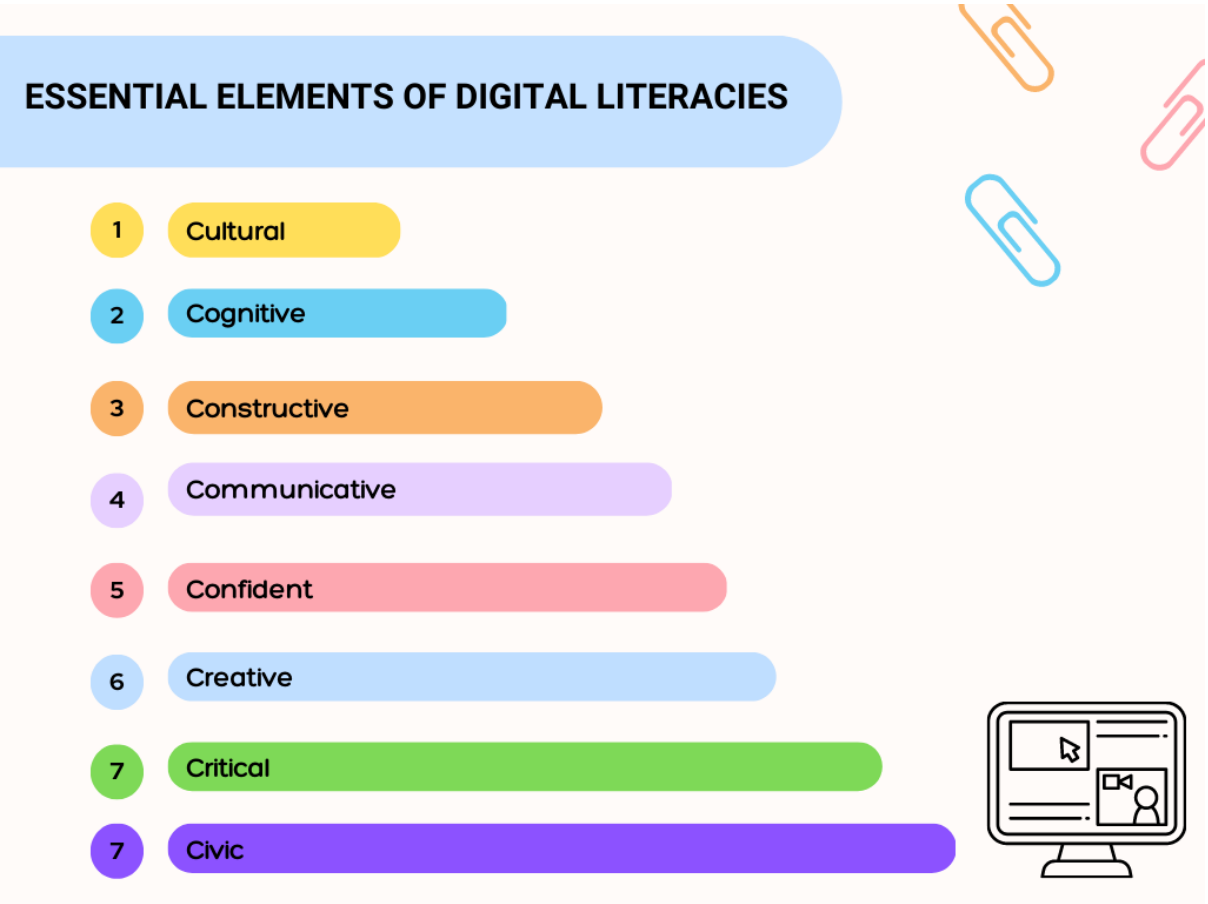

Figure3. Essential Elements of Digital Literacies (Belshaw, 2014)

According to According to Belshaw (2014), digital literacy is characterized by eight elements, as shown in Figure 3, that are described below.

1. *Cultural* element involves (i) the set of norms, rules and expected behaviors during online communication, (ii) the understanding of specific Internet artifacts (meme, emoji, animated gifs, etc.), (iii) the knowledge of the history, language, customs and values of digital environments, (iv) the respect of confidentiality and information protection etc.
2. *Cognitive* component refers to the understanding of key elements of computer literacy, the comprehension of several functions (navigation settings, menus, profiles, tags and hashtags), and the use of digital devices, software platforms and interfaces.
3. *Constructive* element refers to the knowledge of how the online content is created in the digital environment and the knowledge related to copyright.

4. *Communicative* component involves knowledge of the possibilities of communication in digital environments and understanding the specifics of the concepts of "identity", "trust", "exchange", and "influence" in the digital space.
5. *Confident* use, according to Belshaw (2014) refers to the feeling of being part of the online community, understanding and using the advantages of the online space compared to the offline world, and also reflects learning and academic communities in the digital environment.
6. *Creativity* as part of digital literacy indicates the value of creativity in the digital space, the development of new ways to use online tools and opportunities, and the creation of new knowledge through digital technologies.
7. *Critical* element of digital literacy applies to the use of analytical and critical reflective skills in the assessment of digital content, tools and platforms, and in the selection of reliable sources.
8. *Civic* component characterizes the ability of online users for self-organization, active participation in online social movements and events, as well as the knowledge of digital rights and obligations.

According to Belshaw (2011) digital competence refers to the creative aspect of competence building, the ability to use digital equipment and tools to create new and valuable digital information resources or products. Creativity and innovation are fundamental skills to be mastered and developed in the new digital era in order to participate fully in public life. Digital environment can facilitate the establishment and development of connections with local, regional, national and international communities. Today, digital literacy has become a mandatory component of the competencies of the 21st century, which all students should master.

Information Literacy

The goal of media and information literacy is to empower learners or users of a particular technology through continuous learning and acquiring knowledge about the functions of the media, about the mechanisms for creating and distributing informational content. With the immense amount of content uploaded online every minute far exceeding the ability of individuals to be able to navigate through it, highlight the importance of developing and practicing information literacy. Education is key to addressing this challenge. Teachers must

take on a new role, which is to help learners acquire the knowledge and the necessary skills to make full use of digital resources, while protecting them from false, harmful and inappropriate content.

Yet, the process of developing information literacy is gaining momentum and represents an important factor in supporting the learning process. Lack of information literacy skills makes the learner seen as a "naked learner" and not as a "tool-equipped learner" (Rosli et al., 2020). The challenge for practicing literacy skills in the online environment is to get acquainted with the digital tools that would help learners to regulate and self-direct their learning process (Mastrothanais et al., 2018) „in pursuit of academically relevant goals" (Bol & Garner, 2011, p.105).

Digital transformation of education begins with the transformation of its content. Information literacy has become a new element of such content. The concept of information literacy is defined by the *American Library Association* as „a set of abilities requiring individuals to „recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (2000, p.20).

Use of Artificial Intelligence in Education

Technology development is impacting education extensively. Examples of use of Artificial Intelligence (AI) have been reported relatively recently. Intelligent learning systems and chatbots have been already used in several universities where AI assists in personalizing learning, providing students with instant direct feedback throughout the whole learning process. AI is used also in the assessment process, tools and automatic assessment systems to ensure accurate evaluation of educational outcomes. AI is also used in customizing educational content and learning materials, in creating learners' own educational materials, reorganizing textbooks into manageable chunks of information, and generating summaries or other mnemonic helpers. In research, higher education institutions use AI methods for working with big data and preparing educational analytics in order to better understand and predict the curricula and educational outcomes, and increase its effectiveness. The development and the use of these technologies promise to significantly increase the visibility of educational activities and promote their incorporation in everyday teaching and studying processes.

Digital Literacy Strategies in Higher Education

Technology changed the educational landscape, and even the most conservative teachers accept the significant impact of technology on the teaching-learning process. Higher education institutions adopted ICT in their life: reorganized their libraries, creating well-supplied digital libraries, and equipped their research centers with highly sophisticated technologies, and cutting-edge technology infrastructure. At higher education level, learning is usually taken for granted, and assessing and practicing digital literacy does not always have enough emphasis. Yet, practicing digital literacy skills can help students navigate and interact with the great amount of information available today. University teachers most often forget to provide assistance in helping students explore and practice several strategies that will help them learn efficiently. Studies show the effectiveness of academic supervision, tutoring, peer mentoring and coaching, project learning and problem-based learning (Alt & Raichel, 2022; Arefian, 2022). A key task of higher education is to facilitate independent cognitive activity of its students. Strong metacognitive skills stimulate the process of learning and contribute to the desire for self-development (Koulianou & Samartzi, 2018; Alt & Raichel, 2020).

Higher education consists primarily of two main elements: sending and receiving information. Innovative methods in teaching include creative approaches to understanding the discipline, as well as the ability to find non-standard and creative solutions to various problems. Education should become an interesting and exciting process that contributes to the personal and professional growth of a person. In the context of "classical" education, the "chalk-and-talk" method, used in onsite education, is usually passive and students play a minor role in their learning process. The challenge in online education is to tackle the issue of the active engagement of the learner in the learning process.

The purpose of interactive methods in teaching is to create appropriate learning conditions, which makes the learning process effective. Universities today tend to return to providing „universal" knowledge to their students (Mayor, 1998), to enable students to shift to various professions in accordance with the labor demands. While additional knowledge will be needed, „universal" competences empower learners with necessary skills to perform and navigate through a diverse, flexible and uncertain environment, and way better as a „narrow" specialization, which in the case of a new environment will need a complete training and not an additional one. So, what are those „universal" knowledge and skills necessary to be

acquired by learners: creativity, effective communication, team work, problem-solving thinking, critical thinking and digital literacy. Digital literacy is required to empower students with tools to work efficiently with the data. Therefore, a number of digital literacy strategies are known and can be practiced by students to help them efficiently and effectively navigate in the digital world. Some techniques that can facilitate the learning process in the digital era are listed in the table below.

Table 1. Reading Techniques toward Improving Reading Comprehension

Learning and reading technique	Technique Characteristics
Skimming	It is a surface reading technique, crucially important in the age of abundant information and data. It provides learners with a fast-reading skill necessary to identify relevant content and get rid of unclear, confusing, irrelevant, and non-qualitative educational content (Van et al., 2022). Skimming is essential for learners to assess the available content online and on-print and identify the most appropriate one for the learning process.
SQ3R (Survey, Questions, Read, Recite and Review)	Developed by Robinson (1946) in his book *Effective Study*, refers to an active and profound technique of reading the educational content. It consists of five steps, mentioned as well in the technique title. (1) *S (Survey)* – overall skimming of the text to get the general idea of it; (2) *Q (Questions)* – anticipatory selection of what is of interest (a theme, an idea, a concept, by raising questions to the material proposed for reading); (3) *R (Read)* – in-depth look inside the text to capture its essence; (4) *R (Recite)* – close the book, or the article page and try to think critically about what was read and connect it with the personal experience;

Learning and reading technique	Technique Characteristics
	(4) *R (Review)* – reviewing the content and getting back to the questions raised in the beginning to identify the answers received or launch other readings to get answers to remaining questions.
ARMS (Anticipate, Read, Map, Summarize)	This study technique implicates actively and critically going through the educational material, and it allows a deeper understanding of it. Using this method challenges students to pay attention to what they read, to make the information they read meaningful, and helps them monitor their understanding of what they read. ARMS is the acronyms of the key concepts of the technique and also identify the main steps to be followed: anticipate the content, deep and critically read the text, organize the material in a mind-map or a concept-map, and summarize it.
Feynman Technique	It is a study technique, developed by the physician Richard Feynman (1985), to help students with the understanding of complex concepts. Feynman's technique is an effective tool for learning new things, deepening things learners already know or preparing for an exam. The essence of this technique is: if one wants to understand something, one should explain it. The main objective is getting to the core of the concept, and being able to explain it in a simple way.

Due to the fast pace of technological development, it is necessary to revise the practical and theoretical approaches to the content of education, and professional pedagogical training. Experts agree that innovative approaches to training future professionals should be systematic and comprehensive (Numonjonov, 2020).

Role of Teachers in the New Digital Era

The development of e-learning and the massive introduction of distance learning technologies into the educational process are the main trends in the development of education throughout the world. Under these conditions, completely new activities of the teacher arise, the teacher faces new professional problems, the solution of which requires new professional competencies. The concept of "tutor" (i.e., teacher-mentor, teacher-assistant), which arose around the 14th century in classical English universities, acquired a new meaning in distance learning. In online education, tutors or teachers have to have knowledge and skills that would enable them to navigate themselves in the online environment and be able to connect with their students to guide and scaffold their learning experience. Teachers in the new educational format should have (1) scientific and methodological knowledge to implement educational programs using distance learning technologies; (2) skills in adapting the educational content to distance teaching, and (3) organizational and technical abilities to connect and interact with students.

The task of online tutoring remains the one of guiding and facilitating the learning process. Although, the novelty of the learning environment, the insufficient knowledge on how learning happens and how it is generated by the environment in which it happens, teachers may struggle with finding the appropriate ways to get the most out of learning. Teachers should explore various ways that they could track and adjust the individual learning path of each student in an online environment (which might be supported by several learning tracking apps), examine various solutions to dynamically evaluate all learning outcomes and test various approaches to conduct group discussions and make the online learning interactive.

Table 2. Activities of Teachers in Online Settings

Activities in online education
• Presenting and discussing the course content
• Providing continuous and instant feedback on student progress
• Evaluating of assignments/tests
• Providing academic support and tutoring for students
• Motivating students

Activities in online education
• Designing the learning conditions • Data managing • Storing students' records • Facilitating students' interaction with the educational institution administration

The challenge with maintaining students' interest in learning and motivation throughout the online course might need to be taken seriously into consideration. The main role of the online teacher remains the activation of the learning process and guidance through the whole learning process (Dumitru, 2015). Teachers in online educational space should (1) guide and supervise student's learning activities; (2) develop student's sense of responsibility for the study and handing in on time all educational tasks; (3) independently regulate and control their learning process; (4) develop analytical skills and critical self-awareness and (5) critically and wisely use available information sources (Hickson, 2011).

The use of digital learning systems and platforms has led to a change in the structure of the presentation of educational material, allowing more flexibility and autonomy in choosing learning path, presentation and extraction of information and knowledge building, and even providing a personality-oriented educational activity. Modern distance learning platforms are called learning management systems (LMS) (Coates at al., 2005), knowledge management systems (KMS) (Maier & Hadrich, 2011), or online learning environments (OLE) (Moore et al., 2011). A variety of roles and tasks of teachers in the new online or hybrid learning format implies additional training to assist teachers in adjusting to the digital learning format, in mastering all educational and research technologies and introducing these technologies into the practice of educational institutions.

Digital Well-Being

When introducing ICT into the educational process, one should take into account the characteristic features of any technology. Many ICT applications in education fail or perform below expectations as the fundamental features of the technology are lost due to the focus on individual devices rather than on the system as a whole. The abundance of digital resources does not imply strong digital literacy skills, moreover frequent use of digital tools and

technology does not imply information literacy improvement (Kisilowska, 2022; Nikou & Aavakare, 2021). „Students are faced with numerous, complex demands when engaged in distance education and on-line learning" (Bol & Garner, 2011, p. 104). Digital literacy competence is discussed from an ecological perspective in using digital technologies in a special environment, in compliance with hygiene standards and user responsibility.

Frequency and intensity of usage of Internet resources as such do not improve. Moreover, Internet users often suffer from the consequences of problematic Internet use and fear of missing out (FOMO). Several studies (Przybylski, et al., 2013; Kisilowska, 2022) identified a dependency between the level of information literacy and the scale of FOMO intensity. Consequently, information literacy does not protect against problematic Internet use, on the contrary – sometimes it is a factor contributing to it (Kisilowska, 2022). There is a need to include a digital wellbeing perspective in information literacy education – to put more attention on attitudes towards the Internet as an environment of everyday life. Moreover, another concern raised with the wide use of technology is the concern in terms of privacy, regarding the issue of storing personal data on external media, and not in a personal storage domain. Therefore, it is important to consider both the technical side of the matter and the social acceptability of certain approaches. The more the population relies on online sources, the more vulnerable they are to information that can affect society in the most adverse way (Quaglio & Millar, 2020). Information is created, shared and stored on an unprecedented scale; however, few know when, how and to what extent the information is stored, retrieved, understood, used and applied. The difficulty in distinguishing fake news or fake science from reports and from reliable sources is often developing into a phenomenon called „confidence deficit syndrome" (United Nations, 2019, p. 18).

It is crucial to develop literacy skills to help them navigate through this great amount of informational content, to benefit from it and not to be overwhelmed by it and be able to prevent its dangerous and harmful effects. Remote learning can affect mental health, by increasing the anxiety level and loneliness feelings (Kotera et al., 2021; Bećirović & Dervić, 2023). When using digital learning solutions, it is important to fully understand and take into account the limitations that underlie their operation, to be aware of their fundamental limitations and the information security issues. Providing assistance and guidance for students to become more careful consumers of the information they consume online, to teach them how to act in unpredictable and uncertain situations (Breakstone et al., 2018), and to

have "literacy of personal data" (Pangrazio et al., 2020, p. 419).

Conclusion

Digital era triggered a number of large-scale actions that are transforming education today, such as creation of a hybrid learning space, based on a flexible approach and on digital technologies; creation of a global competitive infrastructure for transmission, processing and storage of data; investment in training of highly qualified professionals, development of digital technologies and platform solutions in higher education area. Digital technologies alone, neither platform solutions, nor “digitized” content will not lead to an improvement in the educational quality, nor to an improvement in the quality of skills and people’s quality life in general. In order to effectively benefit from the potential of digital technologies, it is necessary to clearly set specific objectives to develop digital solutions for education, adapt the technological potential to specific tasks for teachers and students, and to better promote mastering skills, values and relevant knowledge in the digital age. Digital literacy is enhanced by the desire of learners to make use of digital technologies to gain a wider and more diverse access to educational resources. However, ensuring online safety and necessary skills to learn wisely and safely in the online environment is raising the question of revising and critically engaging with the educational content. In the light of moving to hybrid learning spaces, education is focused on developing several universal skills, one of them is digital literacy, which imply the ability to use software tools and software packages (Nguyen & Habók, 2023), the ability to search for information online and to critically assess the quality of the information found in digital settings, and the ability to connect, engage and participate actively in the network society, to self-expression, build an accurate online identity and participate actively and consciously in the online world.

It is necessary to provide global competitiveness of educational research on development of digital literacy skills, by providing conditions for the effective learning and increasing the competitiveness of education, reducing noticeably the routine workload for all actors in education, and developing life skills in the digital environment.

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Author Information

Cristina Dumitru

https://orcid.org/ 0000-0003-2970-4549

University of Pitesti

1, Targul din Vale, Pitesti

Romania

Contact e-mail: *cristina.dumitru@upit.ro*

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Chapter 4 - Gender Equality in Online Education in Higher Education: A Literature Review

Meinrad Lembuka

Chapter Highlights

- Gender equality in online higher learning
- Highlights of gender in online education
- Gender and e-learning in Tanzania
- Higher learning and gender equality
- Gender discourses through online education

Introduction

In Tanzania, higher education is defined as that proportion of tertiary education that leads to an advanced diploma or degree. Education system in Tanzania include two years pre-primary, seven years primary, four years junior secondary, two years senior secondary (A level) and three or more years of university or tertiary education. The last decade has seen a significant expansion of higher education in Tanzania. Whilst up to the mid-1980s there were only two universities and a handful of other specialist higher education colleges, by 2005 there were a total 30 universities, the majority of these being private. Also there were 15 additional public Institutions of Higher Education including 6 professional institutes, 2 institutes of technology, a wildlife college and a business college (URT, 2016).

Education remains to be a crucial factor for nations to advance their social, cultural and economic well-being. A nation's ability to acquire and apply knowledge influences development greatly and as knowledge becomes more important, so does higher education (Senzige, 2003). In recenty years Tanzania has experienced an increase in online education or e-learning following the out break of COVID 19 global pandemic that forced the paradigfm shift from traditional teaching and learning method to online education. This process was facilitated by the availability of ICT legal framework, trained staff and respective infrastructures in the education institutions.Historically the online education gradually can be traced from the dawn of independent when the government initiated a number of strategies on the use of ICT in Tanzanian schools (Senzige, 2003 & Lembuka 2022).

The use of ICT in education is not a new concept as in the late 1960's and early 1970's primary and secondary schools were provided with radios to enable them listen to educational programmes designed in collaboration with and broadcast by the Radio Tanzania, Dar es Salaam. Audiocassettes with pre-recorded subject matter were also used. In early 1990's institutions like the then High Precision Technology Centre were already using videocassettes to teach subjects like electronics and quality assurance. The wide spread use of TVs in the mid 1990's would probably have been another step in introducing ICT based school education, but there were no efforts made to integrate these electronic media into education delivery (Senzige et al, 2003 & URT 2016).

The fact that technology is an essential element of online education or e-learning in the 21st

century thus the Government of Tanzaniahas contnued to invest in ICT development and later provided computers to educational institutions. In 1997, the Ministry of Education and Culture issued a syllabus for computer studies for secondary schools, as a response to this, most higher learning institutions introduced courses in computer science and information technology. The private sector also did not want to miss this opportunity and hence they jumped on the bandwagon and several private training institutions were established to address the ICT related education provision (URT, 2016).

Due to family and work commitments, students find it difficult to pursue a degree via the conventional mode of learning. Internet-based instruction is gaining recognition as an alternative mode of learning. Online learning addresses the demand to provide education to those who could no longer be accommodated in campus due to limited facilities and physical resources.

There is a seemingly growing demand for online learning in the past years which was also brought about by the rising development in web-based technologies. Online learning also offers flexibility to students to study on their own pace and space as contrasted to the traditional classes. More significantly, online learning provides equal opportunities to all students (Jolliffe, Ritter & Stevens 2001).

The increase in the use of technology in education had altered educators' attitudes from the traditional ones when they were distributors of knowledge to a new and more flexible attitude now that they are considered more as supporters and motivators who urge and encourage students to participate and learn (Onyema, 2019). Moreover, as Shadiev & Sintawati (2020) suggested, technology supports intercultural learning on many levels. The role of technology could also be the facilitator of personalized learning that allows students to achieve better learning outcomes (Zhang et al, 2020).

Online education or E-Learning are two terms that will ge used simultimious in the article that represents a futuristic mode of education that accommodates the different requirements and expectations of different users with a support of ICT services; in this way, it allows varied methods of educational technology to operate, redesigns instructional methods, and refines performance and effectiveness to adapt to the priorities of e--Learning (Chavoshi et al, 2018). The need for education updating was required because of the fast advances in

technology. They need to learn at any time, and any place was in its way to be achieved. (Wolfinger, 2016). Over the past two decades, online learning has been activated in some global institutes. However, most schools, colleges, and universities do not use this education mode (Mahyoub, 2020).

With equal participation in education the issue of gender equality at all levels of education became a global concern from MDGs to SDGs. Gender equality in education is directly proportional to gender equality in the labor force, in the household and in decision making. The same concern that was addressed in conventional education approach is reflected in online education or e-learning. Widening participation of women's in higher education has been a policy priority in Tanzanian government. Traditional, there is a wide gender gap when it comes to higher education whilst there are no real problems of access to primary education, the trend towards fewer girls in education starts to appear at secondary school level and accelerates markedly in higher learning institutions (Kilango et al, 2015).

The gender inequality is a very concerning issue in our current society and affects many developing nations most especially Tanzanian case as it affects the human dignity and universalm human rigths. This problem arises when a person receives unequal or disadvantageous treatment, under the same circumstances, based on gender. This goes against the first article of The Declaration of Human Rights, "All human species are born free and equal rights for dignity. They are embedded with logical consciousness to act towards one another in the unity of purpose. Gender to education is directly proportional to gender equity in the labor force, in the household and decision-making. Educating the female's lowers infant mother and baby mortality rates that goes to affect higher educational attainment and achievement for next generations and improve the economic conditions of nations (Target, 2015 & Bisanda et al, 2019).

A number of studies have explored gender issues on higher education online learning and findings have shown that gender may have a substantial impact on an individual's participation and perfomance as well as cognitive functions such as perception, memory, and emotion. Also, previous studies have focused on gender differences in traditional face-to-face learning, but there are few empirical studies on gender differences in online learning education in Tanzania. Therefore the article adopted systemetic a scooping litirature review to analyse the gender issues on online education in higher learning in Tanzania.

Gender

Gender is defined as a complex, multilayered social practice that distinguishes between men and women, masculinity and femininity through formal and informal power processes (Van Den Brink, Holgersson, Linghag & Deé, 2016). One of the explanations for the complexity is provided by Marx through society's evolution into a complex system. This evolution leads to more distinct differences in body and mind between women and men, specialized roles and division of labor. The process by which this social process is carried out is called socialization. Socialization is carried out early in an individual's life through the family. This socialization is followed through by education (school system) and the society thereafter continuously. (Holmes, 2007)

The concept of humanity has been taken from social life and gets its meaning only if its personality as well as its behavior are both defined and elaborated inside society. If the discrepancy existed among members of a society get initiated based on natural characteristics and be evaluated on the basis of socio-cultural criteria; hence, some will be credited to a high degree while some not. As a result of this, social inequality emerges. A case in point is gender inequality. In most communities, gender is considered as a socio-cultural phenomena related to sex. Gender inequality can be expressed as an imparity between men and women in the use of available facilities (Alipour et al, 2011).

It also refers to every behavior, policy and performance reflecting constant, comprehensive and institutionalized viewpoints of members of the society toward women as an inferior creature in various fields such as occupation, education, etc. Gender inequality, especially in the field of education, can result in profound disorders in mental, social and living aspects of women's life as well as next generations. One of the main missions of the society is to meet human needs and educational institutions as part of the society can fulfill such needs through different methods namely elearning. In this article, it has been tried to evaluate this newly arisen matter, e-learning, and to apply its results to provide psychological security for women in a society (Alipour et al, 2011).

Higher Education in Tanzania

According to the National Higher Education Policy (1990) of Tanzania, higher education

refers to the scope of knowledge and skills imparted by tertiary education. It excludes both the primary and secondary level of education (p. 7) but includes full academic professional training and intermediary professional training provided by universities and non-universities. Universities are the highest level of higher learning institutions, mainly focusing on research, teaching and public services (Mnubi, 2013).

As a country in transition at the crossroads of globalization, Tanzania requires its higher education institutions, particularly universities, to prepare people to function effectively as sources of skill and knowledge and as important partners in sustainable development (Commission for Africa Report, 2005). This necessitates the national education policy to establish critical national goals and priorities in matters relating to education, particularly higher education (Mnubi, 2013).

Since her independence, Tanzania has established more or less 40 higher institutions to date. The first higher institution was established in 1961 and was called Dar Es Salaam University College, a constituent (university) college of University of London. As an affiliation, Dar Es Salaam University College only catered one faculty, Faculty of Law, and received only 13 students. In 1963, Tanzania and two other Eastern Africa countries, Kenya and Uganda, signed a contract establishing harmonized higher education institution called University of East Africa (UEA) under an affiliation with University of London; University of Dar Es Salaam in Tanzania, Makerere University in Uganda, and University of Nairobi in Kenya. In 1970, UEA collapsed, and the three countries decided to nationalize and run the university in their own country. From 1970 to 2003, Tanzania added 4 more public universities, namely Sokoine University of Agriculture (SUA), Mzumbe University, Open University of Tanzania (OUT), and State University of Zanzibar; the establishment of private institutions was started in 1995 when liberalization of education received concern (Istoroyekti et al, 2016).

While looking back at Tanzania's higher education history, Tanzania has made rapid progress in term of higher education system that went along side with technological changes, from one university in the 1970s to more than 40 universities in 2014 (both public and private universities). As in 2014, Tanzania has established more or less 50 universities. The number of public institutions is 18 and private ones are 32 (TCU, 2014).

This massive progress in one hand provides Tanzanian accessible higher education but in

other hand it places quality education at stake. The issue of human capital, facilities, and credibility has been challenging across Tanzania, both public and private universities and in the long run it jeopardizes the higher education system itself. Reviewing related literatures, current education system and major problem facing Tanzania today, it is important to revise and promote a liberating education system that train students to be independent, critical and analytical (Istoroyekti et al, 2016).

The burgeoning university across the country in the last 2 decades has enacted the government to establish a higher institution body that controls and manages all the universities called TCU (Tanzania Commission of Universities). As it was established on July 2005, TCU envisions an accessible, equitable and harmonized education system particularly in tertiary education level. The main role of TCU is to "recognize, approve, register and accredit Universities operating in Tanzania and local or foreign University level programs being offered by registered higher education institutions". As regulatory, advisory, and supportive institution, TCU builds centralized system of application process that screen eligibility of applicants based on the applicants' Form 6 result. In this manner, university receives students who are already approved by TCU, no universities are allowed to receive direct application (TCU, 2014). In other words, as newly established government's body, TCU regulates the students' intake of all higher institution in Tanzania. Before this establishment, students did not pass through TCU to enroll the university.

Online Education

Online education or E-learning is becoming a key and effective component in higher learning institutions worldwide (Eklund et al. 2003; Stoltenkamp et al. 2007). As learning and technology intersect in tertiary institutions worldwide, implications about the ways women and men engage in online learning environments have become an important issue to examine (West, et al, 2017). Information and Communication Technology (ICT) is progressively playing more influential role in every business domain, and has dramatically transformed the way people and organizations interact with their environment, particularly learners and academic institutions (Bhuasiri et al., 2012).

The diffusion and adoption of ICT have created an opportunity for educational institutions to complement traditional face-to-face classroom teaching. Moreover, adoption and effective

utilization of ICT in education have become an acknowledged issue of strategic importance in educational institutions around the world (Jebeile and Reeve, 2003). Additionally, the technology has become a major player in global provision of education, which is gender sensitive (Morley et al. 2007).

Tanzania embraces online education as the ideal of providing more educational opportunities for minority groups, women and those who cannot access the educational system in the regular way (Kramarae, 2001). In the 1990s, females were at first diffident about using the computer and they were reluctant to learn the use of the internet. However, the expansion and commercialization of internet made it possible for this technology to be less intimidating and easier to use for females Nevertheless, creation and administration of the web continued to be the male's dominion as they were the technically-inclined individuals whereas females as low-level users of technology (Herring, 2001 & Secreto, 2013).

The rapid growth of higher education institution is not accompanied by sufficient number of students' enrollment; even though government has made is easy for Tanzanian to access it. In Education for Self-reliance, Dr. Julius kambarage Nyerere mentions that the purpose of education in Tanzania is "[It must] encourage the development of proud, independent and free citizenry which relies upon itself for its own development, and which knows the advantages and the problems of co-operation" (Nyerere, 1967). His notion on education promotes the importance of able and capable human resources as well as constructive and productive agents in society. In other words, Nyerere addresses university as the manufacturer of high qualified people who are of beneficial for his/her community and to develop it (Istoroyekti et al, 2016).

With the introduction of internet two decades ago, ICT related activities were predominated by males in various aspects of human life not only in Tanzania but it was a global phenomenon. Not only are males more interested in ICT, numerous research findings likewise illustrated that males were heavier users of computers, had positive attitudes about computers and thus performed better than females in ICT literacy including in education activities (Herring 2001 cited in Reinen and Plomp 1993; Volman and Eck, 2001). During those years, various studies further revealed that there was a significant disparity in terms of access and technology literacy in favor of males than their conterparts.

Online Education and Gender

The definition of gender is still controversial to many people around the globe. Taylor, Whittier and Rupp (2007) state, 'our gender, and what it means to us affects the ways we interact with each other, the kind of relationships we form, and our positions in our communities'. Shortly, 'gender refers to the societal meaning assigned to male and female, and to the socially constructed roles, behaviours, activities, and attributes that any given society considers appropriate for men and women' (Schwenke, 2011). However, it is difficult to agree with this definition because, "Even the definition of who is a man and who is a woman can be contested" (Connell, 2009 quote by Schwenke, 2011). Then, gender is the social and psychological dimensions of being male or female (Santrock, 2006 & Mlyakado, 2012).

Gender equality defined as the situation where women and men, girls and boys enjoy the same rights, opportunities and protections (UNICEF, 2011). It is a core human rights principal and valuable end in itself (Ibd). It implies that that women and men have equal conditions, treatment and opportunities for realizing their full potential, human rights and dignity and for contribution and or benefiting from economic social cultural and political development (UNESCO, 2009). Gender equality is essential for protecting universal human rights and fundamental freedoms (UNESCO, 2012). It is also a powerful development accelerator (Msoffe, 2016)

Inequalities in education do not happen as a matter of chance but the socio-cultural socialisation processes can be attributed to the current inequalities between men and women as exemplified in education and employment or career choice' (Petro, 2011). '…women everywhere suffer restrictions, oppression, and discrimination because they are living in patriarchal societies' (Taylor, Whittier & Rupp, 2007). Women have been oppressed through history and across the globe (Keeping & Shapiro, 2011). However, Gender inequality is more pronounced in some aspects of the educational systems than in others (Jacobs, 1996 & Mlyakado, 2012).

Gender equity in higher education is more than putting women on equal footing with men it is eliminating barriers to participation and stereo types that limit the opportunities and choices of both sexes. Gender equity is about enriching classrooms, widening opportunities,

and expanding choices for all students (Bailey 1996). Since the independence 1961 the government of Tanzania has put in place a sector wide approach to education and the Education Sector Development Programme in an effort to reduce gender disparity in the education sector and to improve the quality of education. The international and regional agreements related to women's rights have developed a number of national policies that constitution bans discrimination on whatever grounds. Gender equality in education imply that girls and boys are ensured and actually offered the same chance and treatment in access, process, and outcome of an education of good quality and which is free from any stereotypes (UNESCO, 2009 & Msoffe, 2016).

On another hand the National Education and Training Policy of 2002, National Education Act of 1978 and the National Higher Education Policy of 1999 provides guidelines for achieving gender equity and equality in the various levels of education (Onsongo 2009). Gender inequality in Tanzanian higher learning institution started during the transition from primary to secondary schools. However the government has achieved gender parity in primary and secondary school enrolments hence girls' performance in the primary school leaving examination results remains lower than boys', and gender differentials in enrolment widen in higher secondary and in higher levels of education (Lihamba, Mwaipopo et al. 2006).

Method

The The chapter used documentary review method or desk research to analyse gender in online higher education in Tanzania. The chapter has drawn on secondary data and the author's observations to present the findings in a systematic manner. The review followed a systematic procedure for reviewing or evaluating documents both printed and electronic (computer-based and internet-transmitted) material. Like other analytical methods in qualitative research, document analysis requires that data be examined and interpreted to elicit meaning, gain understanding, and develop empirical knowledge (Corbin & Strauss, 2008).

The review included several documents that reflected gender in online higher learning in Tanzania and some parts of Africa that included books and other research findings with similar drift that were reviewed to justify and enrich the article.

Results

The Tanzania Population and Housing Census, 2022 results, which were released by President Samia Suluhu Hassan on Monday this week, show that females account for 51.3 percent of the country's 61.7 million people (NBS, 2022). Despite of more Women present in the country some of the social and cultural values have been hindering some people to access education system since independence of 1961 particularly female populations. Online education in higher learning is one of the mechanism that was introduced to balance the gender equality in education system.

The country initiated the Education Policy of Self Reliance to address gender inclusion and universal education for all through Arusha declaration in 1967. Distance education was among the features that was introduced during Self Reliance Policy with major aim of provision of education for all and it laid down the foundation of online education in Tanzania (Nyerere, 1967) and it was noted by onlineeducation.com (2020) noted that online teaching and learning originates from and distance learning and the development of digital technologies which facilitate instructional activities by using the internet. The country continues to embrace right to education for all considerably influenced by the Universal Declaration of Human Rights (UN, 1948), Tanzania's adherence to international standards and education conventions as education is the right of every individual in the society, Banjul Charter on human right and People's Right (1981). According to Jomtien convention (1990) and Dakar Framework for Action (2000) put much emphasis on Education for All (EFA) as basic human right.

As a beliver of Universal Human Rights, Tanzania always has been striving to balance gender in all levels of education that goes together with the technological advancement. The national policies are emphasizing on the use of modern technologies in teaching and learning processes, like other developing countries the use of ICT services in education system its considered as competitive tool for improving the academic performance of Higher Learning Institutions (HLIs) (Lwoga et al, 2015). Amongst the widely used technology in teaching and learning in HLIs is E-learning or onlined education and the use of e-learning has resulted in a number of changes in HLIs as far as education delivery is concerned in Tanzania including gender issues (Lwoga & Komba, 2015). Online education most of E-learning usage has allowed marginalised populations in rural areas to have access to education as well distance

education to become more accessible to all.

Tanzania's vision 2023 have highlighted on the importnace of mixed education approaches in meeting basic learning needs of all children, youths and adults is the ultimate target of most of the international and national communities as well as governments across the world' (Kayombo, 2011). 'Over the years, education has focused on access and parity that is, closing the enrolment gap between girls and boys while insufficient attention has been paid to retention and achievement or the quality and relevance of education especially in online education (EQUATE Project, 2008).

To date, either conventional or online educational system Tanzania's educational context is marked by a distinct gendered imbalance with young girls leaving their studies at higher rates than their male counterparts during secondary school. Their early departure results in a gender imbalance in institutions of higher learning (MoEST 2016; Mwita & Murphy 2017), which in turn results in approximately only 30 percent of academic posts at Tanzanian universities being held by women (World Bank 2020).

Research on gender in the African educational system has shown that girls and women's experiences in Tanzania's educational sector can be explained by deeply rooted cultural norms and traditions continuing to influence gender inequity and limited female engagement throughout higher education (Mama 2003; Morley 2010). The primary social roles assigned to female populations affect their involvement in online higher education as well and according to (Morley 2011; Mukama 2020) and norms of patriarchal ideologies often link women to motherhood, domestic duties and care provider in both domestic and professional spheres. In contrast, these norms often link men to notions of independence, assertiveness, leadership, and dominance, and women and men reproduce these norms through their practices and values, which as a result shape and influence their self-expectations and behavior even in online higher education participation (Murphy et al. 2019).

These norms then play out in the higher education and research spaces. For example, Massawe & Sife (2020) found that gender gaps can be seen across all academic ranks with more women than men occupying lower academic ranks and being proportionality underrepresented at all other levels of the academy hierarchy. Much work has been done on gender mainstreaming (Morley 2011) and targeted initiatives, such as affirmative action

(Lihamba, Mwaipopo, & Shule 2006), to address these inequities. Yet it is uncertain whether such initiatives have had a transformative effect on the structure and dynamics of gender relations and expectations within academic institutions (Darkwa et al. forthcoming). This context provides a scene against which the online education in higher learning can be examined. It also provides insight into the situation-sensitive nature of gender norms, values, relations, and expectations within this space.

Inferiority complex to female students in accessing ICT services for online education in higher learning caused by gender imbalance is well noted in Tanzania that resembles other developing countries. Similar studies revealed that the evident gap between male and female students was the level of confidence about their technical capability with males unsurprisingly more confident than their female counterparts. Markauskaite (2006) observed that females manifested anxiety and less confidence about their ICT competencies. It is important to some extent that online learning institutions deal with this ICT related gender inequality which is rooted basically from the difference in characteristics than the gender per se (Markauskaite, 2006).

With focus to include disadvantious groups in the country such as female populations, online education in Tanzania Although, was first introduced to allow people in the remote and rural areas to gain access to higher education and since then online education is regarded as an effective way to deliver education in terms of time and costs in HLIs as it was similar highlighted in a study conducted by Wang et al., (2007). The findings suggest that the use of e-learning such as development of multimedia, information technologies and Internet in teaching, has resulted in radical changes in the traditional process of teaching that left some marginalised populations behind.

More importantly, online or e-learning provided greater flexibility of access to teaching and learning material as well as allowing all students from different background and genders to benefit from online sessions and ICT related education services and rendered a major asset for their future careers. To this end, the integration of onlien or elearning in the education system is viewed as one of the responses to gender inclusion and as well as to meet the growing need for high quality education in HLIs from both developed and developing countries including Tanzania (Masue et al, 2020).

Discussion

Tanzania education policy and related national strategies have been intagrated Online education in higher learning as part of global agenda for inclusive educationa by 2030 through ensuring an equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university. As enshrined in sustainable Development Goal 4 is the education-related goal of the United National 2030 Agenda for Sustainable Development, adopted in September 2015. Its overall aim is: to: "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (UN SDGs, 2020).

In Tanzania, gender inequality in higher learning institution is critical; and it starts during the transition from primary to secondary schools. Tanzania has one of the lowest secondary enrolment ratios in the world, and the majority of places at public secondary schools are taken by families from the richer end of society (Wedgwood, 2005). Although Tanzania has achieved gender parity in primary school enrolments and near parity in lower secondary enrolments, girls' performance in the primary school leaving examination results remains lower than boys', and gender differentials in enrolment widen in higher secondary and in tertiary levels of education still accessibility to online education varies in term of gender criteria (Poverty Eradication and Economic Empowerment Division, 2010).

ICT nand related services have pioneered the process of online education in Tanzania yet there is no agreement on when ICTs where initially introduced into the education sector to facilitate online online education in hugher learning institutions Africa including Tanzania, with equally as many answers as there are attempts at answering this question (Alkharang & Ghinea, 2013; Bagarukoyo & Kalema, 2015; Hubackova, 2015). For example, Alkharang and Ghinea (2013) argue that the appropriation of ICTs for teaching and learning started in the 1960s, whilst Hubackova (2015) points out that the cornerstone of modern e-learning was set in the late 1980's, with the term e-learning first used in 1999. Similarly, Bagarukayo and Kalema (2015) state that in the South African Higher Education context, e-learning emerged in 1990s. Whilst the term e-learning might be relatively new, ICT appropriation in education is not.

With new technological developments, scholars and practitioners in Tanzania and across the

world are still interested in harnessing ICT services for enhancing access to academic knowledge in relations to gender equality. Similar to global trends, a number of African countries have adopted e-learning to extend the reach of education in their territories to all populations. While there is a difference of gender enrollment in online education for higher learning students from country to another, the growing number of student in African universities (Gunga & Ricketts, 2007; Jaycoba & Ilonga, 2019; Lwoga, 2012), with some universities making the adoption of e-learning platforms mandatory without regarding the gender capacity of utilizing ICT services it will be very challenging (Mpungose, 2020). Some of the reported benefits of e-learning include a reduction in costs, the provision of convenient and flexible learning, less environmental impact, as well as access to quality education with more gender inclusion (Alkharang & Ghinea, 2013).

Tanzania resembles other African developing countires with many resource constrained struggling with limited infrastructure that cannot accommodate all prospective higher education students (Lwoga, 2012), the promised benefits of e-learning may explain the widespread enthusiasm around e-learning in Tanzania and the rest of Africa. Whilst e-learning has been promoted an equaliser that can enhance access gender equity and education parity (Awidi & Cooper, 2015), there are a number of scholars who urge caution and reflection when embracing e-learning. In their article outlining various myths around e-learning, Njenga and Fourie (2010, p. 202) question whether e-learning does indeed improve teaching or merely embraced as a “virtual fashion” with new gender stereotyped in education arena.

The phenomenon of gender inequality was magnified during COVID 19 pandemic worldwide and it has been observed since then in online higher education even in Tanzania (UNICEF,2021), the disparity gap that still exists between boys and girls are again widening in other developing countries as well. The international community and countries working abysmally to fulfill the promise to close the gender gap by 2030 remain a mirage. The situation has been tedious, scholarly UNESCO Institute for Statistics (UIS) disaggregates capacity indicators by sex to the effect possible, given parity indices and creative new indicators to better influence the equity and inclusion of girls and boys (Bisanda et al, 2019).

However in online education learning process women have more domestic and family commitments than men, often mature women face significant barriers through multiple

commitments and have serious financial burdens, unequal distribution of men and women in different subject areas. Also, online education has provided for many women, perhaps their only chance to learn when other educational institutions were inaccessible to them (2002) On the other hand, argued that gender inequality in education lowest the mean of human resources in a society it turns to affect economic progression. It is abnormally restructuring the pool of talent from which to draw for education and thereby excluding highly qualified girls and taking less skilled boys instead (Dollar, Gatti, & Filmer, 1999).

The male's predominance over the computer and the internet had greatly declined in the recent years with more and more females gaining greater interest in ICT activities. Thus, gender inequality in terms of access and technology literacy had diminished to a great extent as these new technologies become an indispensible aspect of learning, work and everyday life. Over the years, these differences have slowly and entirely ceased to exist. Herring (2001) noted that the internet promoted greater gender equality and became instrumental for bringing women online in the mid 1990s. She added that internet suits the female because it is "clean, safe and can be used indoors".

With the emergence of the web and email technologies the web as a source of information and email as a medium of communication, have captured the interest of women because of their increasing practical significance in computer supported learning (Gunn, 2003). Communicating online, Gunn observed that women tend to be more collaborative and intimate, while men are more of the confrontational type. Because of this inherent communication style of females, they are more likely to develop interpersonal relationship online (Secreto, 2013).

The review has shown that online education offered opportunities for studying without the constraints of time and place, female students were more reflective in their learning, appeared less hesitant to engage in the online environment, felt they had more control over their learning and found the mode a positive experience compared to face to face courses in similar academic area, Also it allowed accessibility for people who are prevented by work and family commitments or by other factors such as disabilities or lack of mobility to attend classes but who enjoy a degree of flexibility in their schedules.

Studies made by Markauskaite (2006) revealed that while males have more experience with

ICT, there were no significant gender differences in terms of ICT literacy and there was no apparent disparity in students' participation in online learning for both genders. Evidently, the gap between male and female students was the level of confidence about their technical capability with males unsurprisingly more confident than their female counterparts. This could be attributed to the fact that females spent lesser time in computer activities than males did. In terms of time spent on the web and the computer, a case study conducted by Gunn (2003) reported that women did not have "priority access" to the computer at home. Further studies revealed that males spend more time in computer use and put study as one of their priorities. More recent studies conveyed that the gap between the number of male and female online has greatly decreased with more women taking advantage the Internet as a mode of communication.

Internet has been described as an electronic meeting place where individuals can meet equally regardless of gender (Monteith, 2002). As internet becomes a balanced and neutral environment, Herring (2001) projected that the number of females who goes online will continue to increase thus giving them more power not merely in terms of number but in technical facet as well that will shape the nature and uses of the internet with women not just users but as administrators as well. To assume that the Internet has the ability to create gender equality is parallel to saying that men and women are equal offline (Herring, 2001). Monteith (2002) predicts that "gender issues in cyberspace are likely to persist as long as they also exist offline" (Secreto, 2013).

Therefore, online education has been integrated into online and distance education in Tanzania as a result it has succeeded to contributed on educational inclusion and equity for all people including irrespective of sex, age, race, colour, ethnicity, language, religion, political or other opinion, national or social origin, property or birth, as well as persons with disabilities, migrants, indigenous peoples, and children and youth, especially those in vulnerable situations or other status, should have access to inclusive, equitable quality education and lifelong learning opportunities. Vulnerable groups that require particular attention and targeted strategies include persons with disabilities, indigenous peoples, ethnic minorities and the poor. Also, online education has grown into an important global strategy in resolving problems of access to education among both female and male students (Mkwizu & Ngaruko 2020).

Challenges

The capacity of instructors in online higher learning differ and affect the delivery of online learning to the students. The fact that male and female instructors have adapted diferently to online teaching as studies have shiown that women may have performed more poorly than their male counterparts because of the (already well-documented) grave diculties they faced in reconciling work and childcare during the first waves of the pandemic (Adams-Prassl et al., 2020; Alon et al., 2020a, 2020b; Deryugina et al., 2021; Farr´e et al., 2020; Zamarro and Prados, 2021). In that case, the gender gap could widen as a result of a genuinely poorer performance by female instructors.

On the other hand, online teaching may have narrowed the gender bias in teaching evaluation, if remote classes benefited from female teaching styles which are thought to be more interpersonal (MacNell et al., 2015). Assuming that women are more likely to be supportive, accessible or personable than men, students may be more appreciative of the support received from their instructors in dicult times (such as during a pandemic) and that may be reflected in their evaluation of the teaching. But again, if online instruction makes it more dicult for women to excel through verbal communication (given that non-verbal communication and body language are often eliminated) they may be penalized (Fauville, 2021).

Furthermore, it could be that female instructors have less experience in the courses that all of a sudden need to be taught online; and again, that could be reflected in differences in the evaluations of the teaching of male and female lecturers. Also, one needs to consider the possibility that men and women teach subjects of a different nature, which could in turn have different degrees of adaptability to an online environment. Thus, it is important to discount the possibility that gender differences in teaching evaluations are not the result of self-selection (or sorting) by students into subjects. Nonetheless, if one can discount all the aforementioned mechanisms and still observe a gap in teaching evaluations to the detriment of women, it must be that online teaching contributes to the strengthening of gender bias (either because of prejudice or dislike, either conscious or not, either implicit or not) (Bertrand et al., 2005; Rooth, 2010; Oreopoulos, 2011; Bohnet, 2016).

However, some instructors of in higher learning institutions are the victims of gender imbalance and they still are still abusing students online either knowingly or unknowing.

Some instructors are used to conventional learning approach and shifting to online approach has become disadvante to them with social constructed belief that ICT is for specific gender domination and ultimate affects the intended goal of quality online learning in higher education. Also, this likely affected low socio-economic and vulnerable student populations the most, failing to uphold Goal 4 of inclusive and accessible education for all. Changes in the learning environment (e.g., the transition from face-to-face learning to online learning) can influence students' well-being, behaviors and learning basing on gender differently (Zhang et al, 2022).

Lesson Learned

- Tanzania has taken important steps since independence of 1961 towards addressing gender equality in education systems, much remain to be desired, specifically the gender mainstreaming in online higher education
- Gender equality either through conventional or online education has been promoted by the international development community for over two decades; however, it has remained to be a contemporary challenge to promote gender equality through online education in higher learning institutions.
- Even though the internet is considered as a gender-neutral environment nevertheless there are differences of how students in higher learning institutions react and use the internet. Male students are more linked to technology aspect than their counterparts.
- Mainstreaming gender in online education higher learning system should start from the scratch i.e. from primary level to higher educational institutions as vital sites for normative change and have the potential to address gender inequalities and prevent gender based violence (GBV) in online education.
- Online or E-learning have more opportunities in addressing gender disparities in higher education and addressing the challenges facing education system in developing countries. Well-designed e-learning initiatives can provide a low-cost, flexible, culturally appropriate and more gender inclusion
- Traditions, subcultures, and ethnic matters that are sometimes observed with bias that have potential to induct irreparable damage to vurnerable and marginalised populatiions in higher education, but e-learning can act as a shield to reduce such damage.

- Online education or E-learning has proven to attract a large number of women and other marginalised populations into educational environments.
- Supportive and solicitous parents prefer e-learning for their children, especially their daughters, while married women and their husbands prefer elearning.
- Expansion of e-learning can surmount the educational and socio-psychological needs of women and other margnialised populations in developing countries including Tanzania.
- The promotion the culture of e-learning by families viewing e-learning as an opportunity to improve psychological security of female students and their families
- Online education or E-learning has provided an opportunity for a higher learning student to simultaneously manage family, occupation and extra curricular activities compared to conventional education system. Thus online education in higher learning should be advocated and promoted as a tool for national-cultural preservation.

Conclusion

In Tanzania and other developing countries to achieve gender equality in both conventional and online education requires system-wide from National policy framework to institutional level change in the way policies and realistic plans are developed to ensure no one is left behind. With existing cultural practice that facilitate gender disparities in various education approaches yet the vital need to identify and mainstreaming online education gender issues and ways to turn gender differences into assets rather than disadvantages. Also, the country needs to develop online learning curiosity among women and girls from early stage of their development. In addition, strategies to ensure effective application of online education or e-learning in higher learning institutions with gender parity are needed, including strong enforcement of an ICT institutional policy on gender mainstreaming, availability of trained staff in gender and institutional led monthly open discussions regarding gender issues in online education in the teaching and learning process.

Recommendations

The Government

- The government of Tanzania needs to develop specific educational policy of online

education and that stipulates integratation of gender education at all levels of education from primary school to higher learning institutions.

- The government needs to develop online learning culture among women and girls from early stage of their development.
- Online education should be used as an altenative approach for accessible and quality education to empower the poor and the marginalized groups
- The government should oversee the creation and the issue of local content learning materials. Diverse languages facilitates gender biasness and this can be addressed by creating and sharing local, customised content which improves learning because the learners study better in their first language.

Higher Learning Institutions

- Higher learning institutions should use online education as an approach to promote gender parity to all i.e. girls and boys, women and men, rich and poor should have equal opportunity to enjoy education of high quality and equal benefits from education.
- Each higher learning institutions should create an online gender awareness information and counselling system that gives effective support to students on the issues related to gender based violence by training relevant staff.
- Higher learning institutions should promote public awareness campaign on the vital need of using online ducation as alternative for disadvantaged groups women, poor men and disabled so as to achieve career development and nation's socio-economic development.
- Higher learning institutions should conduct public awareness campaign on gender awareness so that men can find the importance of sharing gender roles in the family and community level. This may provide women with ample time to participate fully in online education and ultimate contribute to the nation's socio-economic development.

Notes

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Author Information

Meinrad Lembuka

https://orcid.org/0000-0002-8267-5161

The Open University of Tanzania

Box 23409

Dar es salaam

Kawawa Road - Kinondoni

Tanzania

Contact e-mail:

meinradlembuka@gmail.com

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Chapter 5 - Technology Enhanced Learning (TEL) Pedagogy for Quality Education: Insights and Prospects

Dippi Verma, **Santosh Satyanarayan Baheti**, **Rameesha Kalra**

Chapter Highlights

- The Chapter is comprehensive in nature defining the growth in a publication related to the TEL curriculum and pedagogy for quality education for the past 22 years.
- Global contribution from authors and their research productivity in the domain of Technology Enhanced Learning is explained through different software like Vos Viewer and Biblioshiny.
- The chapter has highlighted studies instrumental in shaping the knowledge base of TEL and quality education since 2000.
- Influential themes that have emerged over the past 22 years are explained through bibliographic coupling.
- In the present era what is the focus area of the different researchers and academicians is presented through the analysis of trending topics in TEL.
- Thematic mapping in four quadrants is presented through the author's keyword analysis.
- The introduction part of the study has explained the essence of the study post-COVID-19 pandemic.
- The discussion part of the study has explained the different dimensions of the TEL and its interlinkage with SDG-4.
- Study has done a quantitative assessment of publication trends, annual growth, author and country productivity, and their collaborative tendency assessment.

Introduction

The recent advances in technology have opened up new avenues in each domain of life. The education sector has also immensely benefited from the use of technology, specifically when the COVID-19 pandemic was around. During the pandemic, all the traditional learning methods have shifted towards virtual learning. The COVID-19 pandemic has moved the focus of the academic fraternity to teach online and played a significant role in reshaping the entire educational model (Van der Spoel et al., 2020). A research study was conducted on 200 Dutch teachers to understand Teaching-Learning expectations during the pandemic. Results demonstrated a significant change in teachers' perception regarding their resolutions to implement technology in their lessons in a post-corona era. The growing expectations of learners witnessed a considerable change (Van der Spoel et al., 2020). Teaching The importance of education cannot be undermined as it facilitates lifelong learning and enhances the quality of life in a country. Technology offers immense opportunities to learn, ensures that teaching happens more productively, and contributes to the overall knowledge creation for the students. Le et al (Le et al., 2019) are of the view that technological advancement has transformed education into more of a personalized experience for learners.

Digitalization of education has led to pedagogical innovation which confirms the quality of education. Teachers use technology primarily for delivering content and developing distance learning sessions. (Liu, 2011). Intention to use a particular technology is guided by the Theory of Reasoned Action Approach. The theory supports the view that intention to use is the most important predictor of the behavioral intention of it in the future. The higher the intent to use technology, the more likely the behavior is likely to happen. Also, if a person perceives a certain behavior positively, he/she is more likely to influence their social contacts and family members to perform that behavior even in the future. digital transformation has happened across all sectors, it is important to adapt and renew one’s skills to meet the changing requirements. In the education sector, digital technologies have a lot to offer to the education sector that will not only ensure an intense engagement for learners but will improve the quality of their learning experience.

The term Technology Enhanced Learning (TEL) is a combination of all the tools, techniques and approaches in which technology supports the teaching learning process especially students augmented learning (Noroozi et al., 2012). Terms like e-learning, web-based

learning, online learning come under the purview of technology enhanced learning (Noroozi and Hatami 2018). Technology is employed in the education sector to enhance the critical thinking skills, active engagement and overall utilizing their potential (Visvizi et al., 2018) Higher educational institutions play a key role in imparting the knowledge required to face the complex challenges faced by the economy. This can be addressed through providing access to quality education to the learners of today.

Quality education is the vision of every country and is one of the SDG given by the United Nations. Quality education is seen as one of the important drivers of sustainable development of a country. When we talk about quality education, it is not possible without a well-designed and practical skill-oriented curriculum that can help the learners to adapt to the changing needs of society. For ensuring effective curriculum, inputs from key stakeholders (alumni, industry experts, academicians) should be sought to make it more meaningful and thereafter a feedback mechanism has to be ensured to review the curriculum each year.

Technology is also one of the enablers of quality education. Learning and technology go hand in hand and synergize with each other quite well. The learning process cannot be separated from technology as it is now considered as integral in our day-to-day requirements. The central figure in the process of education and learning is the teacher who is the decision-maker about the technologies to be employed and pedagogical approaches to be used.(Trepule et al., 2015). Hermans et al (Hermans et al., 2008) are of the view that teachers who believe in adopting a learner-centric approach to teaching-learning have a positive attitude towards technology enhanced learning as compared to those who adopt teacher-centric approach. The role of a teacher is not to just transmit information and knowledge but to ensure learner's engagement in such a manner that leads to high level of cognitive and interpretative skills for the learners.

For Technology Enhanced Learning to be effective, the course design/curriculum and the learning environment must promote active forms of learning, decision-making, problem-solving and interpretation skills(Roth & Roychoudhury, 1993). The research revolves around higher education institutions as they produce competent leaders of tomorrow. As technology has become integrated into teaching-learning processes, it has been recognized that leveraging technology will result in a better student engagement as well as achievement of educational goals. (Ellis & Bliuc, 2016). The quality of students' learning approaches to

learning is largely dependent upon their perception towards the learning environment and the inherent motivational factors(Coertjens et al., 2016) An important manifestation of technology enhanced learning is online/blended learning which resulted as an emergency alternative to the outbreak of Covid-19(Yeung & Yau, 2022). TEL has led to a drastic change in the learning environment by offering a diverse range of online learning tools such as learning management systems, online courses, online classrooms, and assistive technology at affordable prices.

Casanova et al (Casanova et al., 2011) proposed *five* dimensions to evaluate the quality of Technology Enhanced Learning as: expectations and perceptions of the stakeholders, desired competencies of the teachers and learner to take part in TEL practices, the required learning environment and resources, assessment strategies and practices in line with the requirements of the course and required support from administration in terms of logistics and tools.

The existing paper would adopt a bibliometric approach to review the existing studies that have happened on TEL and would provide the researchers with scope for further research by focusing on the areas that are less researched. The main contribution of the study would be the proposed framework for TEL-based education and pedagogy to enhance the quality of education.

The chapter intends to answer the following research questions:

RQ1: What is the pattern of growth in a publication related to the TEL curriculum and pedagogy for quality education since 2000?

RQ2: What characteristics of authors and their productivity in the domain of TEL research?

RQ3: Which studies are instrumental in shaping the knowledge base of TEL and quality education since 2000?

RQ4: What is the association between TEL curriculum - pedagogy and quality education?

RQ5: Evaluate existing TEL integrated framework for quality education?

The increasing use of technology in education has gained attention from academician also and thousands of researchers are found on various aspects of TEL However, most of the research has specific focal point or limited to small sample. There is few research in which TEL is studied with the perspective of higher education (Shen & Ho, 2020) and secondary

education(Del Cerro Velázquez & Morales Méndez, 2018)Most of these studies focus on learning enhancement and competency from perspective of teacher (Baena-Morales et al., 2020), achievement from perspective of students(Tamim et al., 2011).Some of the studies on SDG 4 i.e. quality education are related to its perspective(Boeren, 2019) and multilevel governance analysis(Franco & Derbyshire, 2020) . There is a rare amount of research contribution which provides insight on TEL curriculum and pedagogy with the aim to achieve specific SDG.

This study fills the gap of the existing study by providing comprehensive view about various studies which have focused light on TEL curriculum and pedagogy for quality education, by discussing its performance, collaborative pattern, influential author, and studies. Based on previous literature, the study will also throw light on the various frameworks for TEL based curriculum and pedagogy as well as prospects for framework and research. The period of the study will be 2000-2022.

Research Methodology

Selection of Database

There are many data sources like Scopus, EBSCO, ProQuest, Inspec, and Web of Science. For the present study, On October 22,2022. through Scopus database the existing and available literature. Scopus Database as it is the most extensive database consisting of more than 22,000 journals across different disciplines (Bartol et al., 2014). The Boolean operator AND was used to execute the search with key strings “Technology Enhanced Learning” AND SDG4 AND Curriculum AND Pedagogy. The search was expanded with the Boolean operator OR with the key string (“Technology Enhanced Learning” OR “Education Technology”) AND (SDG4 OR “Quality Education”) AND Curriculum AND Pedagogy. The language selected was English. In addition to specify the search the option was enabled by title and keyword resulted into total 453 documents consisting of 367 articles, 2 book, 56 book chapters, 2 editorials, 1 note and 24 reviews from the period 2000-2022. The resulting database of 453 documents downloaded as CSV file is used for bibliometric analysis through Biblioshiny and VOS Viewer software.

The generated pool of 453 articles downloaded from the Scopus database was used for bibliometric analysis. The results are presented in four sections: 1) Characteristics and

Performance, 2) Influential Author and Document, and 3) Thematic Analysis. The visualization software used for the study is VOS Viewer(van Eck & Waltman, 2010) and Biblioshiny, a bibliometrics R package.

Results

Characteristics and Performance of TEL Research

RQ1: What are the characteristics and performance of green finance research for the past two decades?

The study inspects characteristics of 453 publications and analyses annual publication trend, annual citation performance, and geographical spread in TEL research. In the data retrieval process, the study has come across 453 publications on TEL from 2000-2022. Table 1 shows the overall characteristics of 453 TEL publications using Biblioshiny for R Studio.

Table 1. Overall Characteristics of TEL Publication

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2000:2022
Sources (Journals, Books, etc)	232
Documents	453
Annual Growth Rate %	18.39
Document Average Age	6.47
Average citations per doc	13.52
References	19151
DOCUMENT CONTENTS	
Keywords Plus (ID)	1050
Author's Keywords (DE)	1455
AUTHORS	
Authors	1158
Authors of single-authored docs	108
AUTHORS COLLABORATION	
Single-authored docs	117

Description	Results
Co-Authors per Doc	2.89
International co-authorships %	0
DOCUMENT TYPES	
Article	367
Book	3
Book Chapter	56
Editorial	2
Note	1
Review	24

(Source- Extracted from Biblioshiny R)

Figure 1 shows annual Publication trend shows year on year increase in the research of TEL.

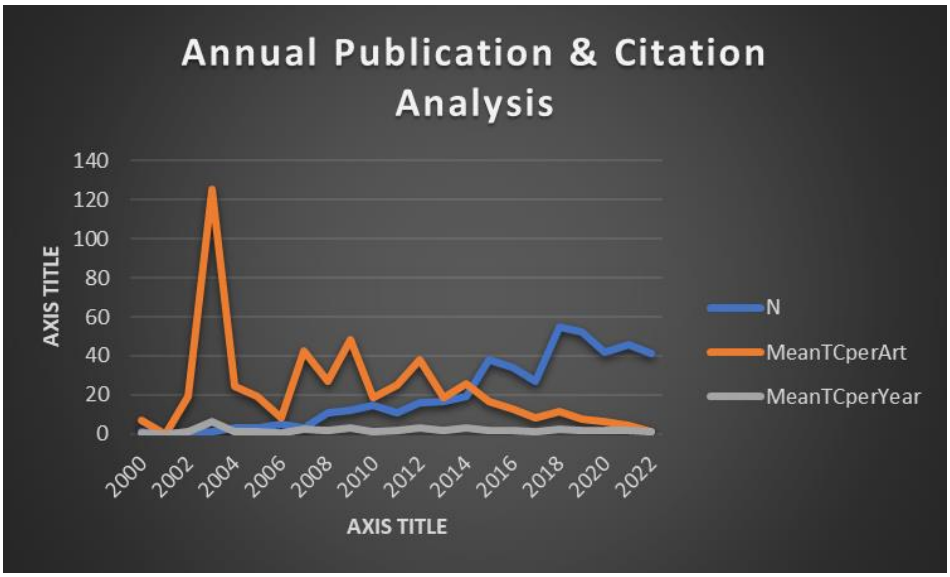

Figure 1. Annual Publication and Average Citation Analysis

Earlier the pursuit of higher education was elitist. The focus was knowledge for the sake of knowledge. But with massification of higher education with knowledge based and technology driven economy, the focus shifted to employability based education .(Gupta, 2021). The need to equip students with the skills which the market requires was realized. Early 2000 onwards the world was in era of digitalization. Technology has disrupted most of the sectors of the economy and changed our way of life. The Education Industry was no different. It also got impacted by the disruption. With the comparative advantages, relative to traditional

"chalk-and-talk" classroom instruction, TEL helped in scaling up standardized instruction, facilitating differentiated instruction, expanding opportunities for practice, and increase student engagement. When schools, colleges and universities use technology to enhance the work of educators and to improve the quality and quantity of educational content, learners will thrive. This has grabbed the attention of academicians also. That is the reason TEL based research and publication increased consistently.

Table 2. Annual Publication & Average Citation Trend

Year	N	Mean TC per Art	Mean TC per Year	Citable Years
2000	1	7.00	0.30	23
2001	0	0.00	0.00	0
2002	1	19.00	0.90	21
2003	1	125.00	6.25	20
2004	3	24.33	1.28	19
2005	3	19.33	1.07	18
2006	5	8.20	0.48	17
2007	3	42.67	2.67	16
2008	11	26.82	1.79	15
2009	12	48.08	3.43	14
2010	15	18.40	1.42	13
2011	11	25.18	2.10	12
2012	16	37.88	3.44	11
2013	17	18.76	1.88	10
2014	19	25.58	2.84	9
2015	38	16.84	2.11	8
2016	34	12.91	1.84	7
2017	27	8.11	1.35	6
2018	55	11.62	2.32	5
2019	52	7.73	1.93	4
2020	42	6.38	2.13	3
2021	46	4.20	2.10	2
2022	41	0.95	0.95	1

(Source- Extracted from Biblioshiny R)

RQ2: What characteristics of authors and their productivity in the domain of TEL research?

Table 3 shows a comprehensive assessment of the most influential authors in TEL research. The threshold limit is taken as at least one document with a minimum of 50 citations. Out of 1158 authors 81 met the threshold. The first 10 authors having the highest citation are considered for analysis Figure 2.

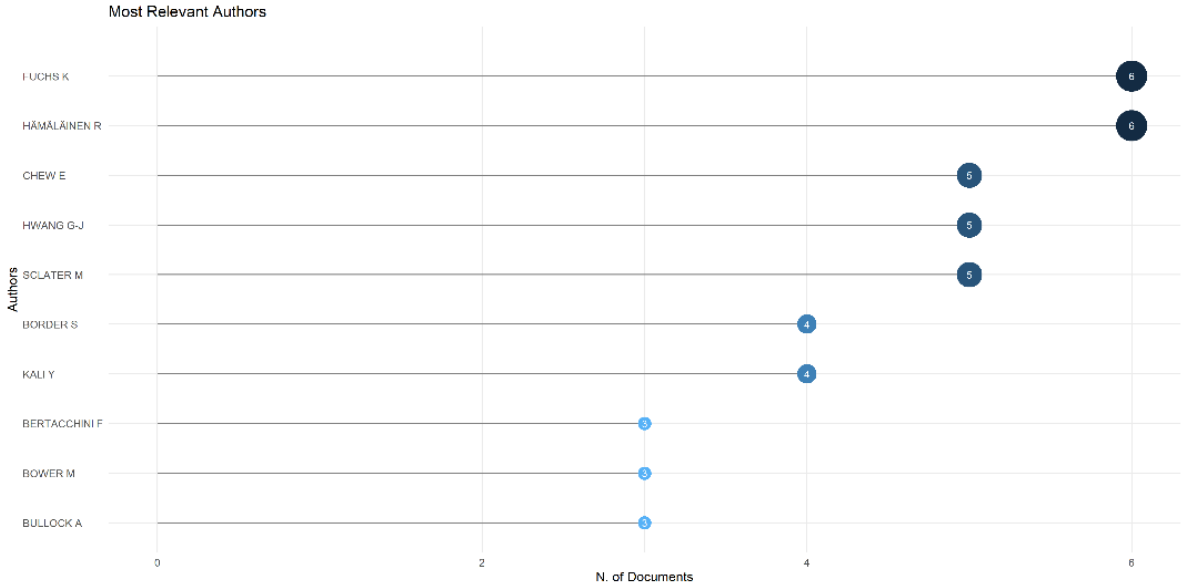

Figure 2. Influential Authors Publication Analysis

(Source-Extracted from Biblioshiny R)

Dr Dillenbourg Pierre of EPFL Switzerland's forte of research in collaborative learning. (P. Dillenbourg & Tchounikine, 2007; Pierre Dillenbourg et al., 2009), and later integrating it with learning technologies as melting into a beam of educational tools, (Pierre Dillenbourg, 2008)integrated within many other pedagogical activities that the teacher orchestrates(Pierre Dillenbourg, 2008). (Pierre Dillenbourg et al., 2009). Sanna Jarvela of University of Oulu along with Dr Dillenbourg Pierre and Frank Fischer of University of Munich, Germany researched on evolution of computer based collaborative learning (Pierre Dillenbourg et al., 2009), Dr Nati Cabrera Lanzo , University Oberta de Catalunya, Spain has focused on integrating concept of inclusive learning with e- learning(Sangrà et al., 2012), Dr Dimitrios Vlachopoulos area of interest is critical analysis of technology-enhanced learning(Bower & Vlachopoulos, 2018) pedagogy in education(Essel et al., 2021; Vlachopoulos & Makri, 2017) quality of education technology and curriculum(Vlachopoulos, 2016) online transformation of education(Essel et al., 2020).Dr Yael Kali brought together in an ecological framework

that can be used by researchers to study teacher design knowledge and work across projects. This synthesis could also provide an articulated framework for developers and facilitators of teacher professional development programs for identifying key areas for support to teacher-designers in specific settings.(Kali et al., 2015).

Table 3. Influential Authors Publication Analysis

id	Author	Documents	Citations	Affiliated Institution	Country
1	Dillenbourg Pierre	2	465	Ecole Polytechnique Fédérale de Lausanne	Switzerland
2	Jarvela s.	2	426	University of Oulu	Finland
3	Fischer f.	1	416	University of Munich	Germany
4	Cabrera n.	1	236	University Oberta de Catalunya	Spain
5	Sangrà a.	1	236	University Oberta de Catalunya	Spain
	Vlachopoulos d.	1	236	Erasmus University Rotterdam	Netherland
7	kali y.	4	180	University of Haifa	Israel
8	Mckenney s.	2	166	Open University of Netherland	Netherland
9	barsom e.	1	155	Academic Medical Centre	Netherland
10	christoph n.	1	155	Academic Medical Centre	Netherland

(Source: Author's Compilation)

RQ3: Which studies are instrumental in shaping the knowledge base of TEL and quality education since 2000?

The study conducts citation analysis of influential articles using Vos viewer. We have considered those influential articles which have got at least 50 citations. Out of 453 documents 27 met the threshold. (Figure 3). Based on citation and cross-referencing Table 4 shows the top 10 most influential documents. The research focus of top cited documents are mainly on evolution and development of TLE(Pierre Dillenbourg et al., 2009; Sangrà et al., 2012).The field in which TEL is researched more is medical education(Hardyman et al.,

2013; Moule et al., 2010). Recent researchers investigated the effect of different instructional designs using computer supported collaborative concept mapping on students' conceptual understanding, focusing on the type of processes of knowledge co-construction that students engage (Farrokhnia et al., 2019) and role of informal digital learning in developing digital competency (Mehrvarz et al., 2021).

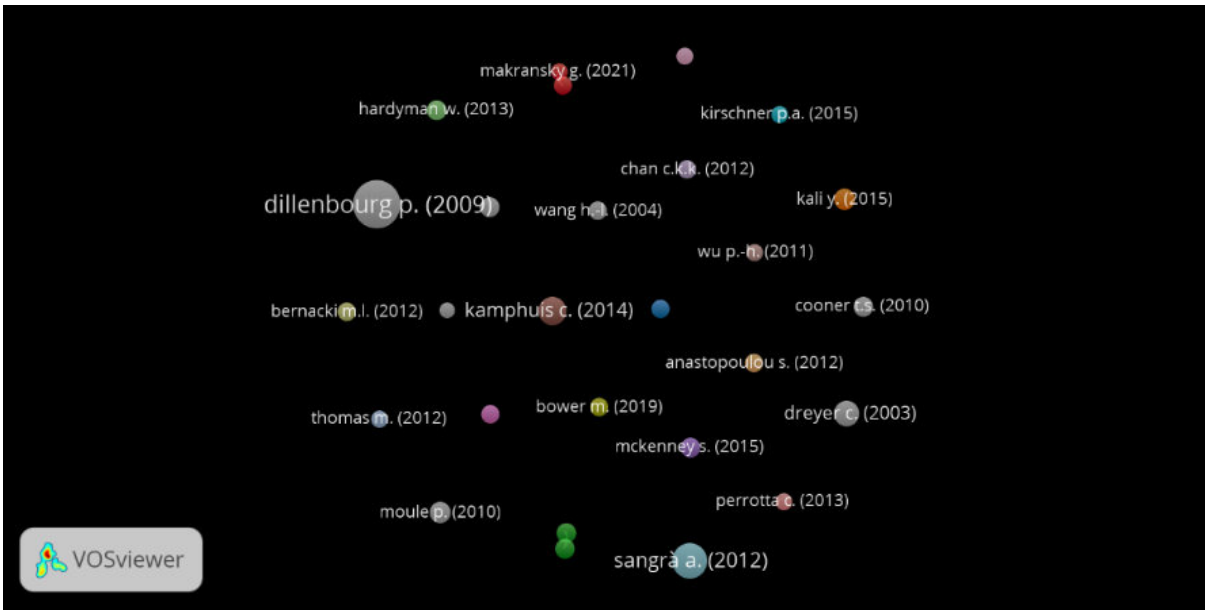

Figure 3. Citation analysis -Document Wise

(Source-Extracted from Vos-viewer)

Table 4. Influential Document Analysis

No.	Title	Authors	Name of the Journal	Citation	Year
1	The Evolution of Research on Computer-Supported Collaborative Learning	Pierre Dillenbourg, Sanha Jarvela and Frank Fischer	Technology Enhanced Learning, Principle & Products	416	2009
2	Building an inclusive definition of e-learning: An approach to the conceptual	Albert Sangrà, Dimitrios Vlachopoulos and Nati Cabrera	International Review of Research in Open and Distance	236	2012

No.	Title	Authors	Name of the Journal	Citation	Year
	framework		Learning		
3	Augmented reality in medical education?	Caroline Kamphuis, Esther Barsome,Marlies Schijven, Noor Christoph	Perspective in Medical Education	155	2014
4	Teaching reading strategies and reading comprehension within a technology-enhanced learning environment	Carisma Dreyer, Charl Nel	System	125	2003
5	Teachers as designers of technology enhanced learning	Yael Kali, Susan Mckenney,Ornit Sagy	Instructional Science	87	2015
6	Nursing and healthcare students' experiences and use of e-learning in higher education	Pam Moule, Rod Ward, Lesley Lockyer.	Journal of Advanced nursing	83	2010
7	Teacher design knowledge for technology enhanced learning: an ecological framework for investigating assets and needs	Susan McKenney, Yael Kali, Lina Markauskaite & Joke Voogt	Instructional science	79	2015
8	Mobile technology supporting trainee doctors' workplace learning and patient	Wendy Hardyman, Alison Bullock, Alice Brown, Sophie	BMC Medical Education	77	2013

No.	Title	Authors	Name of the Journal	Citation	Year
	care: an evaluation	Carter-Ingram & Mark Stacey			
9	Academic workload: the silent barrier to the implementation of technology-enhanced learning strategies in higher education	Mary Sarah-Jane Gregory, Jason Michel Lodge	Distance education	75	2015
10	Modelling benefits-oriented costs for technology enhanced learning	Diana Lorillard	Higher education.	74	2007
11	Computer-supported collaborative concept mapping: The effects of different instructional designs on conceptual understanding and knowledge co-construction	Farrokhnia, Mohammadreza Pijeira-Díaz, Héctor J. Noroozi, Omid Hatami, Javad	Computers & Education	82	2019
12	The mediating role of digital informal learning in the relationship between students' digital competency and their academic performance	Mehrvarz, Mahboobe Heidari, Elham Farrokhnia, Mohammadreza Noroozi, Omid	Computer & education	73	2021

(Source- Author's Compilation Based on Data)

RQ4: What is the association between TEL curriculum - pedagogy and quality education?

Keywords are significant indicators of the growing research trends among academicians and authors across the globe. Keyword analysis can be performed using the index, author, and author-index keywords. We have considered the author keyword as a threshold for the present study. The author's keyword is essential for identifying research trends, gaps, and exciting research areas. Out of 1455 author's keyword 48 meet the threshold of minimum 5 times occurrence. Figure 4 shows the result of Keyword co-occurrence analysis. Table 5 presents first 25 keywords based on occurrences/ The essential key words identified along with technology enhanced learning (Occurrence:269) are higher education(O:24m TLS: 40),e-learning (O: 24, TLS: 37), online learning(O:19,TLS :34), blended learning(O: 19,TLS 31) , collaborative learning (O:10 , TLS: 21), active learning (O: 14, TLS : 18) and inquiry based learning(O:8. TLS: 13) Most of the researches related to TEL are related to educational approach, a very few keywords related to curriculum and pedagogy identified in past research..

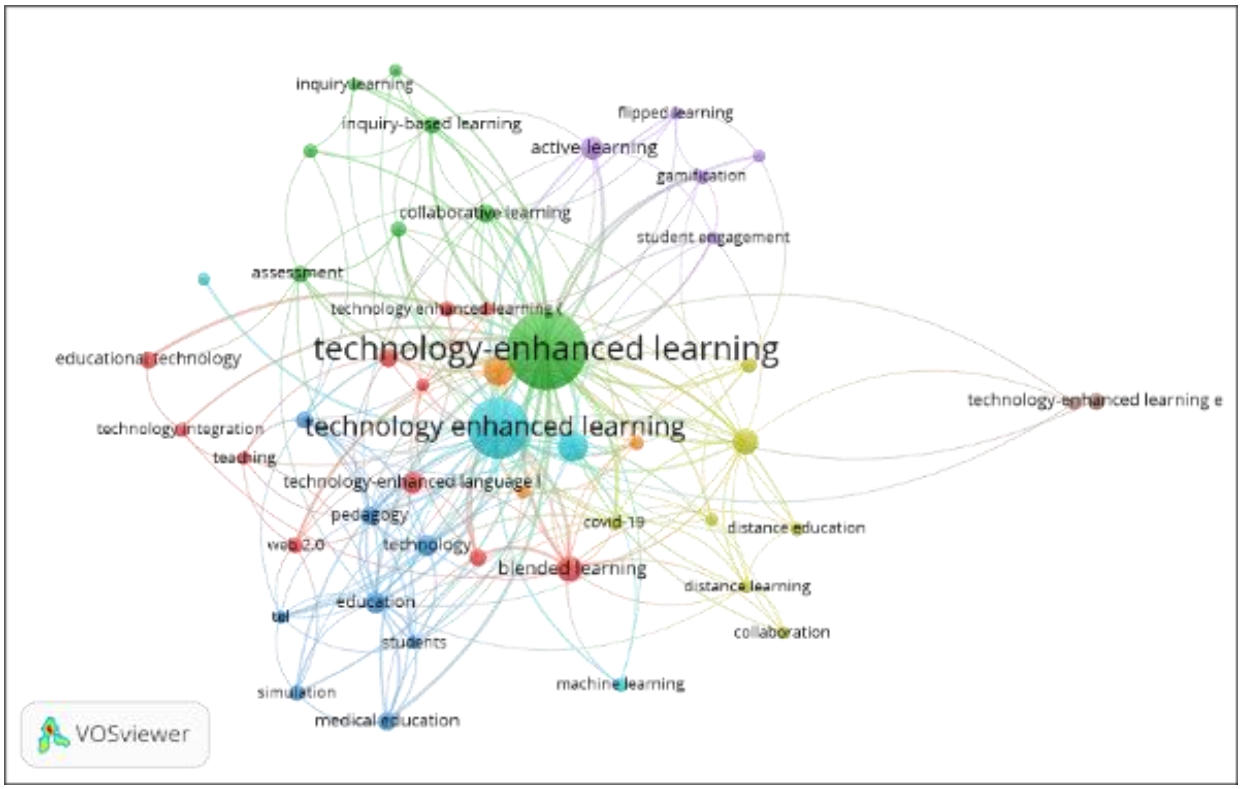

Figure 4. Co-occurrence analysis (Author's Key Word)

(Source- Extracted from Vosviewer)

Table 5. Keyword Co-occurrence Analysis

Id	Key word	Occurrence	Total Link strength
1	Technology-Enhanced Learning	172	156
2	Technology Enhanced Learning	103	89
3	E-Learning	24	37
4	Higher Education	24	40
5	Blended Learning	19	31
6	Online Learning	19	34
7	Active Learning	14	18
8	Education	13	34
9	Technology	13	19
10	Technology-Enhanced Language Learning	13	6
11	Collaborative Learning	10	21
12	Medical Education	10	21
13	Pedagogy	10	31
14	Technology-Enhanced Learning (Tel)	10	9
15	Assessment	9	15
16	Flipped Classroom	9	14
17	Learning	9	18
18	Technology-Enhanced Learning Environments	9	3
19	Educational Technology	8	8
20	Inquiry-Based Learning	8	13
21	Mobile Learning	7	12
22	Professional Development	7	12

Id	Key word	Occurrence	Total Link strength
23	Simulation	7	12
24	Technology Enhanced Learning (Tel)	7	8
25	Web 2.0	7	10

(Source: Extracted from Vos viewer)

Thematic Analysis

Bibliographic Coupling

The idea of bibliometric coupling was coined by Kessler (Kessler, 1963). Kessler explained in bibliometric analysis that scientific publication shows intellectual association with referencing pattern, wherein scientific publication that cites similar sources show an intellectual association. In that sense, the bibliographic coupling can be predicated as articles with the exact referencing will have similar content. The bibliometric Coupling map of the document is shown in Figure 5. Out of 453 publications, 52 meet the threshold of 30 citations. For each 52 items, TLS is calculated, and based on the strength, 42 items are selected. These 42 items are divided into 8 clusters. The top 3 Clusters have 6(red),6(green) and 6(blue) items. The research area of the top 3 cluster are discussed below.

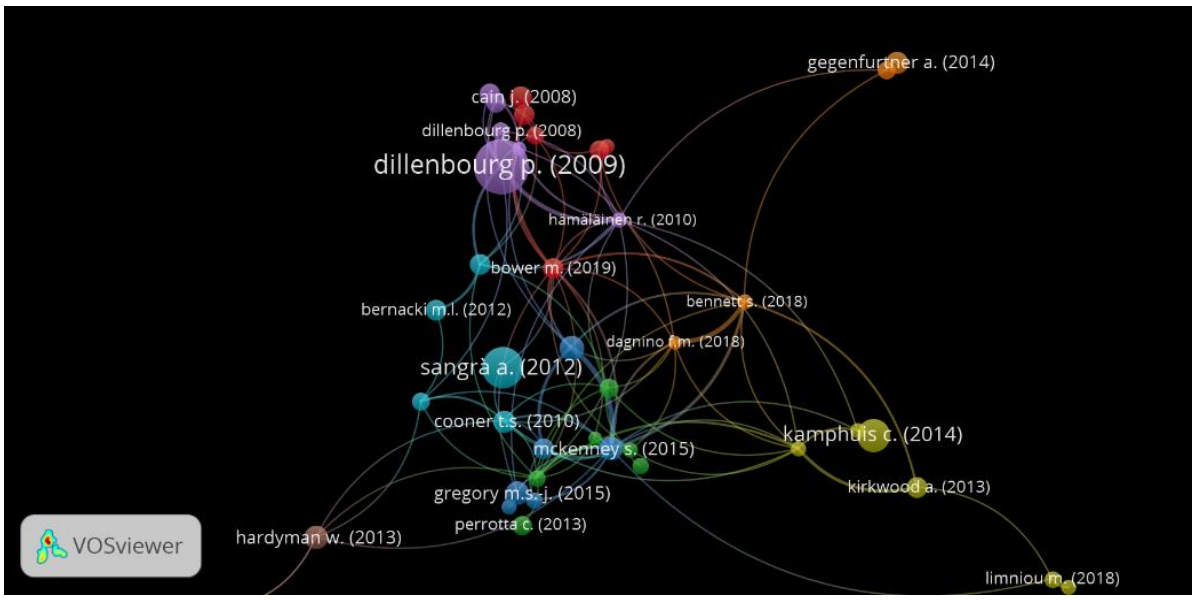

Figure 5. Bibliographic Coupling

(Source-*Extracted from Vosviewer)*

Cluster 1(TEL Perspective in Learning)

Cluster one consists of 6 items and has been cited 325 times. The articles in this cluster discuss synthesizing and understanding of learning in context of TEL. The researches highlights that TEL is a significant associative tool for mediating learning(Bower, 2019). Reflection or deep learning requires specific support. TEL is recognized as effective facilitator the supports student as well as group learning. (Kori et al., 2014; Kyprianidou et al., 2012) The researches describes affective and cognitive factors that can lead to TEL-Immersive Virtual Reality based learning includes interest, motivation, self-efficacy, embodiment, cognitive load, and self-regulation.(Makransky & Petersen, 2021).

Cluster 2 (Teacher's Perspective for TEL)

Cluster 2 consists of 6 items and has been cited 249 times. The cluster discusses about experience of teacher ability to integrate technology in pedagogy.(Doering et al., 2014; Perrotta, 2013) .The authors used a mixed-methods design employing surveys and observations to evaluate teacher experiences within a professional development program focused on developing in-service geography teachers' technological, pedagogical, and content knowledge (TPACK) through content-specific learning tools and resources. (Fabregat-Aibar et al., 2019; FitzGerald et al., 2018) Extending the discussion personalization is considered as positive phenomenon and authors have proposed frame for personalized TEL. Digital stories are researched as enabler for knowledge cocreation and helped teachers critiquing the usability, usefulness, efficacy and flexibility of the technologies(Parsons et al., 2015).The efficiency of workplace based feedback and assessment in professional education can be enhanced by E-Portfolio by learning analytics (van der Schaaf et al., 2017).

Cluster3 (TEL Implementing Perspective)

Cluster 3 consists of 6 items and has been cited 373 times. This research cluster emphasis on TEL implementing perspective. The practices like pedagogy first approach to encourage use of, and experimentation with, technology within teaching practice and to promote the mainstreaming of innovative practice(Glover et al., 2016). At the same time for many decades teachers are identifies as sculptors for curriculum designing , so in the era of digitalization , teachers can play a significant role in utilizing knowledgebase to design

TEL(McKenney et al., 2015).The implementation of TEL is seen as a tool for intellectual expression and linked with educational aim, relation between innovation and practices user engagement and flexible workload.(Gregory & Lodge, 2015; Laurillard et al., 2009).

Trending Topic

The study identifies trending topics of the last five years using Biblioshiny. Figure 6 shows the plot of trending topic. In the last 5 years the research related to TEL is concentrated around curriculum, machine learning and virtual reality. With predictions that virtual reality (VR) and related technologies could reach 15 million learners by 2025 (Goldman Sachs 2018), the number of research studies related to VR is rapidly rising. A literature search shows that the number of studies on Scopus that suggest VR in combination with either teaching-learning, imparting education, or training is rapidly rising(Makransky & Petersen, 2021) Not only conventional and regular education but education related to fine arts like music violin and sports also uses TEL-machine learning to enhance efficacy.(Dalmazzo & Ramírez, 2019).

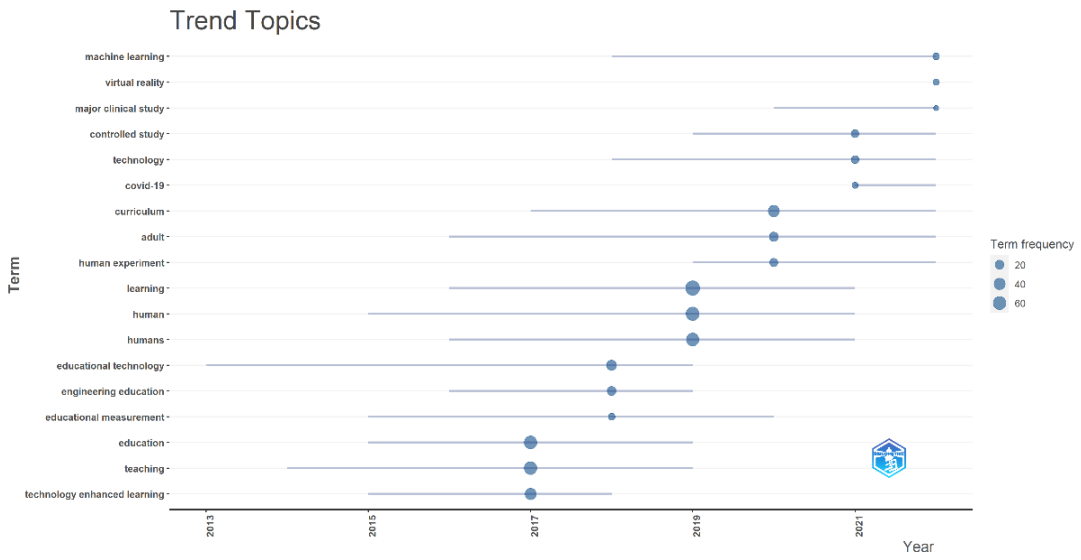

Figure 6. Trending Topic

(Source: Extracted from Biblioshiny R)

Thematic Map (Based on Authors Keywords)

To identify the themes and different themes discussed among the identified research papers,

the study draws a thematic map using the R studio Biblioshiny package with a frequency of 10 per thousand words and number of words 150. The technique helps to map main themes into four quadrants, according to their centrality and density rank, along with the X and Y axis. Centrality is a measure of an essential theme in research, whereas density measures the development of a theme based on the internal strength of the network. The four quadrants are Basic (High-centrality and Low Density), Motor (High-centrality and High Density), Niche (Low-centrality and Low Density), and emerging & declining theme (Low-centrality and High Density) (Ghasemzadeh et al., 2022). The motor themes are well-developed and contain the critical structure of the research. Niche themes are specialized and well-developed research themes of the research area. The third quadrant is emerging or declining themes, and the fourth quadrant, i.e., basic themes, covers important themes that require development. The thematic map of TEL shows in Figure 7 that the burning themes (motor theme) for researchers are virtual reality, augmented reality web 2, game-based learning, pedagogy and reflection education. Whereas other tools of TEL like blended learning, collaborative learning active learning technological assessment and higher education are themes of relevance but there lot of scope research in these area (Basic theme).Technology based language learning ,distance learning, students feedback are niche area of research while self-regulated study and work place learning are emerging or dying area of study.

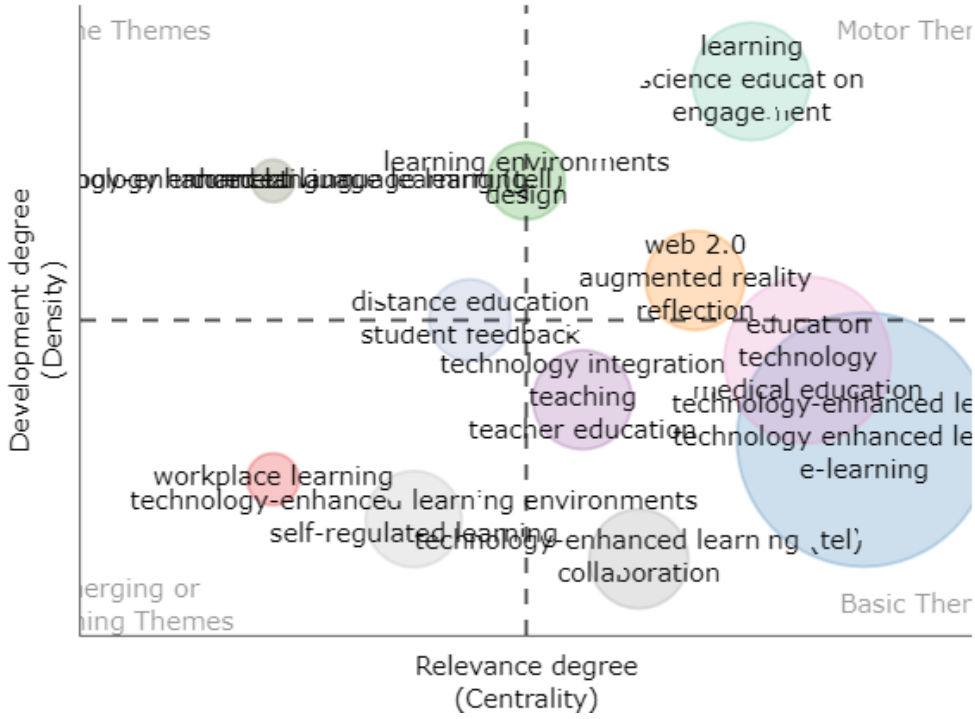

Figure 7. Thematic Analysis

(Extracted from Biblioshiny R)

Conceptualizing and Discussion on TEL Pedagogy for Quality Education

Practices like pedagogy first approach to experiment with, technology within teaching practice and to promote the mainstreaming of innovative practice is the requirement of TEL. At the same time for many decades teachers have been identified as sculptors for curriculum designing, so in the era of digitalization, teachers can play a significant role in utilizing knowledgebase to design TEL. The implementation of TEL is seen as a tool for intellectual expression and linked with educational aim, relation between innovation and practices, user engagement and flexible workload. A reflection or deep learning requires specific support. TEL is recognized as an effective facilitator the supports students as well as group learning. The research describes affective and cognitive factors that can lead to TEL-Immersive Virtual Reality based learning includes interest, motivation, self-efficacy, embodiment, cognitive load, and self-regulation.

The attainment of Sustainable Development Goal 4, which aims to guarantee inclusive and equitable quality education while promoting lifelong learning opportunities for all, holds a pivotal position in constructing sustainable, inclusive, and resilient societies.(UNESCO, 2019). This goal supports the reduction of disparities and inequities in education, both in terms of access and quality. The researchers opined success of technology depends on dimensions of TEL. TEL can improve dimensions of knowledge by different knowledge perspectives. The role of technology in education can be approached through the lens of educational sustainability, considering its contribution to fostering a sustainable environment. Additionally, it can be evaluated based on how technology usage aids in accomplishing various sustainable development objectives, such as promoting equal educational opportunities across all segments of society.(Daniela et al., 2018; Visvizi & Daniela, 2019). Similarly, the presence of technology in education can serve as a catalyst for fostering inclusive education and an inclusive society. It achieves this by aiding students with particular learning requirements and by creating opportunities for students to gain knowledge that would otherwise be unattainable without technological aid.(Rodriguez-Ascaso et al., 2011).Further technological process can help in acquiring and creating knowledge along with enhancing learning process(Ifenthaler & Yau, 2020; Zhu et al., 2016).

So the TEL has all substance to achieve access and quality education of SDG 4. TEL can help education in reaching nuke and corner of world through various platforms and ICT tools. The

other aspect of quality can be attained through orchestrating TEL pedagogical activities. The process can be termed as “Smart Pedagogy”. The term "smart" pertains to the utilization of digital technologies within the learning process(Visvizi & Daniela, 2019).. This concept of smart pedagogy takes the forefront in Technology-Enhanced Learning (TEL), aiming to examine the necessary pedagogical activities that contribute not only to a technology-rich learning experience but also to improved learning outcomes and enhanced access to knowledge. Consequently, smart pedagogical competence acts as a driving force to ensure that technology integration in classroom activities holds pedagogical significance, thereby facilitating technology-enhanced learning.

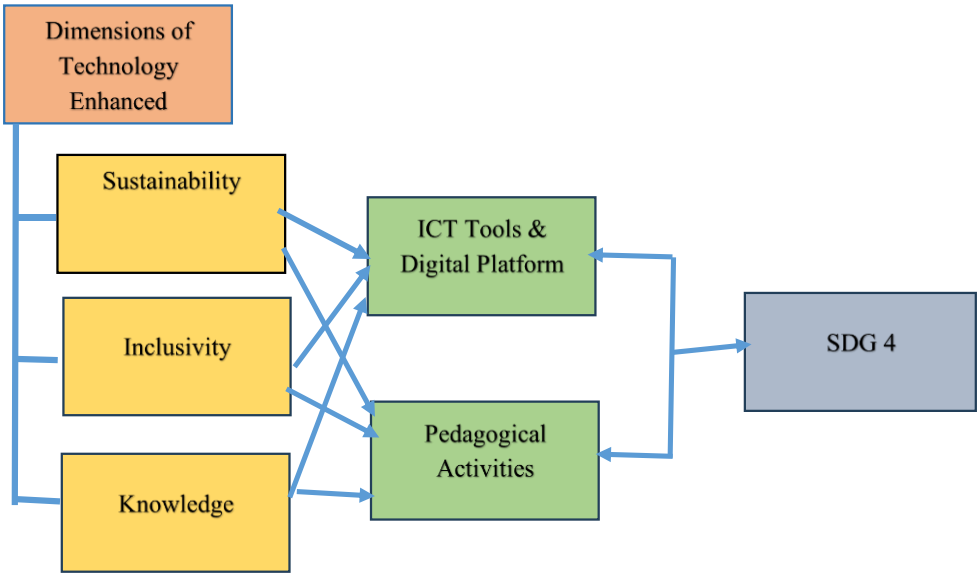

Figure 8. Technology Enhanced Learning and SDG4

(Source: Adapted from existing studies)

TEL pedagogy addresses the current issues associated with the education system. UN defined 17 SDG 4 as quality education and world become self-reliant in technology, it becomes imperative to develop such TEL curriculum and pedagogy which can help countries attain SDG 4. The curriculum and pedagogy require to enable, educate and empower every learner knowledge as well as knowledge associated by technology. The learning model requires :1) capacity building 2)development of instructional objective to provide purpose ,motivation and direction to learners, 3)Instructional objectives should be at par with real world and it should fill the gulf between real world and education offered.(Sherly & Uddin, 2010). The past researches advocates collaborative learning as a method for quality

education(Kali et al., 2015; Kyprianidou et al., 2012; Vlachopoulos & Makri, 2017).There are various model suggested by past researcher which can integrate technology with curriculum and pedagogy. One of such models is problem-based learning in two approaches. One of the approach suggests learning /implementing PBL to concurrent to technology skill ,however the other approach advocates learning PBL before technical skills.(Walker et al., 2010). The other model emphasises the development of technological pedagogical and content knowledge (TPACK) via content-specific learning tools and resources. According to the findings, instructional scaffolding plays an important role in improving teachers' ability to integrate technology in pedagogically meaningful ways that improve students' inquiry skills..(Doering et al., 2014).Based on course a model suggests collaborative learning approach using technology.(Domalewska, 2014; Noroozi et al., 2012). Gamification is argued to be fun and enjoyable method to support quality education(Dehghanzadeh et al., 2021).Thus, various pedagogical approach as required by the course is well accepted with integrated technology. Nevertheless, whichever the model teacher play pivot role in orchestrating technology in curriculum, content and pedagogy.(Pierre Dillenbourg et al., 2009).

Conclusive Remarks

Summarized findings of the studies are discussed as follows:

- These 453 studies were drafted by 1158 authors.
- Documents selected for the study have received on average fourteen citations.
- Twenty-three percent of the documents are contributed by the single author and seventy seven percent of the documents is the result of collaboration between the authors.
- Overall assessment shows that on an average twenty percent of the new research studies have been published enriching the relationship between technology enhanced learning and quality education across the globe.
- Technology enhanced learning, e-learning, higher education, blended learning, and online learning are the most influential keywords in our assessment.
- Contribution from developing countries and developed countries is significant, still the maximum research productivity is from developed countries.
- International collaboration between the authors and associations is found to be negligible, most of the collaboration between the authors and institutions is domestic

or local level.

- Analysis of bibliographical coupling shows that TEL perspective in learning and researchers' perspective in learning are mostly discussed topics by the academic fraternity.
- Most influential studies are contributed by influential authors like Pierre Dillenbourg, Sanha Jarvela, Frank Fischer, Albert Sangrà, Dimitrios Vlachopoulos, Nati Cabrera.
- Most influential institutions that have contributed to the domain are Ecole Polytechnique Fédérale de Lausanne, University of Oulu, University of Munich, and Academic Medical Centre.
- In terms of the nature of studies most of the studies are conceptual and empirical in nature. There are very few studies that have done systematic review of the domain.
- Co-authorship analysis shows that authors have formed collaboration within and between the institutions of their own country.
- Twenty-two percent of the research output is from the USA alone.
- SDG Four and TEL has attracted research contributions from across the globe. In total, 48 countries contributed to the knowledge domain through their scientific contribution.
- Most of the authors, institutions, and countries have contributed once or twice to the knowledge domain.
- Academicians have contributed most of the research output on the interlinkage between TEL and quality education in comparison with practitioners.
- Practitioners have also contributed to the research domain, but their contribution is limited in number.
- The importance of TEL and technology management is appreciated in different educational levels consisting junior level to the higher level of studies.
- Most of the authors, institutions, and countries have contributed once or twice to the knowledge domain.
- Academicians have dominated IJPM research in comparison with practitioners.
- Practitioners have also contributed to the research domain, but their contribution is limited in number.

Limitations of Study

Our study has recognized a few limitations. They are discussed as follows:

- Since our focus was to incorporate the interlinkage between TEL and quality education for the past 22 years of research studies, we have not offered detailed propositions linking the elements, which would be a logical next step.
- Scopus assigns one-unit value to each author, study, institution, country, and publication. This implies that one study has an author; it will have the same value as if it had two or more authors.
- Database like Web of Science, EBSCO, PROQUEST are not considered while filtering out the necessary articles.
- The study has not discussed the conceptual model and proposed relationship between the identified factors.

Future Implications

- In future we wish to develop the conceptual model and define the relationship between identified factors through empirical relationship.
- The relationship between TEL and its applicability in the higher educational institutes can be further explored.
- The role of digital teachers in a global economy can be explored as there is a growing attention across the globe about digital economy.

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Author Information

Dippi Verma
https://orcid.org/0000-0001-7521-9267
Christ (Deemed to be University)
Bangalore
India
Contact e-mail: *dippiverma@gmail.com*

Santosh Satyanarayan Baheti
https://orcid.org/0009-0000-8371-6351
Christ (Deemed to be University)
Bangalore
India

Rameesha Kalra
https://orcid.org/0000-0001-6274-6324
Christ (Deemed to be University)
Bangalore
India

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Chapter 6 - Effects of Blended Learning Approach on English Performance of Students at Primary Level

Muhammad Hafeez, Samikshya Bidari, Zahid Zulfiqar

Chapter Highlights

- The objective of this quasi-experimental study was to determine the effects of blended learning on the English performance of grade 3 primary students.
- The students were evaluated in three areas of linguistic proficiency in English: comprehension, verb usage, and punctuation.
- The respondents were divided into two groups: Experimental 30 students and control 19 students from grade three.
- A pre-test was administered at the start of the study and a post-test after 6 weeks of teaching using blended and traditional methods, respectively.
- Three hypotheses and three research questions were formulated to find the effects of blended learning approach on students' performance in English at the primary educational level.
- The results were analyzed using SPSS-25 and the findings showed significant improvement in the students' English skills through blended learning approach.
- The study recommends that advanced technological tools must be used to improve the academic performance of the learners.

Introduction

The recent advancements in learning tools have revolutionized the teaching and learning landscape, providing students and educators with access to a plethora of learning tools such as mobile phones, personal computers, tablets(Hafeez, 2021a) and internet-based tools that make the learning process interactive, engaging, and creative (Albiladi and Alshareef, 2019; Iqbal et al., 2021; Hafeez et al., 2021). One such approach is blended learning, which combines traditional in-person instruction with online or mobile-based learning. This method is gaining popularity in various domains of education, such as language learning, educational technology, and distance education (Hashemi and Si Na, 2020; Hafeez, 2021b).

Numerous studies have confirmed that students appreciate and value the blended learning approach for its effectiveness in facilitating learning (Hockly, 2018; Simbolon, 2021, Saira et al., 2021). Blended learning shifts from a teacher-centered, lecture-style approach towards a more student-centered approach that empowers students to actively participate in creating their learning environment (Rerung, 2018; Sriwichai, 2020; Ajmal et al., 2022). This method is flexible and can be customized to meet the learner's individual needs, cognitive abilities, and educational level (Hafeez et al., 2023).

Traditionally, drill and imitation techniques taught English in a teacher-centered classroom (Saira et al., 2021). However, with the advent of technology, the approach to English language teaching (ELT) has transformed a more communicative, student-centered, and participatory process. The development of the internet and technology has provided students with access to a wealth of resources, enabling them to explore the language in greater depth than previously possible (Mulyadi et al., 2020; Hafeez et al., 2022). Blended learning offers a structured approach to teaching English as a foreign language that combines in-person instruction with online or mobile-based learning, giving students and teachers access to a wide range of resources and materials (Sari and Wahyudin, 2019; Hafeez, 2021c).

Background of the Study

Technology in EFL Pedagogy

Blended learning is a new approach to teaching English as a foreign language that combines in-person instruction with online learning to give both students and teachers access to a wide

range of materials and resources that are methodically structured. Technology has dramatically impacted the field of English as a foreign language (EFL) pedagogy (Bidari, 2021; Stroud, 2020). The traditional approach to teaching English, which was focused on drills, imitation, and face-to-face interaction in a teacher-centered classroom, has given way to a more communicative and student-centered approach. The advent of the internet and technology has provided students with access to more resources and has enabled teachers to incorporate online learning into their instruction, leading to the development of blended learning as a pedagogical approach (Hafeez & Akhter, 2021, Basit et al., 2021).

The effectiveness of blended learning has been established in various disciplines including English language and teaching (Isti'anah, 2017; Akbarov et al., 2018; Rahim, 2019). As Blended learning provides an opportunity to blend traditional face-to-face instruction with technology seamlessly, it has rapidly gained popularity as a pedagogical approach in educational environments of all levels, including primary education. The definition of blended learning varies from combining face-to-face and online learning, utilizing technologies, to incorporating different methodologies.

However, according to Oliver & Trigwell (2005), blended learning is best understood as a combination of face-to-face instruction and mobile-based learning. Osguthorpe and Graham (2003) further define blended learning as the integration of face-to-face (f2f) instruction with distance delivery systems, where the combination can take on three forms: a blend of activities, a blend of students in both f2f and mobile-based learning environments, or a combination of both. As blended learning continues to evolve, it remains a highly regarded and sought-after approach in English as a foreign language (EFL) pedagogy (Hafeez et al., 2022).

Problem Statement

The under-researched practical implementation of blended learning in the primary school education sector for early-grade English language and teaching is a pressing issue that requires immediate attention. The current study is crucial in addressing this issue by exploring the effects of blended learning on the English performance of grade three students, filling the gap in the existing research on blended learning in primary education.

Objectives of the Study

The objective of the current research is to evaluate the impact of blended learning on English comprehension, correct use of verbs, and punctuation accuracy among grade three students at the primary education level. According to Piaget's theory, this population was selected as they belong to the pre-operational and concrete operational stages of cognitive development, making them the ideal age group (5 to 10 years) to assess the effectiveness of blended learning in enhancing their English skills. The aim is to address the limitations of traditional learning approaches in meeting the needs of modern learners and society in the 21st century (Ahmad et al., 2016).

Significance of the Study

The study has the following significance:

- To offer English language educators with a recent approach to teach English and use them in the design and improvement of English curriculum.
- To discuss the similar difficulties in educational research that relates to teaching English language.
- To advance teaching approaches for English teachers that use new blended learning approaches to replace older learning approaches that are still used in the classroom.
- To enhance the comprehension skills of grade three students in the pre-operational and concrete stages of cognitive development in English language through the integration of technology-based tools with traditional learning methods.
- To encourage English teachers to adopt blended learning methods to improve the quality of education.

Hypotheses

Ho1: There is no significant difference in mean scores of English comprehension in posttest between control and experimental groups of grade three students.

Ho2: There is no significant difference in mean scores in correct use of Verbs in posttest between control and experimental groups of grade three students.

Ho3: There is no significant difference in mean scores in correct use of punctuation in posttest between control and experimental groups of grade three students.

Review of the Relevant Literature

Blended Learning in the ESL/EFL Context

Research on blended learning approach in English teaching and learning has increased as researchers have looked for ways to use this educational model in teaching English as a second/foreign language (ESL/EFL). Blended learning approach has been the focus of many research studies (Ghazizadeh & Fatemipour, 2017; Zhang & Zhu, 2018; Ramzan & Hafeez, 2021) that investigated the use and the effectiveness of blended learning approach in the ESL/EFL context (Ahmad et al., 2022). Several academic and social benefits of using this learning approach have been identified. For instance, Marsh (2012) mentioned that the use of blended learning could provide many benefits to language learners over traditional learning approaches. Some of these benefits include developing language learners' autonomy, providing more individualized language support, promoting collaborative learning, increasing students' interaction and engagement, providing opportunities to practice the language beyond the class settings, and improving the language skills of language learners. Sharma and Barrett, (2007) mentioned that several factors influence the uptake of a blended learning approach in language courses. These factors are teachers' positive or negative attitudes toward technology use, learners' proficiency levels, teachers' training, teachers' and students' accessibility to technology, and cost. Each one of these factors plays a vital role in decisions regarding implementing a blended learning approach in language classrooms.

Blended Learning Approach and Language Learning

Many studies (Adas & Bakir, 2013; Ghazizadeh & Fatemipour, 2017) have indicated that blended learning approach can be used effectively to develop the language skills of language learners. For instance, learners' speaking, listening, reading, and writing abilities can be developed when using blended learning approach instead of traditional face-to-face learning approach. Grgurovic (2011) investigated the use of blended learning approach in an ESL context. Using Neumeier, (2005) framework of blended learning, the study aimed to determine how blended learning is used in ESL classes and how both face-to-face and distance learning are integrated. The study was conducted in a speaking and listening class in an intensive English program in the USA. The participants were 19 ESL students and one English instructor. The research method included observing the language classes, surveying the students, and interviewing the instructor to explore the effectiveness of blended learning

approach. The findings indicated that blended learning approach could be successfully and effectively used to teach all language skills. Both teachers and students shared positive perceptions and attitude toward integrating blended learning approach in English teaching. They believed that the use of online teaching added to the traditional ways and improved the students' language learning process. The researcher concluded by stating that blended learning approach can be used effectively to teach English in foreign/second language programs.

Adas and Bakir (2013) examined the use of a blended learning approach in developing the writing competency of EFL learners. Specifically, the study aimed to determine whether blended learning can be an effective approach that helps in increasing students' overall performance in writing. Sixty EFL learners in a Palestinian university participated in the study. The students were divided into two groups: one was taught English writing using the traditional face-to-face approach, while the other group was taught using a blended learning approach. At the end of the teaching period, the researchers found that the group that was taught using a blended learning approach performed better in writing than the other group. In other words, the use of blended learning approach helped in developing the writing competencies of the participating EFL learners. The researcher concluded by stating that using blended learning developed many aspects of the participants' writing such as grammar, spelling, punctuation, and paragraph coherence.

As a way of illustration, in a quasi-experimental study, Ghazizadeh and Fatemipour, (2017) examined the effects of blended learning approach in developing the reading skills of English language learners. Specifically, the study aimed to investigate whether blended learning approach can be used to develop the reading proficiency of sixty intermediate-level Iranian EFL learners. The participants were randomly assigned to two groups: an experimental group, which received classroom instructions and blended learning focused on the reading skills, and a control group, which received a more traditional learning approach to English teaching. The two groups were tested before and after the treatment to determine the learners' reading proficiency level. After comparing the two groups using a t-test, the researchers found that the use of blended learning approach resulted in a statistically significant positive effect on the reading proficiency of the EFL learners. In other words, Ghazizadeh and Fatemipour, (2017) asserted that using blended learning approach with language learners has a direct impact on enhancing the reading skills of language learners. Based on the study

results, the researchers also stated that blended learning facilitates the learning process and can be successfully adopted in English reading classes. However, some studies indicated that the use of blended learning does not always have a direct impact on language skills.

Tosun, (2015) investigated the effect of using a blended learning approach in teaching English vocabulary. The study also explored English language learners' perceptions about blended learning approach in learning English vocabulary. The study included 40 students studying at two classes in an intensive English program in Turkey. The participants were divided into two groups: an experimental group that studied the target vocabulary through a blended learning approach, and a control group that was taught the same vocabulary using the traditional learning approach. At the end of the instruction period, both groups were tested to determine their vocabulary knowledge. The findings indicated that even though the students were satisfied with blended learning approach as a teaching strategy, the use of a blended learning approach did not have any positive effect on students' vocabulary knowledge. Tosun, (2015) mentioned that their findings did not resonate with many previous research studies that linked the use of blended learning approach to the development of language skills. Tosun, (2015) added that the one possible explanation of these results is the short duration of the study.

As a conclusion, research shows that blended learning approach can be used effectively to develop the language competencies of English language learners. The reviewed studies indicated that language teachers could utilize blended learning approach as a teaching model to develop various skills such as reading, writing, speaking, and vocabulary knowledge. The concept of blended learning approach is shown in Figure 1.

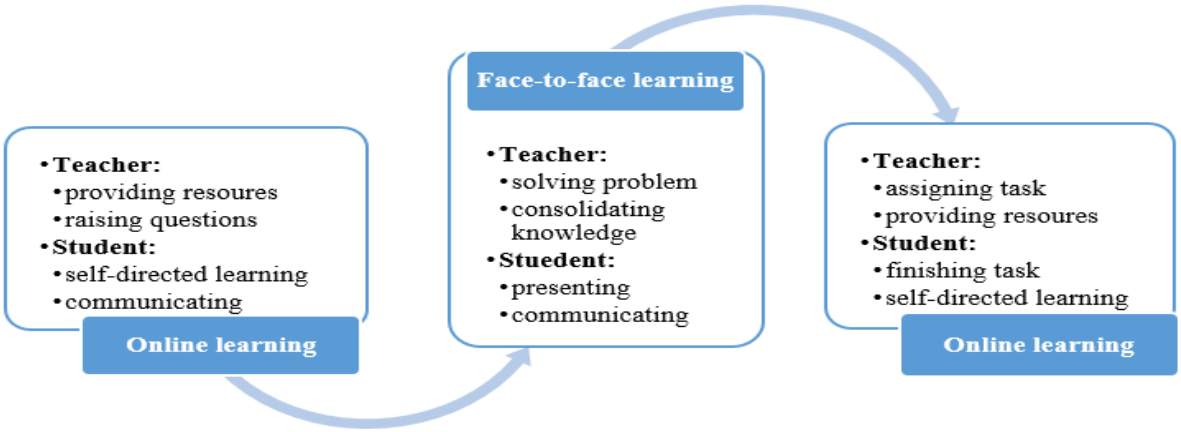

Figure 1. Concept of Blended Learning Approach

Students' Motivation and Engagement

Perhaps one of the most important benefits of blended learning approach in the ESL/EF context is related to students' motivation, satisfaction, and engagement. Language learners usually showed their satisfaction when both approaches (traditional face-to-face and online or mobile based) were combined. The strength of blended learning approach rests in using both teaching approaches effectively, and that motivates students to interact and engage in the language learning process. Yoon and Lee (2010) investigated students' perspectives and the effectiveness of blended learning approach as a teaching strategy in an ESL writing class. For more than 16 weeks, 47 university language learners in two writing classes participated in the study. Four sources of data were used: questionnaires, pretest, post-test, and midterm examination. The results indicated that students showed positive attitude and perceptions toward the use of a blended learning approach in L2 writing classes. The students believed that this learning approach is useful, motivating, and interacting. Moreover, the use of blended learning approach resulted in a better performance in students' writing abilities. The researcher stated that the use of blended learning approach increased students' motivation and promoted many significant aspects in language learning such as interaction, autonomy, and collaboration.

In another study, Manan, Alias and Pandian, (2012) examined the effectiveness of blended learning approach using one of the social media features. Specifically, the researchers used Facebook groups along with face-to-face instruction in an ESL context. The study included 30 undergraduate ESL learners enrolled in an ESL course at one of the public universities in Malaysia. The students were taught using the conventional classroom teaching as well as online using Facebook groups. According to the researchers, after observing students learning through this blended learning approach and asking their perceptions, it was found that the majority of students showed appositive perceptions toward this learning approach. The students said that using a Facebook group along with classroom instructions was interesting and authentic. They were motivated to interact and collaborate, and that is one of the significant strengths of blended learning approach.

Furthermore, a study conducted by Liu, (2013) examined the effectiveness of blended learning approach in an academic English writing course at a major university in Beijing, China. The study aimed to evaluate several aspects of blended learning approach such as

course design, material presentation, students' involvement, and classroom assessment. The class in which the study was conducted included 90 minutes of classroom meetings each week and one more online hour after the class. Based on the teacher's reflection and students' evaluation of the course, it was found that the students highly appreciated the use of blended learning approach because it had many advantages such as motivating autonomous learning, increasing classroom interactions, eliminating communication anxiety, and improving learners' academic writing competencies. The researcher concluded by stating that because it allows for two different types of learning interactions, the use of blended learning approach is more motivating and inspiriting for language learners.

Banditvilai (2016) conducted a study that examined the use of blended learning approach to enhance English learners' language skills and learning autonomy in an Asian university. The study was carried out in an English for specific purpose class and included 60 undergraduate students majoring in English. The study aimed to understand students' attitudes toward blended learning approach in English learning. The researcher used e-lessons, a questionnaire, and achievement tests as instruments to collect data. The findings of the study indicated that the use of an online approach aligned with classroom instruction enhances the language skills of language learners. Also, it was found that blended learning approach can be used effectively to increase autonomous learning and learners' motivation.

Ultimately, the use of blended learning approach has been linked to increasing students' motivation and engagement. Combining the traditional and online or mobile based learning modes allows language learners to interact with the language inside and outside of classroom settings. Different studies showed that this type of learning facilitates language learning and improves students' participation and engagement.

Blended Learning Approach and the Learning Environment

The review of the literature related to blended learning approach revealed that one of the significant benefits of using this learning approach in the ESL/EFL context is enhancing the language learning environment, which plays a vital role in the learning and teaching process. Several studies have indicated that relying on a blended learning approach strategy will result in improving the teaching and learning process. Ja'ashan, (2015) investigated students' perceptions and attitudes toward the use of blended learning approach in an EFL English

course in Bisha University, Saudi Arabia. To understand the students' perceptions and attitudes, a survey was administrated and involved 130 undergraduate English learners. Analysis of the data indicated that students showed positive perceptions toward the use of blended learning approach in English teaching. The participants were satisfied with blended learning approach because they believe this teaching approach can be used to enhance their language skills, develop their learning autonomy, improve student-teacher interaction, enhance the learning process, and allow for interesting learning experiences. The researcher also reported some disadvantages of using blended learning approach as it requires long time to prepare and implement blended lessons.

Zhang and Zhu, (2018) conducted a study in which blended learning approach mode was compared to traditional face-to-face learning mode. Specifically, the study investigated the effectiveness of blended learning approach compared to the traditional methods used to teach English as a second language in China. The sample size of the study included 5376 students who were enrolled in ESL courses at a major university in Beijing. The researchers analyzed a large database that included students who were enrolled in ESL courses and their performance, gender, grade, and discipline. The results indicated that students who were studying using a blended learning approach had better academic achievement in ESL courses when compared with other students who were taught using the face-to-face mode. In other words, students in blended learning approach performed better in ESL courses than students in face-to-face settings. The researcher indicated that the results showed that the use of blended learning approach has a positive impact on student learning outcomes.

Another study conducted by Akbarov, Gönen and Aydoğan, (2018) investigated students' attitudes toward blended learning approach in the EFL context. The study's sample involved 162 English language learners. The researchers employed a questionnaire, which included questions that examined the learners' perceptions and attitudes toward blended learning approach compared to the traditional classroom in EFL classes. The study's results indicated that most of the EFL students prefer blended learning approach over the traditional approach of English teaching because it enhances their motivation to learn which resulted in improving of the learning process. In other words, they believed that blended learning approach has a direct impact on their learning. Nevertheless, the participants reported that they prefer to be tested using traditional ways rather than digital ways. In summary, research shows that blended learning approach can be used to enhance the learning process and outcomes of

language learners (Abass et al., 2021; Dankers & Stoltenkamp, 2022; Faridah et al., 2022; Gault, & Cuevas, 2022; Ghimire, 2022; Mursid et al., 2022; Silvero et al., 2020). English language learners usually show positive perceptions and attitudes toward the use of blended learning approach as an English teaching approach. These positive perspectives are derived from several directions, including, but not limited to, developing students' language skills in interacting and engaging settings, fostering the learning process, and providing opportunities to be independent learners.

Challenges of Using Blended Learning Approach in ESL/EFL Context

Even though research regarding blended learning approach focuses on the benefits of this learning mode, some challenges have been identified for this learning approach (Chiraz, 2022; Softa, 2022; Strori, 2022). Perhaps one of the most comprehensive discussions to shed light on the issues of blended learning approach can be found in Bonk's and Graham's, (2012) work. The researchers identified six major issues arising when designing a blended learning environment. These issues are: 1. The role of live interaction, 2. The role of learners' choices and self-regulation, 3. Models for support and training, 4. Dealing with the digital divide, 5. Cultural adaptation, and 6. Finding balance between innovation and production.

The first issue is the role of live interaction. This is related to the amount of interaction in both learning mode, face-to-face, and online or mobile based learning. The second challenge is understanding the role of learners' choices and self-regulation. This means understanding students' choices regarding which kinds of blended learning approach they participate in, and how a teacher can guide and affect their learning when using blended learning approach. The third issue is related to the models used for support and training. To use a blended learning approach more effectively, support is needed for both technological aspects as well as pedagogical and instructional teaching. The fourth challenge is the digital divide. Bonk and Graham, (2012) mentioned that "the divide between the information and communication technologies available to individuals and societies at different ends of the socioeconomic spectrum can be great". The fifth issue that arises when designing a blended learning course is cultural adaptation. This is related to the materials that are used in both modes and their relation to the students' culture. The final issue is to find a balance between innovation and production. According to authors, in designing a blended learning classroom, a tension might arise between trying to use the new technological innovation and the ability to produce cost-

effective results. Also, Riel et al. (2016) indicated six sets of challenges that teachers encounter during the implementation process of a blended learning curriculum.

1. Teachers might face issues when working with students on curriculum activities. Students might have difficulty communicating with peers to finish the given tasks.
2. There might be challenges with student self-management. When using a blended learning approach, teachers might have difficulty keeping students focused on their task, so teachers need to keep activities relevant and active.
3. Establishing work expectations is another challenge that might face teachers when implementing blended learning. This refers to setting achievable goals and objectives related to students' learning.
4. Curriculum orchestration concerns organizing the work and finding time to conduct the lesson as well as a time frame to finish the work.
5. When implementing the blended learning approach is outside-of-classroom challenges. One example could be participating in out of the class activities. Scheduling a time for students to participant in out of the class activities can be difficult.
6. Teachers might face technology challenges. These are the technological problems that arise during the implementation process of blended learning.

Research Questions

RQ1: What is the effect of Blended learning approach on learning English Comprehension of grade three students?

RQ2: What is the effect of Blended learning approach on learning how to do correct Use Verbs of grade three students?

RQ3: What is the effect of Blended learning approach on learning correct use of Punctuation of grade three students?

Research Methodology

Approach of the Study

The current study employed quasi-experimental approach due to its appropriateness and its capability to attain its objectives by pre and post achievement tests for control and experimental groups. In control group, students were taught the topics of English

comprehension, correct use of verbs and correct use of punctuation from the text book of English for class three published by Punjab Text Book Board, Lahore using traditional learning approach. Experimental group was also taught the same study material employing the blended learning approach (Lecture method+ practice on mobile tablet Samsung Galaxy A6). The Literacy and Numeracy Derive (LND) Application was used for the practice of study material taught by traditional learning approach on the tablet (blended learning approach). The material was taught during the academic year 2022-2023.

Research Site and Sample Selection

This research study was done in a primary school located in one of the village of district Dera Ghazi Khan, Punjab, Pakistan. A placement test was taken from the 50 students of control group and 50 students from experimental group to select the suitable sample for the study. The 19 students from control group and 30 students from experimental group passed the placement test and selected for the study.

Sample Size

A sample of 49 students of grade three was taken as the main sample. The sample was divided into two groups named as Control group (n=19) and Experimental group (n=30).

Sampling Technique

The convenient sampling approach was used to take the participants for sample as one of the researchers was working in the school selected for the study.

Study Variables

i. Independent Variables

a) Blended Learning Approach

b) Traditional Learning Approach

ii. Dependent variables

The English performance marks of students in the pre and post-tests by traditional and

blended learning approaches were selected as the dependent variables.

Study Tools

The pre and posttests were used as the tools to collect the data and to determine the effects of blended learning approach on student's English performance of grade three at primary educational level.

Performance Tests (Pre and Post Tests)

The researchers prepared the Performance tests i-e pre and post-tests to assess the effects of blended learning approach in English performance of grade three students. The pretest and posttests were consisted of 30 questions including 10 questions of English comprehension, 10 questions of correct use of verbs and 10 questions of correct use of punctuation. The correct response to each question on the pretest and posttest received 3 marks, whereas the incorrect response received zero mark.

The test had maximum scores of 90 with 30 marks of each section (English comprehension 30 marks, correct use of verbs 30 marks and correct use of punctuation 30 marks) and a time limit of 60 minutes. The pre-test was taken at the start of the study from control and experimental groups. The teaching topics and demographic information of participants are given in Table 1 and 2. Figure 2 shows the experimental design of the study.

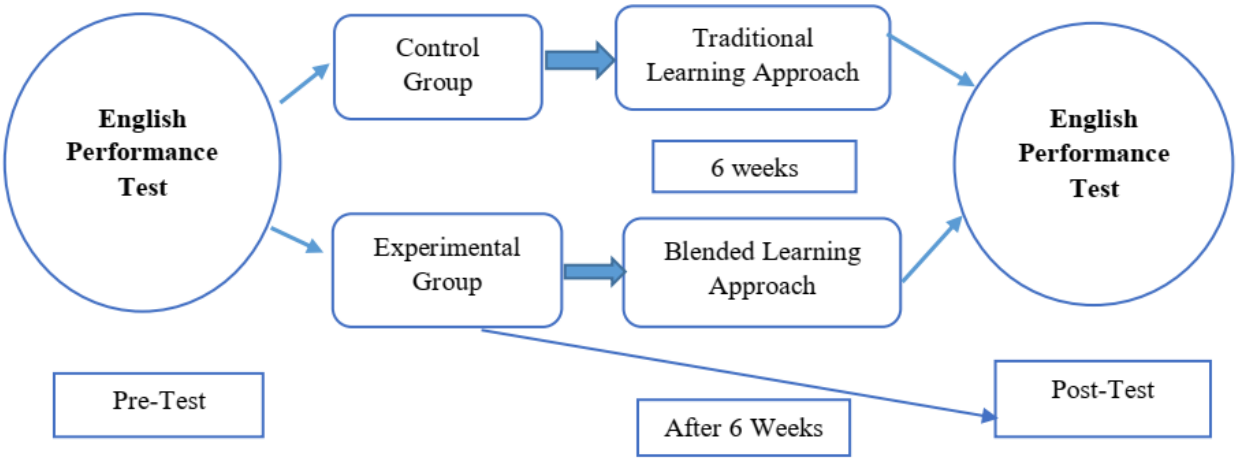

Figure 2. Experimental Design of the Study

Table 1. Teaching Topics

Sr. No	Unit No.	Topic	Pages
1	4, 8,9	Comprehension	44, 90, 117, 123
2	1, 4	Correct Use of Punctuation	10, 46
2	2, 4,7, 8, 9	Correct Use of verbs	20, 86, 41,76, 92, 101

Table 2. Demographic Information of Participants

Group	N	Level	Grade	Age (Years)	Learning Approach
Control	19	Primary	Three	7-10	Traditional
Experimental	30	Primary	Three	7-10	Blended
Total	49				

Procedure for Conducting Post-Test

The participants were divided into two groups: the experimental group and control group. The control group was taught English comprehension, correct use of verbs and correct use of punctuation related questions through traditional learning approach (whiteboard teaching method). The experimental group was given the extra time after teaching them with traditional learning approach to do the practice of English comprehension, correct use of verbs and correct use of punctuation related questions on the mobile Tablet (Samsung Galaxy TabA6). After six weeks learning with traditional and blended (mobile based) approaches, the post test was conducted. A question paper consisted of 30 questions including 10 questions of English comprehension, 10 questions of correct use of verbs and 10 questions of correct use of punctuation was formulated and conducted as posttest. The correct response to each question on the post-test received 3 marks, whereas the incorrect response to question received zero mark. The test had maximum scores of 90 and a time limit of 60 minutes.

Validity of Data Collection Tools (Pre and Post Tests)

The pre and post-tests were formulated from the three class English text book published by the Punjab Textbook board, Lahore as the syllabus for class three. The tests were then sent to five school teachers who had done their M.Phil. Degrees in English Linguistic and Literature and had been teaching English at primary level from previous ten years. The correction of the

tests was done according to their suggestions.

Reliability of Data Collection Tools (Pre and Post Tests)

The reliability of the data collection tools (pre and posttests) was verified by the researchers by using test-retest procedure. The reliability coefficient of 0.89 was as suitable for the current study.

Statistical Analysis

The experimental and control groups' pre- and post-test results were collected, and SPSS-25 was used to analyze the collected data. An independent samples t-test was conducted to assess the significant difference between control and experimental groups.

Ethical Consideration

The data of the study was collected by taking the permission from the school's principal.

Results

The gender wise frequency distribution, percentage of male and female learners and their marks distribution in English performance test are shown in Table 3. From the total of 30 students in experimental group, 20 were male students and 10 were female students. The percentage of male students was 66.67% and it was 33.33% for female students.

Table 3. Students' Variables in the Experimental Group

Variables	**Levels**	**f***	**%***
Gender	Male	20	66.67
	Female	10	33.67
	Total	30	100

The performance of students in English comprehension in posttest of control and experimental groups is shown in Table 4. In control group, no student got super excellent

marks (30/30), 5.26% students got excellent marks (26-29), 15.79% students got very good marks (22-25), 36.85% students got good marks (18-21), 26.31% students got satisfactory marks (14-17) and 15.79% students got unsatisfactory marks (below 14). So, the traditional learning approach does not prove to be very effective in learning of English comprehension for grade three students at primary level. On the other hand, the marks of students in English comprehension were remarkably good in experimental group learned by blended learning approach. In experimental group, 6.66% students got super excellent marks (30/30), 26.67% percent students got excellent marks (26-29), 46.66% students got very good marks (22-25), 13.35% students got good marks (18-21), 6.66% students got satisfactory marks (14-17) and no students got unsatisfactory marks (below 14). So, the blended learning approach proved to be very effective approach for learning English comprehension for three grade students at primary level.

Table 4. Frequency Distribution of Posttest Results of Control and Experimental Group in English Comprehension

Performance Factor	Marks and Remarks	Frequency		Percentage (%)	
		Control	Experimental	Control	Experimental
Performance in English Comprehension	30/30 Super Excellent	0	2	0	6.66
	26-29 Excellent	1	8	5.26	26.67
	22-25 Very Good	3	14	15.79	46.66
	18-21 Good	7	4	36.85	13.35
	14-17 Satisfactory	5	2	26.31	6.66
	Below 14 Unsatisfactory	3	0	15.79	0
	Total	19	30	100	100

The performance of students in correct use of verbs in posttest of control and experimental groups is shown in Table 5. In control group, no student got super excellent marks (30/30), 5.26% students got excellent marks (26-29), 10.52% students got very good marks (22-25), 26.31% students got good marks (18-21), 36.85% students got satisfactory marks (14-17) and 21.06% students got unsatisfactory marks (below 14). So, the traditional learning approach does not prove to be very effective in learning of correct use of verbs for grade three students at primary level. On the other hand, the marks of students in correct use of verbs were remarkably good in experimental group learned by blended learning approach. In

experimental group, 3.34% students got super excellent marks (30/30), 16.66% students got excellent marks (26-29), 56.66% students got very good marks (22-25), 20% students got good marks (18-21), 3.34% students got satisfactory marks (14-17) and no students got unsatisfactory marks (below 14). So, the blended learning approach proved to be very effective approach for learning correct use of verbs for three grade students at primary level.

Table 5. Frequency Distribution of Posttest Results of Control and Experimental Group in Correct Use of Verbs

Performance Factor	Marks and Remarks	Frequency		Percentage (%)	
		Control	Experimental	Control	Experimental
Performance in Correct Use of Verbs	30/30 Super Excellent	0	1	0	3.34
	26-29 Excellent	1	5	5.26	16.66
	22-25 Very Good	2	17	10.52	56.66
	18-21 Good	5	6	26.31	20
	14-17 Satisfactory	7	1	36.85	3.34
	Below 14 Unsatisfactory	4	0	21.06	0
	Total	19	30	100	100

The performance of students in correct use of punctuation in posttest of control and experimental groups is shown in Table 6. In control group, no student got super excellent marks (30/30), 5.27% students got excellent marks (26-29), 15.79% students got very good marks (22-25), 36.84% students got good marks (18-21),26.21% students got satisfactory marks (14-17) and 15.79% students got unsatisfactory marks (below 14). So, the traditional learning approach does not prove to be very effective in learning of correct use of punctuation for grade three students at primary level.

On the other hand, the marks of students in correct use of were remarkably good in experimental group learned by blended learning approach. In experimental group, 3.33% students got super excellent marks (30/30), 10% students got excellent marks (26-29), 63.34% students got very good marks (22-25), 20% students got good marks (18-21), 3.33% students got satisfactory marks (14-17) and no students got unsatisfactory marks (below 14). So, the blended learning approach proved to be very effective approach for learning correct use of punctuation for three grade students at primary level.

Table 6. Frequency Distribution in Post-test of Experimental Group in Correct Use of Punctuation

Performance Factor	Marks and Remarks	Frequency		Percentage (%)	
		Control	Experimental	Control	Experimental
Performance in Correct Use of Punctuation	30/30 Super Excellent	0	1	0	3.33
	26-29 Excellent	1	3	5.27	10
	22-25 Very Good	3	19	15.79	63.34
	18-21 Good	7	6	36.84	20
	14-17 Satisfactory	5	1	26.31	3.33
	Below 14 Unsatisfactory	3	0	15.79	0
	Total	19	30	100	100

Pre-test Results

English Comprehension

The descriptive statistics for results of pre-test in English comprehension for control and experimental groups are given in Table 7. The table indicates that mean scores for experimental and control group are approximately same for learning English comprehension. The standard deviation is also approximately same for both the groups. So, it can be determined that before learning with blended learning approach, the students of control group and experimental group have same capabilities for learning English comprehension.

Table 7. Descriptive Statistics for Pre-test Results of Experimental and Control Groups for English Comprehension

Group	N	Mean	Standard Deviation
Control	19	16.67	1.79
Experimental	30	16.91	1.72

Correct Use of Verbs

The descriptive statistics for results of pre-test in correct use of verbs for control and experimental groups are given in Table 8.

Table 8. Descriptive Statistics for Pre-test Results of Experimental and Control Groups for Correct Use of Verbs

Group	N	Mean	Standard Deviation
Control	19	14.87	1.15
Experimental	30	14.47	1.27

The table indicates that mean scores for experimental and control group are approximately same for learning of correct use of verbs. The standard deviation is also approximately same for both the groups. So, it can be determined that before learning with blended learning approach, the students of control group and experimental group have same abilities for learning correct use of verbs.

Correct Use of Punctuation

The descriptive statistics for results of pre-test in correct use of punctuation for control and experimental groups are given in Table 9. The table indicates that mean scores for experimental and control group are approximately same for learning correct use of punctuation. The standard deviation is also approximately same for both the groups. So, it can be determined that before learning with blended learning approach, the students of control group and experimental group have same capabilities for learning correct use of punctuation.

Table 9. Descriptive Statistics for Pre-test Results of Experimental and Control Groups for Correct Use of Punctuation

Group	**N**	**Mean**	**Standard Deviation**
Control	19	15.45	1.67
Experimental	30	15.04	1.75

Post-Test Results

English Comprehension

The results of descriptive statistics of post-test for control and experimental groups are given in Table 10.

Table 10. Descriptive Statistics of Post-test Results for Experimental and Control Groups in English Comprehension

Group	N	Mean	Standard Deviation
Control	19	19.23	2.09
Experimental	30	25.83	1.34

Table shows that mean scores for experimental group is 25.83 and the mean scores of control group is 19.23. So, there is greater difference in the mean scores of experimental and control groups for English comprehension. It is revealed from the table that blended learning approach increased the learning abilities of learners in English comprehension as compared to the learners who has learnt with traditional learning approach. There is also a greater difference in the standard deviation of the control and experimental groups for learning English comprehension. The SD for control group is 2.09 and it is 1.34 for experimental group.

Correct Use of Verbs

The results of descriptive statistics of post-test for control and experimental groups are given in Table 11.

Table 11. Descriptive Statistics of Post-test Results for Experimental and Control Groups in Correct of Verbs

Group	N	Mean	Standard Deviation
Control	19	17.19	1.89
Experimental	30	25.09	1.20

Table shows that mean scores for experimental group is 25.09 and the mean scores of control group is 17.19. so, there is greater difference in the mean scores of experimental and control groups for correct use of verbs. It is revealed from the table that blended learning approach increased the learning abilities of learners in correct use of verbs as compared to the learners who has learnt with traditional learning approach. There is also a greater difference in the standard deviation of the control and experimental groups for learning correct use of verbs. The SD for control group is 1.89 and it is 1.20 for experimental group.

Correct Use of Punctuation

The results of descriptive statistics of post-test for control and experimental groups are given in Table 12. Table shows that mean scores for experimental group is 26.13 and the mean scores of control group is 16.83. so, there is greater difference in the mean scores of experimental and control groups for correct use of punctuation. It is revealed from the table that blended learning approach increased the learning abilities of learners in correct use of punctuation as compared to the learners who has learnt with traditional learning approach. There is also a greater difference in the standard deviation of the control and experimental groups for learning correct use of punctuation. The SD for control group is 1.99 and it is 1.29 for experimental group.

Table 12. Descriptive Statistics of Post-test Results for Experimental and Control Groups in Correct Use of Punctuation

Group	N	Mean	Standard Deviation
Control	19	16.83	1.99
Experimental	30	26.13	1.29

Hypotheses Testing

Ho1: *There is no significant difference in mean scores in English comprehension in posttest between control and experimental groups of grade three students.*

To find the significant difference between the control and experimental groups in mean scores of posttest in English comprehension, the researchers tested Ho1by using independent samples t-test. The results of t-test are shown in Table 13. The results of t-test indicated that there was a significant difference between the mean scores of posttest of experimental group who taught by blended learning approach and control group who taught by traditional learning approach. The t-value was obtained as -3.234 and p-value was 0.0001. As the p-value is very less than 0.05, so, the results are highly significant and proved that the blended learning approach had greatly affected the performance in English comprehension of students of experimental group of grade three at a primary educational level and rejected the Hypothesis Ho1. The blended learning approach really improved the students' academic

achievement in English comprehension.

Table 13. Results of t-test for Posttest between Control and Experimental Groups for English Comprehension

Group	N	Mean	SD	t	p	Result
Control	19	19.23	2.09			
Experimental	30	25.83	1.34	-3.234	0.0001	Significant

Significant at a significance level of 0.05

Ho2: *There is no significant difference in mean scores in correct use of Verbs of posttest between control and experimental groups of grade three students.*

To find the significant difference between the control and experimental groups in mean scores of posttest in correct use of verbs, the researchers tested Ho2 by using independent samples t-test. The results of t-test are shown in Table 14.

Table 14. Results of t-test for Posttest between Control and Experimental Groups in Correct Use of Verbs

Group	N	Mean	SD	t	p	Result
Control	19	17.19	1.89			
Experimental	30	25.09	1.20	-4.892	0.00001	Significant

Significant at a significance level of 0.05

The results of t-test indicated that there was a significant difference between the mean scores of posttest of experimental group who taught by blended learning approach and control group who taught by traditional learning approach. The t-value was obtained as -4.892 and p-value was 0.00001. As the p-value is very less than 0.05, so, the results are highly significant and proved that the blended learning approach had greatly affected the performance in learning correct use of verbs of experimental group of grade three at a primary educational level and rejected the Hypothesis Ho2. The blended learning approach really improved the students' academic achievement in correct use of verbs.

Ho3: *There is no significant difference in mean scores in correct use of punctuation of posttest between control and experimental groups of grade three students.*

To find the significant difference between the control and experimental groups in mean scores of posttest in correct use of punctuation, the researchers tested Ho3 by using independent samples t-test. The results of t-test are shown in Table 15. The results of t-test indicated that there was a significant difference between the mean scores of posttest of experimental group who taught by blended learning approach and control group who taught by traditional learning approach. The t-value was obtained as -5.321 and p-value was 0.001. As the p-value is very less than 0.05, so, the results are highly significant and proved that the blended learning approach had greatly affected the performance in learning correct use of verbs of experimental group of grade three at a primary educational level and rejected the Hypothesis Ho3. The blended learning approach really improved the students' academic achievement in correct use of punctuation.

Table 15. Results of t-test for Posttest between Control and Experimental Groups in Correct Use of Verbs

Group	N	Mean	SD	t	p	Result
Control	19	16.83	1.99			
Experimental	30	26.13	1.29	-5.321	0.001	Significant

Significant at a significance level of 0.05

Discussion

BL is a modern educational strategy that has replaced e-learning gradually in most educational institutions. BL is a logical and scientifically acceptable alternative to e-learning, has higher yields, is less expensive, and incorporates more sophisticated types of learning (Hamad, 2015). BL is a term that explains the various attempts made by teachers to incorporate the element of technology into the traditional classroom setting, because of the efficiency this arrangement brings. BL aims at interactive learning, resulting in the blending or mixing of a teacher's role in a traditional classroom with that in the virtual one. The technology applied in BL is often intended to generate optimal performances by students. BL systems are intended to promote learning by facilitating the integration of visual cues and

educational concepts (KM Eshreteh & Hisham Siaj, 2017). The use of virtual environments acts to capture the attention of the audience involved while augmenting interactions between subject parties.

BL has many benefits, including the following: making computers and local and global networks of information available for learners; developing teachers' roles as leaders and mentors to their students in terms of their expertise in computers and networks of local and international information, in addition to being producers rather than importers of knowledge; enabling learning groups to use multimedia, e-mail, virtual libraries, and all internet data collaborative software; having the ability to combine different possibilities for different schools and universities in productive ways; and overcoming the problem of lasting change in the content of educational materials. The problem addressed in this study stems from the need to diversify the teaching approach used in the field of learning and education, particularly in the English. The aim of this research was to determine the effects of blended learning approach on English performance of grade three students at primary level of education. Three research questions were formulated to determine the effects of blended learning approach. The results related to each research question are presented in the following lines:

Results Related to RQ1

The first research question of this study was "what is the effect of blended learning approach on the performance in English comprehension in posttest for grade three students at primary educational level"? To find the answer of this research question, hypothesis (Ho1) was tested at a significance level of 0.05 to find the significance of blended learning approach for learning English comprehension for grade three students. The outcomes found concerning the first research question showed that there was a significant difference between experimental and control groups taught by blended and traditional learning approaches as the null hypothesis (Ho1) was rejected. The results were favoring towards the blended learning approach. The results presented in table 13 show that the mean scores for blended learning approach were 25.83 and 19.23 for traditional learning approach for control and experimental groups in posttest for learning English comprehension. As there was much difference in the mean scores of experimental and control groups of posttest so, it is concluded that blended learning approach has a positive effect on English comprehension performance of grade three students.

Results Related to RQ2

The second research question of this study was "what is the effect of blended learning approach on students of grade three that how to use correct verbs"? To find the answer of this research question, hypothesis (Ho2) was tested at a significance level of 0.05 to find the significance of blended learning approach for learning how to use the correct verbs for grade three students. The outcomes found related to second research question showed that there was a significant difference between experimental and control groups taught by blended and traditional learning approaches as the null hypothesis (Ho2) was rejected. The results were favoring towards the blended learning approach. The results presented in table 14 show that the mean scores for blended learning approach were 25.9 and 17.19 for traditional learning approach for control and experimental groups in posttest for learning how to use the correct verbs. As there was much difference in the mean scores of experimental and control groups of posttest so, it is concluded that blended learning approach has a positive effect on the students' performance in learning how to use correct use of verbs in grade three students.

Results Related to RQ3

The third research question of this study was "what is the effect of blended learning approach on students' performance in correct use of punctuation in grade three"? To find the answer of this question, hypothesis (Ho3) was tested at a significance level of 0.05 to find the significance of blended learning approach on the performance in correct use of punctuation for grade three students. The outcomes found concerning the third research question showed that there was a significant difference between experimental and control groups taught by blended and traditional learning approaches as the null hypothesis (Ho3) was rejected.

The results were favoring towards the blended learning approach. The results presented in table 15 show that the mean scores for blended learning approach were 26.13 and 16.83 for traditional learning approach for control and experimental groups in posttest in correct use of punctuation. As there was much difference in the mean scores of experimental and control groups of posttest so, it is concluded that blended learning approach has a positive effect on the performance of students in correct use punctuation in grade three.

Conclusion

The objective of this study was to find the effects of blended learning approach on the English performance for three grade students at primary educational level. Three areas of English namely English comprehension, correct use of verbs and correct use of punctuation were investigated by applying the blended and traditional learning approaches. The quasi-experimental (pre and posttests) designed was formulated to find the effects of blended learning approach on the performance of students in English at grade three. The outcomes of the study showed that the usage of blended learning approach had a positive impact on three grade student's English performance. The students performed better in three areas of English namely English comprehension, correct use of verbs and correct use of punctuation by applying blended learning approach as compared to the traditional learning approach. So, on the basis of results, it is recommended that we should use the modern learning tools like blended learning to improve the academic performance of the learners.

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Author Information

Muhammad Hafeez
https://orcid.org/0000-0002-3262-7014
Department of Education
Institute of Southern Punjab, Multan
Pakistan
Contact e-mail: *mh9589041@gmail.com*

Samikshya Bidari
https://orcid.org/0000-0002-5190-5358
Meiji University
Nakano Campus
Japan

Zahid Zulfiqar
https://orcid.org/0000-0002-6691-9373
Department of Sociology
National College of Business
Administration and Economics, Multan,
Pakistan

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Chapter 7 - Using Multi-Stakeholder Perspectives to Enhance Integration of Mobile Technology for Students with Communication Needs

Kathryn Lubniewski, Lori Price, Yao Du, Nikita Soni

Chapter Highlights

- Describe the background of students in the U.S., specific needs around language learning and the implications of disorders of speech and language learning.
- Identify different types and genres of apps and app features that can be used by teachers and SLP practitioners to instruct students with communication needs.
- Explain the connection and importance of the collaboration between teachers, speech-language pathologists (SLPs), and app designers/developers in choosing, assessing, implementing, and designing technology to support speech and language learning for individuals with communication needs.
- Identify the ways to engage in the use and design of mobile apps using a novel research model and the iRPD ("Research, Practice, and Design for iPad Apps") framework.
- Synthesize recommendations for implementing and designing mobile apps for students with communication needs in educational settings.

Introduction

There are more than 50 million students in the U.S. that are enrolled in public pre-K through 12th grade (National Center of Educational Statistics, 2022). Of these students 70% are in pre-K through 8th grade and 30% are in 9th through 12th grade. The students range from diverse backgrounds and include over 5 million who are identified as English Learners (ELs) and participate in language assistance programs to support their educational achievement (National Center for Education Statistics, 2022). The most common home languages for ELs are Spanish, Arabic, Chinese, and Vietnamese.

Among the 50 million K-12 students in the U.S., in 2020-2021, over 7 million received special education services under the Individuals with Disabilities Education Act (IDEA), with the second most prevalent diagnosis being speech or language impairment (SLI). An SLI diagnosis includes disorders in the areas of speech, language, hearing, voice, social communication, and fluency. An SLI diagnosis can co-occur with other developmental disabilities such as a specific learning disability, autism spectrum disorders, or an intellectual disability. Children and students with a communication disorder are served across K-12 grades in the schools, as early as 0-3 years through early intervention programs, and as old as 21 years through adulthood, in transition programs. In addition to speech or language impairments, children can present with feeding and swallowing diagnoses which can require specialized services during the school day.

When students communicate, they are exchanging information and knowledge among the stakeholders (i.e., peers, teachers, administrators) (Friend, 2018). This requires a message, a sender, a receiver, and a channel. In a communication act, the sender formulates a message and the receiver decodes it. This requires linguistic competence on the part of both the sender and the receiver. Breakdowns can happen on the speech level, the language level, or with perception (e.g., hearing). Speech is the behavior of forming and sequencing the sounds of oral language and includes the elements of voice, resonance, articulation, and fluency. Language is the system of symbols that individuals use for communication based on their culture, and can be broken into expressive language (e.g., using words in sentences to express thoughts) and receptive language (e.g., understanding the thoughts expressed in words in sentences). There are five components of language that include the form (i.e., phonology, morphology, syntax), content (i.e., semantics), and function (i.e., pragmatics).

When students struggle with speech and language, their difficulties occur across the entire range of cognitive abilities and can profoundly affect a student's learning (Friend, 2018). There is also a higher risk of reading difficulties for students with speech and language delays (Catts et al., 2002; Snowling et al., 2000; Zipoli & Merrit, 2017). Socially and emotionally these students may be targets of peer teasing (Knox & Conti-Ramsden, 2003; Redmond, 2011). They may experience difficulty in social situations, such as being left out of play (Fujiki, Brinton, & Todd, 1996). Frequently they are at higher risk for behavior problems because of their frustration with communication; for example, withdrawing from peers in the classroom and showing anxiety about social interactions with peers (Hart et al., 2004; Stanton-Chapman et al., 2007). These behavior difficulties can compound and persist. Studies investigating youth offenders in the criminal justice system provide significant evidence that youth offenders perform more poorly on language measures relative to age matched peers (Anderson et al, 2006).

Most schools will have an early identification system or support for students like *Response to Intervention* (RTI). In this approach, the process begins with a universal screening of each child in the general education classroom. Some examples of ways the disability can manifest itself in the classroom are included in Table. 1. If some of these struggles are occurring, an intervention team discusses specialized plans for the learner to provide them with interventions at increasing levels of intensity to improve their rate of learning. Progress and data are closely monitored to assess the learning rate and academic level of performance of the individual student. If a student continues to struggle with these supports, then they will be referred to the child study team for discussion around specific assessments that may be requested. Involving teachers throughout this process helps to address the child more holistically, rather than one generalized need. Once a determination is made and permission is obtained, data is collected and reviewed, the team will determine federal eligibility defined in IDEA (P.L. 105-17). Part B of the document states that a child is only eligible for services if the impairment "adversely impacts educational performance (ASHA, n.d.)."

To further assist in understanding the variety and depth of communication disorders and the scope of practice for the speech therapist, the American Speech-Language-Hearing Association (ASHA) created the Big Nine classification system. These are not grouped in a specific order and include; articulation, cognitive aspects of communication, communication modalities, fluency, hearing, receptive and expressive language, social aspects of

communications, swallowing, and voice and resonance.

The following table looks at the *ASHA Big Nine* in terms of the school-based setting, describes specific characteristics that may occur, and describes the adverse impact of different disorders on classroom learning.

Table 1. ASHA Big Nine, Connection to Characteristics and the Classroom Impacts

ASHA Big Nine	Characteristics	Adverse Impact in Classroom Learning at Schools
Articulation **how speech sounds are made using the mouth, lips, and tongue. Main focus on errors in production of individual speech sounds**	A child needs to be able to produce the “s” sound to say "star" instead of "tar.”	*Functional impact in the classroom: (Hitchcock et al., 2015)* Difficulty being understood in the classroom. At risk of being teased or bullied
Cognitive Aspects of Communication **includes attention, sequencing, problem-solving, executive functioning**	Executive Function: Scheduling, planning. Problem Solving: Breaking an assignment down to steps.	*Functional impact in the classroom: (Pfiffner, Barkley et al., 2006)* Executive function issues can cause a student to be disorganized and turn in assignments late. Problem solving deficits can cause a student to have difficulties scoping research projects, and choosing facts to support arguments.
Communication Modalities **includes oral, manual, augmentative and**	Aided: Communication boards with symbols, Augmentative	*Functional impact in the classroom: (Walker & Chung, 2022)* Curriculum may need to be adapted.

alternative communication techniques, and assistive technologies)	Alternative Communication (AAC) software and devices. Unaided: sign language, facial expression, gestures, body position	Teachers and paraeducators need to be trained to use the aided or unaided systems. Peer relationships may be difficult to form. Difficulty participating in classroom discussions. Literacy instruction requires specialized teacher training and experience.
Fluency **forward flowing speech**	Repetitions of sounds, syllables, words, and phrases; prolongations; and blocks. Can be accompanied by visible tension in the face, speaking avoidance, struggle behaviors, and secondary behaviors such as eye blinking.	*Functional impact in the classroom: (Adriaensens et al., 2017)* Reluctance to raise hand and participate in class discussions. Difficulty working in small groups. Social emotional issues such as fear and lack of confidence. Increased risk of bullying.
Hearing **Hearing loss is a partial or total inability to hear in one ear (unilateral) or**	Students with hearing loss using hearing aids, cochlear implants, and FM	*Functional impact in the classroom: (ASHA, n.d.)* Hearing loss can delay a child

both ears (bilateral).	systems; also, students who are trying to hear in noisy classrooms and/or classrooms with poor acoustics.	developing speech and language and prevent a student from discerning comments/questions from peers during "whole class" discussions. Hearing loss can mimic learning disability and cause social isolation.
Receptive and Expressive Language Receptive Language: **How the individual <u>understands</u> language** Expressive Language: **How the individual <u>expresses themselves</u> with language**	Receptive Language: Following two-step directions such as "Put down your pencils and open your book." Expressive Language: Telling a story or answering questions in complete, grammatically accurate sentences.	*Functional impact in the classroom: (Ziegenfusz et al., 2022)* Receptive language deficits can cause difficulties with reading, understanding directions for assignments. Expressive language deficits can cause difficulties with putting thoughts into sentences in a way that makes sense (e.g., contributions to class discussions and written assignments can lack coherence or meaning).
Social Aspects of Communication **challenging behavior, ineffective social skills**	Pragmatic skills: Difficulty maintaining reciprocal conversations, making eye contact, reading social cues and body language. Inappropriate use of language.	*Functional impact in the classroom: (McClemont et al., 2021)* Difficulty with group assignments. Increased risk of rejection by peers and bullying.

Swallowing **oral, pharyngeal, esophageal, and related functions**	Children on feeding tubes, children learning how to self-feed and swallow after being on a feeding tube, medically fragile children, children with multiple disabilities, children with eating disorders.	*Functional impact in the classroom: (Arvedson & Homer, 2006)* Poor nutrition can impact academic performance. Psychosocial issues resulting from feeding tubes or eating disorders can isolate a student and impact peer relationships in the classroom.
Voice **How the vocal folds and breath are used to make sounds.** Resonance **The voice quality that results from the balance of sound vibrations in the throat, mouth and nose.**	Voice can be too loud or soft, or high- or low-pitched. With resonance issues, their voices can have a muffled or nasal quality. Caused by functional, organic or neurologic processes.	*Functional impact in the classroom: (Ruddy & Sapienza, 2004)* Example: Children can hurt their voices by too much yelling on the playground. Voice and resonance issues decrease student ability to communicate in the classroom and increase the risk of bullying.

Classroom Connection & Technology

Children with communication needs and disorders work with teachers and speech-language pathologists (SLPs) across diverse educational settings including early intervention, general education, and special education classrooms to increase their communication skills so they can access the educational curriculum (Byrnes, 2000). Depending on the need and severity of the individual child, they may require support through *Response to Intervention* or an Individualized Education Program (IEP). By providing this approach or plan, children are required specialized adaptations to help them communicate in the classroom and access the curriculum.

Some of these specialized adaptations often include assistive technology. Assistive technology, in general, is any piece of equipment, or product system that is used to increase, maintain, or improve the functional capabilities of a child with a disability (IDEA, 2019). Some examples of assistive technology include augmentative and alternative communication (AAC) devices, educational technology such as dictating tools, pre-recorded textbooks, writing software with predictive capability and/or mobile apps (Gilakjani et al., 2013).

There are many benefits when using mobile apps in the classroom. Depending on the mobile app that is utilized, they have been shown to increase communication (Dias & Victor, 2022; Du et al., 2022; Holyfield et al., 2018) and language learning (Light et al., 2019). They have also been shown to support and facilitate social interaction including collaboration (Dias & Victor, 2022; Du et al., 2022; Light et al., 2019). At the same time, when using apps, there has also been evidence that they can encourage independent learning (Dias & Victor, 2022). When students are able to work independently, this can assist the teacher in differentiating individual students' strengths and needs more easily because they have the ability to share resources with the individual student and the students can also share among each other. The individual support that many apps provide can help increase engagement (Du et al., 2022; Lubniewski & Kiraly, 2020). Teachers and clinicians are motivated to use apps as a dynamic way of teaching and targeting various goals (Dias & Victor, 2022; Du et al., 2022).

Currently, there are over 2 million mobile apps that teachers have access to download on iOS or Google Play (Ceci, 2022). Teachers and SLPs choose an app for a variety of reasons (e.g., recommendation from a colleague, student interest, specific design features, connection to the curriculum, instructional features; Du et al., 2023; Lubniewski et al., 2018). Depending on the hardware device where the mobile app is operating, many devices have sensors, cameras, microphones, touchscreens, voiceover and voice agent feedback (Dias & Victor, 2022; Crescente et al., 2011). Due to the flexibility and support provided, it makes it a popular choice for teaching and learning especially when supporting a diverse student population.

To use mobile apps, the teacher may need to be trained and taught how to effectively implement a mobile app to achieve a specified goal in the student's program (Andzik et al., 2019; Du et al., n.d.). Oftentimes, the teacher will also need to train the paraprofessional and the family in using the educational and assistive technology. This can be an issue because typically teacher preparation programs have traditionally had a low emphasis on technology

integration (Kimmons, Miller, Amador, Desjardins & Hall, 2015). This creates a large barrier because there is a lack of knowledge and skills for successful implementation of assistive technology and educational technology in the classroom (Dell, Newton, & Petroff, 2021; Dias & Victor, 2022).

The iRPD Framework and the Present Study

One of the ways to support teachers' technological knowledge and skills is to partner with an SLP whose practice includes the integration and development of technology tools such as mobile apps. When the teacher and the SLP collaborate, each plays an important role in the successful implementation and development of the technology tool in the student's education program. Using a design-based research methodology, the Research, Practice, and Design for iPad Apps (iRPD) framework is one of the first models to engage stakeholders in a three-way collaborative process to collaboratively produce apps for educational purposes (Kucirkova, 2017, Figure 1). The iRPD framework is governed by five guiding principles: triple collaboration, shared epistemology, interconnected social factors, awareness of app affordances, and child-centered pedagogy. The three key stakeholders of iRPD, also referred to as the ''iPRD trio'', include practitioners, researchers and mobile app designers. The iRPD trio works in triple collaboration through shared epistemology to develop an awareness of affordances of the mobile apps.

The iRPD framework expands upon the traditional child-centered user-design approach by visualizing equal involvement across all three stakeholders (e.g., practitioners, researchers, and mobile app designers) and addresses how an interprofessional research team could collaborate to design and evaluate mobile apps for education. To establish this triple collaboration with a shared epistemology, it is important to ensure that all stakeholders ''share a set of values and an understanding of the scope of the project'' (Kucirkova, 2017). In other words, practitioners, researchers, and designers should collaboratively consider how to provide an internally consistent user experience and coherent message to articulate differences across domain knowledge during app production. Additionally, the research team works together to resolve any conflicts and barriers posed by interconnected factors (e.g., sociocultural, economic, ethical, and political) by including children as active partners in the research cycle.

This framework is particularly inspirational for the present study because it not only constructs the collaborative relationship across three stakeholders but also emphasizes the importance of a shared epistemology across stakeholders that informs and powers the design process. Building upon this model, the present study seeks to synthesize qualitative interviews with SLPs as well as non-SLP designers/developers and researchers who design and use apps for pediatric speech-language therapy. Results from this study enable the iRPD model to be further developed and expanded to explore the roles and responsibilities of stakeholders during the app design and implementation process. These findings provide cross-profession education for teachers who will be working with children with communication needs and SLPs in diverse educational settings and contexts. Based on the iRPD framework, this study was designed to answer the following questions:

1. When using and developing mobile apps for pediatric speech and language learning, what student needs, challenges, and recommendations are discussed by practicing speech-language pathologists and app designers/developers?
2. What technology tools, in addition to mobile apps, do speech-language pathologists use to support speech and language goals?
3. Using the iRPD framework, how can teacher practitioners collaborate with multiple stakeholders to design and develop mobile apps that address the learning needs of students with communication needs?

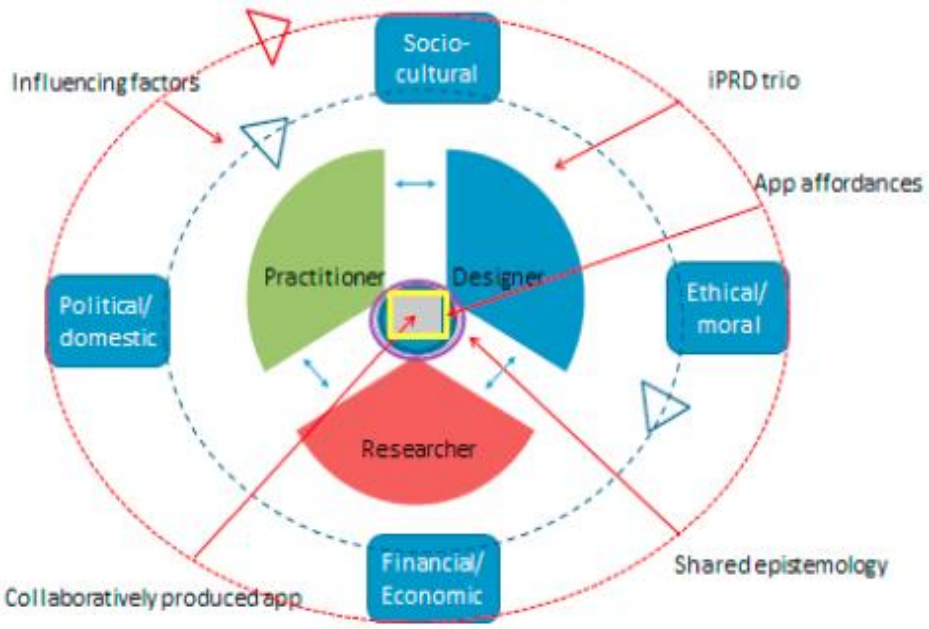

Figure 1. The Research, Practice, and Design for iPad Apps (iRPD) framework by Natalia Kucirkova

Method

A total of 50 participants (Appendix A: Participant Demographics) were recruited via email using snowball sampling strategies from the third author's personal network and word-of-mouth referrals, as well as recruitment through technology-related presentations at professional conferences. To collect a comprehensive perspective about the process from mobile app design and development, to implementation and use, semi-structured interview sessions (ranged from 45 to 70 minutes) were collected and analyzed via qualitative coding based on the Consolidated Framework for Implementation Science (CFIR), a theoretical framework developed by Damschroder et al. (2009). The semi-structured interview questions were constructed based on two domains ("intervention characteristics" and "characteristics of individuals") out of the five domains of CFIR in order to examine individual characteristics of SLPs and characteristics of mobile apps. Additionally, the interview questions investigate mobile apps used as intervention tools by analyzing five specific subdomains of "intervention characteristics": sources, relative advantage, design quality and packaging, cost, and adaptability. To further understand contributing factors related to app design and adoption, four influential factors; (1) financial, (2) social-cultural, (3) political, and (4) ethical/moral factors from the Research, Practice and Design for iPad Apps (iRPD) framework (Kucirkova, 2017) were integrated into the qualitative coding process to unpack the collaborative process to produce/use iPad apps for educational purposes.

Amongst these 50 participants were 23 "SLP App Users" (P1 to P23) who reported using apps across various clinical contexts in public and private school settings, university clinics, children's hospitals, and a cerebral palsy center, via in-person and teletherapy. The other 14 participants "SLP App Designers" (P24 to P37) were not only SLP app users but also have been involved in app designing. These SLP App Users and SLP App Designers came from different states in the United States, with three international SLPs that came from China, Malaysia, and Sweden. The remaining 13 participants "Designers" (P37-P50) were individuals from various backgrounds (e.g., parents of children with disabilities, Ph.D. students, producers) without a clinical background as SLPs but were involved in the development process for apps used by SLPs.

Interviews were analyzed using template analysis (Brooks & King, 2012; Crabtree & Miller, 1992; Crabtree & Miller, 2022) and thematic analysis (King, 2004) and then summarized in

clinician user personas (Jansen et al., 2021; LeRouge et al., 2013, Appendix C), a technique used in the field of human-computer interaction. Each transcript was coded independently by two coders. Then, using member checking, 5% of the total text within each transcript was compared for differences and resolved by the larger research team (Creswell and Miller, 2000) until a consensus was reached. A total of seven emerging themes were identified, including mobile app use techniques, clinical practice, therapy activities, therapy techniques, influential factors, perceptions and attitudes about mobile apps, and app design and development recommendations (Appendix B).

To answer the research questions of this study, we highlighted findings from SLP practitioner designers and practitioners (P1-P37) by focusing on themes developed from the codes. For question 1, deeper analysis was conducted on codes and themes under client characteristics (i.e., age group, type of disability/disorder, levels of ability), clinical practice (i.e., clinical challenges), support systems (i.e., perception and attitudes), and recommendations (i.e., unmet clinical needs). For question 2, further analysis was conducted on the codes under clinical practice (i.e., therapy activities, therapy materials), app characteristics (i.e., app names and genres) and tools. For question 3, the codes that were used were clinician and developer characteristics (i.e., clinical setting, clinician/developer experience), app characteristics (i.e., app names and genres, app use techniques, design and development, app features), recommendations (i.e., app design, system design, unmet needs), and marketing (i.e., distribution channel and methods, advertising/public relations/promotion, marketing research).

Results

Client Characteristics

The clients that the participants have provided services for have been from birth (P2), preschool (P2, P8, P11, P14, P19, P26, P29), elementary (P2, P6, P8, P11, P12, P14, P15, P29) middle school (P2, P6, P11, P12, P15), high school (P11), and adult (P2, P6, P8, P12, P19). Some clients were bilingual (P14, P26, P29). There is a variety of diagnosed disabilities among the clients that included a speech or language impairment, autism spectrum disorder (P2, P6, P8, P14, P19, P26), cerebral palsy (P6), cognitive impairment (P2, P6, P11, P26), deafness (P2), Down syndrome (P2, P6, P14, P26), specific learning disability (P11, P12, P14), mental disorders (P6), motor impairments (P2), and Parkinson's (P26). The range of

severity of the disability was from mild, moderate, severe, profound, and nonverbal. The clients included those who had individualized education plans (IEPs) and 504 plans for the general education curriculum, those in general education identified for special education services, those in a pull-out setting within the school (e.g., special education, speech pathologist setting), and those in private schools for students with disabilities.

Educational Setting & Goals

For the participants 1-37 that identified themselves as a speech language pathologist (i.e., clinician or an SLP designer/developer), the main setting that was identified where the speech language services were being administered was within the school (P8, P14, P15). Many participants did not identify whether this was a public school or private school; however, within the school setting some participants further identified that the services were provided within the classroom (P2, P6, P11, P12, P19, P26). Two participants did not identify a specific setting within the school (P29, P31). Within the classroom setting, the participants identified a variety of levels of support including small student-teacher ratio, co-taught settings, and as a resource to provide additional support (e.g., paraprofessional, therapy assistant (P26). During these sessions a variety of therapy goals were being addressed including: language (expressive/receptive, P26, P29), vocabulary (P19), semantics (P19), social skills (P14, P19), articulation (P19), syntax/grammar (P29), and narrative development (P14).

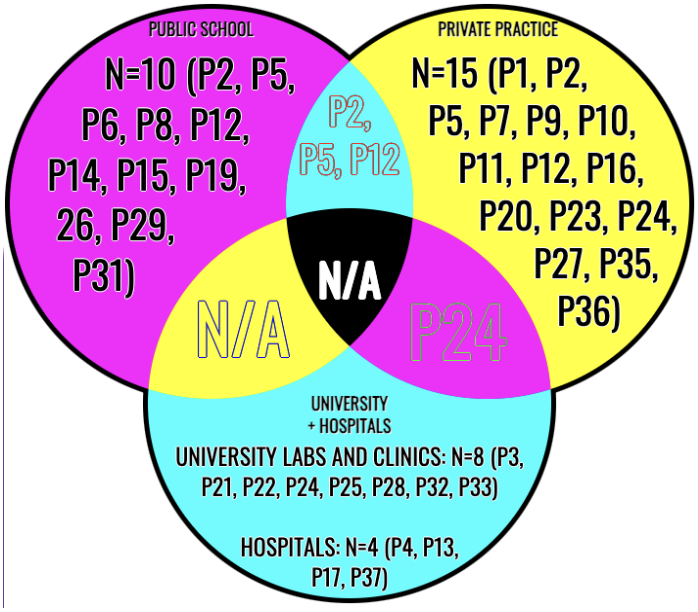

Figure 2. Work Settings for SLP Participants (P1-P37)

Practitioner Challenges & Recommendations

Participants highlighted specific areas of need, and their perceptions and attitudes about technology, including the use of apps. Overall, six themes were identified that focused on dispositional, pedagogical, identified support from administrators and families, resources and professional development, student needs, and technology factors (e.g., design and development, usability).

Dispositional

The participants shared dispositional qualities that they perceived were needed when implementing technology with students. The identified qualities were open-minded (P29) and consistent (P14). One participant also shared that teachers are receptive to SLP ideas because they are considered "leaders regarding tech" (P6), and as an SLP they felt that they wanted a "smart partnership" with the teacher to collaborate about the technology. To be a leader in tech, a few participants shared that there needs to be "more guidelines for apps and having some evidence-based research that can pull from those resources (P2, P26)." They wanted guidelines for designing apps, but specific apps for "education (P2, P19)", "a specific population (P25)", or "for children with disabilities (P26)". There was a clear desire for more structure when designing, selecting, implementing, and assessing apps for students.

Pedagogical

Due to the goal-driven nature of speech therapy and special education services, participants stated that app selection and use needed to support goals and objectives (P8, P11, P12, P19, P29). Technology is used "for a reason (P12)." There was a desire that "technology should be in the classroom, but must be tied to the purpose of the activity (P19)" and "don't use it for the games aspect of it unless the game is part of an application that works on articulation or language (P11)." Some participants also stated that they chose an app to promote and support positive behavior (P11, P15) or as a reward for a student during a therapy session (P19). Overall, the participants stated that having clear goals and objectives that connect to the student's strengths and/or needs was critical when using the technology.

Depending on the app or technology that is chosen, some clients may be distracted. This can

create behavioral difficulties if the SLP or teacher is working in a group setting because they may not have the full attention of all the students (P8, P11, P12). It's important to use "clinical judgment needed to take into account motivation, reinforcement, interaction between students on a given day (P26)." One way to address this is to make sure to differentiate the types of apps that are used (P29), select apps that include a human element like reciprocal communication (P6), or apps that are able to augment reality (P15). Some participants shared that depending on the app that was selected they spent "too much time in therapy answering questions about the apps (P2)." There was also advice that even though there may be a form of data collection or assessment within an app, "make your own tracking system with google sheets and documents (P15)."

Support from Administration & Families

Participants identified needs from administrators and families (P8, P14, P19, P26, P29). They identified that they wanted more accountability from the stakeholders (e.g., families, paraeducators, teachers, administrators) who are using the child's specifically programmed AAC app (P19) and that they wanted "assistance" from administration (P19). Some participants felt that families needed more information about the benefits of apps (P26) because of the debates about negative effects of technology with children (P29). Participants felt the need to be able to communicate with families so that there is consistency with the use of the technology (P14, P29), they can create connections for the students who may be struggling (P8), and they can promote language development (P29).

Resources and Professional Development

The support from administration and families is critical as well as identifying communities and organizations that support technology (P19, P26). It "would be nice to have some type of group to connect about technology, maybe a technology SIG through ASHA or some other organization (P26)." Another SLP discussed the benefits of being involved in the *SLP Peeps community* on *Twitter* and said, "It was an incredible growing experience. As the only SLP in my community, I'm literally the only one in town. I didn't have anyone that I could bounce questions off of that actually understood what I did (P8)."

There was a desire to have additional professional development so that they would "be able

to adopt or know an AAC system well enough to find specific vocabulary and model it with something in real life (P19). P41 also shared that to find useful apps they would "search on iTunes or the internet" and "typically I end up on some speech blog or website, and then I find more apps there." A number of participants identified that there aren't specific resources or places where to find information about apps, so some participants began blogging and speaking at conferences to educate fellow teachers and speech therapists (P30, P31, P32).

Challenges for Student

Another theme from the data was specific to students. Some participants shared that for specific populations of students (e.g., autism, motor impairments, cognitive deficits), navigating apps can be challenging (P2). They may not have immediate success because they aren't moving quickly from level to level (P2). One participant suggested that the app have a specific focus area, "in autism maybe positive feedback and visual attention (P15)" to increase the success with using the app. There were concerns stated about the attachment to the screen (P2) and some even went on to say that students could become "technology addicts (P6)." Due to the overuse of screen time, "children don't know how to interact with others (P8)" Ensuring that apps are "not for entertainment purposes but for therapeutic purposes (P11)" is critical in their success. Another concern was that the app could be "overstimulating (P14)" and that while "technology can be more engaging (P19)", educators should pick "something that will be more toned down to keep engagement appropriate (P11)." The participants recommended that apps should be designed to be more inclusive of student's vocabulary (P2) and additional apps should be designed to focus on cause-effect to support understanding, new learning, and memory (P15).

Impact of Technology for Clinicians

In general, the participants discussed overall drawbacks and benefits of technology. Participants identified that they had issues with connectivity and that some apps moved at a slower speed (P2, P11, P26). Some apps had mandatory updates (P14) that took time and needed to be completed frequently. The participants wanted fewer options (P14) but ones that were more customizable (P2) with fewer stimulating sounds and images (P14, P26). The participants felt that the iPad allowed for more consistency and standardization (P26); however, across apps, the participants wanted the voice output to be standard dialects. Even

with all the design and development needs, there was still an advantage of that the use of technology "can be more timely or up-to-date and have more variety (P26)."

The participants also identified the ease and convenience of using technology. One example was "giving an assessment, where especially with the two iPads, where the examiner has things at their fingertips (P26)." To assist in supporting teachers with the use of technology, data was collected to identify specific technology and tools based on different types of non-digital vs. digital therapy tools along with diverse software and hardware (Table 2), and a mapping of popular app genres with sample apps based on the ASHA Big Nine domains (Table 3).

Table 2. Different Types of Non-Digital vs. Digital Therapy Tools

Hardware Devices	iPad, iPhone, Samsung Tablet, Microsoft Surface Pro, CD-ROM, SMART board, Tobii Dynavox AAC device
Non-Digital Materials	Flash Cards (e.g., articulation, sequencing, PECS, paper, flashcards, category pictures, PTS flashcards), worksheets and books (Mad Libs), board games (e.g., board, tic-tac-toe), paper and markers, Rolodex, toys and manipulatives.
Online Database	School district database, IEP goal banks, app database, online vocabulary glossary, subscription of Smarty Symbols
Software Applications	Android & iOS App Store (for checking ratings and cost), video conferencing (e.g., Skype, Zoom, Facetime), mobile Apps (e.g., Youtube, Google Reader, Super Duper therapy apps, Toca Boca game apps), PDF reader, iBooks, Google Drive, PowerPoint
Websites	Assessment platforms (e.g., Pearson Q-Interactive), Pinterest, Facebook (e.g., groups, community, downloads on pages), ASHA Forums, blogs that have reviews on apps (e.g., Yappguru.com*), Teachers Pay Teachers, Craigslist

*YappGuru.com is no longer in operation.

Technology Tools & Key Features

Amongst all the mobile apps used by SLPs, several key features were identified for different genres of apps across several content areas (e.g., speech, language, or social skills). Example apps for each app genre category along with ASHA Big 9 categories and implications for teachers are included in Table 3. For example, participants mentioned the most critical feature of articulation and speech apps include drill-based activities for repeated practice and the ability to record audio or voiceover for feedback on students' production; for language and articulation apps, it is important to ensure that activities are scaffolded. For example, for an articulation activity, they first proceed with a syllable, to a word, then to a phrase, to sentence, to structured conversation, to unstructured conversation level activities. For social skills apps, problem-solving scenarios based on real-life situations were reported to be highly desired. In addition, participants highlighted various gamification and data management features and app design techniques that could be beneficial for app designers and developers. These included gamification features such as utilizing level design (e.g., the ability to unlock one level to get to another level) and enabling multiple users to play together for better social interaction, interaction features that highlight preferred visual and functional design preferences (e.g., using colorful and fun graphic design, enabling pauses within in-app progress), and data management requests (e.g., integrating the ability to track therapy goals and progress).

Table 3. Sample Apps for Across Different App Genres Based on ASHA Big 9 Areas

App Genre	**Implication for Teachers**	**ASHA Big 9/SLP Utility**	**App Names**	**App Description**
AAC Apps	Teachers should be prepared and/or dedicate time to implement the use of AAC in the classroom,	Communication Modalities Receptive & Expressive Language	Go Talk Now AAC <Developed by Attainment Company>	Individuals can communicate through actions, recorded or text-to-speech messages, and images.
		Communication Modalities	LAMP Words for Life <Developed by	Gives individuals a variety of pre-stored words used

	support programming of the AAC systems (e.g., adding vocabulary, creating new pages).	Receptive & Expressive Language	Prentke Romich Company>	to expand into sentences to express wants/needs.
		Communication Modalities Receptive & Expressive Language	Proloquo2Go <Developed by AssistiveWare>	This app is customizable and used to help assist individuals in expressing wants/needs.
		Communication Modalities Receptive & Expressive Language	Snap Scene <Developed by Tobii Dynavox LLC>	Offers the opportunity to take a photo and include a recording to communicate in real time.
Academic and Entertainment Apps	Teachers can use these apps to support academic goals as well as for classroom or behavior management.	Cognitive Aspects of Communication Receptive & Expressive Language	Organic chemistry app: Little Alchemy <Developed by Jakub Koziol>	Aims to teach children how to mix simple elements in a fun and interactive way.
		Receptive & Expressive Language Social Aspects of Communication	YouTube Kids (e.g., Peppa Pig, Paw Patrol, PJ Masks, Bubble Gum Bee, Bubble Guppies) <Developed by YouTube>	Interactive videos that teach children basic concepts (colors, shapes, letters, numbers), language, and social skills.
Assistive Technology	Teachers should collaborate	Cognitive Aspects of Communication	ClaroSpeak Plus <Developed by Claro Software	Text is highlighted and read to the individual while

Apps	with the SLP and occupational therapist to support students' needs within the classroom.	Communication Modalities Receptive & Expressive Language	Limited>	also offering word predictions to assist in writing.
Game Apps	Teachers need to be mindful of ads that may "pop up" during the app use to determine if it is appropriate to use with a specific student.	Cognitive Aspects of Communication Receptive & Expressive Language Social Aspects of Communication	Angry Birds Reloaded <Developed by Rovio Entertainment Corporation>	Aim angry birds utilizing a slingshot to destroy different obstacles and unlock new levels.
		Receptive & Expressive Language Social Aspects of Communication	Candy Cards app <Developed by AppStar Studio>	Virtual way to draw cards during a game of Candy Land.
		Cognitive Aspects of Communication Receptive & Expressive Language	My Play Apps (My Play Home-language, My Play School-language, cognition, My Play Store-language, cognition) <Developed by PlayHome	Allows individuals to manipulate certain environments (house, school, store) in detail.

			Software Ltd>	
		Social Aspects of Communication	Reward games - Daniel Tiger's Grr-ific <Developed by PBS KIDS>	Gives children the opportunity to learn about emotions in a fun and interactive way.
		Cognitive Aspects of Communication Receptive & Expressive Language	Toca Boca App <Developed by Toca Boca AB>	Children can experience and manipulate a variety of different environments (neighborhood, school, office, stable, and farm).
Simulation Apps	By using these apps, it promotes critical and evaluative thinking. Usually simulation apps are more ambiguous or open-ended and they increase student engagement.	Cognitive Aspects of Communication Receptive & Expressive Language	Cut the Rope- fine motor, control swiping. <Developed by ZeptoLab UK Limited>	Cut a rope in a variety of different ways to feed a monster and unlock new levels and hidden prizes.
		Hearing Receptive & Expressive Language	Finger Drums- expressive language, math, receptive language, literacy, music, and rhythm. Work on answering questions, asking questions.	Provides three drum kits where you can play along to pre-recorded songs or songs in your music library.

			<Developed by On Beat Limited>	
		Receptive & Expressive Language Social Aspects of communication	Pocket Pond-feed, pet and watch koi fish in a pond. <Developed by TriggerWave LLC>	A koi pond where you can feed, pet and watch koi fish.
		Cognitive Aspects of Communication	Pop the Bubbles-cause and effect, when you touch something, something happens immediately. <Developed by Yonatan Erez>	Shoot bubbles in a variety of combinations to complete levels.
Speech-Language Apps	Teachers need to understand that an app is two dimensional and some students with perceptual disabilities may struggle with transferring the information. It's important to use	Articulation Receptive & Expressive Language	Boo Articulation Helper <Developed by Thomas Ljungblad> Articulation Station <Developed by Little Bee Speech>	Teaches children consonant sounds and offers activities in the word, phrase, sentences, and story levels.
		Receptive & Expressive Language	Language app - Super Duper Pronouns <Developed by Super Duper Publications>	App aims to improve overall language skills in children.

	multimedia learning to promote learning.	Articulation Cognitive Aspects of Communication Receptive & Expressive Language	Smarty Ears apps <Developed by Smarty Ears>	Offers therapy resources for individuals with basic concept skills, receptive and expressive language, articulation, sequencing, and auditory memory difficulties.
		Cognitive Aspects of Communication Receptive & Expressive Language Skills	Between the Lines <Developed by Romain Lebouc>	Trains the brain to read a simple phrase and infer the hidden meaning.
		Articulation	Speech Blubs <Developed by Blub Blub Inc.>	Voice-controlled app used to help children learn new sounds and words.
		Cognitive Aspects of Communication Receptive & Expressive Language	Tactus therapy apps <Developed by Tactus Therapy Solutions Ltd.>	Offers therapy resources for individuals with reading, writing, naming, comprehension, and conversational difficulties.
Utility Apps	Teachers should frequently review the	Hearing Voice and Resonance	Decibel X:db Sound Level Meter	Sound level meter. Assist teachers in identifying harmful levels of classroom

	utility apps that have been downloaded and uninstall the ones that are not being used to create more space.		<Developed by SkyPaw Co. Ltd>	noise, help students learn to control vocal volume.
		Expressive Language	iDoodle <Developed by Vson Technology Co., Ltd.>	Give individuals the opportunity to draw freely; creates opportunities for expressive language (e.g. describing, answering -wh questions, etc.)

Profile of the SLP Clinician Designer

The profile of an SLP clinician designer is multi-faceted. In addition to clinical expertise that informs the app, clinician designers have visual design skills running the gamut from sketching on paper and handing off control to designers, or starting with digital sketches and working back to paper. They also have product management skills (e.g., specifying features and functions, conducting usability tests on end-users to get feedback on app design, communicating with developers, driving the development process, and revising the app as needed based on stakeholder feedback). In addition to product management, SLP clinician designers are product marketers. In our data, SLP clinician designers perform or participated in product design (P9, P15, P24, P21, P26, P37), usability testing (P24, P26, P30, P37), and marketing and promotion (P9, P24, P34). SLPs collaborate with different stakeholders during the dynamic process of app creation (P34, P37). SLP designers report that good communication with developers is critical, as is knowing the limits of their own expertise within that IRPD trio. “I'm not a software engineer and so sometimes I don't realize what is hard to program and what's not (P21).” “Having open communication…not being rigid” is important to successful app creation (P26).

The common factor that SLP-designers bring to the table is insight and motivation based on clinical experience (P9, P24, P25, P26, P27, P28, P37). Some SLP designers are motivated to create apps for specific disorders (P24, P28, P37), and other SLP designers are motivated by

the challenge of improving clinical service delivery by infusing interactivity and fun into the therapy process (P24, P37). For example, an SLP designer created a dance party app to motivate students doing articulation therapy, which is typically very repetitive (P24). Another group of SLP designers is motivated to create tools and assessments that fill a gap. "I realized that there should be an app that works at the sound level" (P37). SLP clinician designers use their clinical experience in the ideation and design process, "I wanted to create functionality that resembles what I do in therapy (P37)" and often draw on the input of other stakeholders including teachers and parents (P34).

Testing and Revising Apps

SLP clinician-designers test apps with the end-user (e.g., the student) in sessions meant to simulate actual use (P12, P24, P37). The value of the iRPD trio in the test development process is that it serves as an iterative loop for product design. Usability testing by the practitioner can trigger a different design direction or confirm a design decision. "Usability testing confirmed my suspicion that the older the child was, the more they expected some kind of gameplay where you get a score or win something. That wasn't my [original] intention with the app (P37)." SLP designers also do usability research among colleagues who are teachers and speech therapists, "I always find myself asking: does this make sense to you? And I mean that from a user experience point of view … do they [the students] know where they need to tap first? (P24)."

Marketing Apps

SLP clinician-designers had an entrepreneurial mindset to engage in the variety of activities needed to market and promote an app; for example, developing "go to market" strategies such as identifying target markets, and determining pricing (P32). SLP clinician designers reach out to bloggers and app influencers (P41), and promote apps through digital means including social media (Twitter, Facebook) (P9), special mailing lists, creating promotions such as contests and giveaways (P9), speaking at conferences (P34), and using professional networks to get word out (P5, P11, P12, P48). "Word of mouth is a very real thing. If you create something and it brings a client success, the client's parents or clinician is going to talk about that (P24)." Some designers leverage the experience of media professionals such as TV executives or branding professionals (P27). App store reviews are mentioned as a key driver

for app downloads ('I think the main thing is ratings. Those are very important in the app world (P9)."

Professional Development and Support

SLP clinician designers are working "out of the box" professionally on many fronts: with new technology, new stakeholders (developers, coders, researchers, marketers), and new roles and responsibilities. SLP clinician designers spoke about being lonely in this new enterprise (P37) and needing support from a community of SLP developers (P28). SLP designers also spoke of the need for communities where developers and clinicians can come together and share ideas "a forum…where both a developer and SLP speech therapists could come together and talk. That might be interesting (P37)." Other SLP designers voice a need for professional associations such as American Speech and Hearing Association to provide standards and publish research (P34) about app functions, features, and design and the benefits of technology use in speech therapy. Proximity to a gaming/developer community or a university is also helpful for clinician designers, to reach out for ideas and possible developer-collaborators (P37).

App Features

SLP clinician designers included a myriad of features in their apps based on insights or ideas from their clinical practices, including interaction features, settings, and methods of delivering instruction. For example, in assessment, it is critical to give each individual being tested consistent instructions, or else the results can be skewed. An assessment app was designed to give the student pre-recorded directions via the iPad speaker, to eliminate the possibility of different testers giving variations of the directions, or unconsciously emphasizing words or phrases (P25). An SLP clinician who wanted to keep her clients motivated designed enticing and unpredictable interactions throughout the app, "You can push different images …there's just a little noise, or an act happens and kids have to figure out where they are, it's not always on the same spot (P30)." Another SLP clinician designer spoke about the need for levels of prompting so an app could be used with students with different levels of functioning, or so that the app could keep pace with the student's skill progress (P28). A story app included audio files reading the story, and on screen, a scroll of text highlighting the story as it was read, so a pre-reader could follow along (P30). An

articulation app displayed the speech sound, gave the student auditory feedback, allowed students to record themselves saying the sound, and allowed them to rate themselves when they produced the sound (P34).

App Use Techniques

SLP clinicians designed techniques for using their apps based on clinical practices, such as an articulation app that taught speech sounds based on simple consonant-vowel combinations that are easy for beginners (e.g., Boo, Bee, Baa). The student drags the consonant and vowel together and the SLP using the app can have them articulate the words slowly or multiple times, triggering continuous, multiple repetitions that optimize learning and motor speech planning (P37). The same app has a visualization of the vocal cords moving when the sound is voiced vs silent. Another app-use technique facilitated skill generalization. The app included a record feature which allowed children to record themselves practicing outside of a speech therapy session. Then "When they come back, the first thing I do in therapy is review their recordings (P34)."

Discussion

There is an important connection that the SLP and teacher share; similar populations of students who need skill development in order to communicate and use language successfully in the classroom. In this paper we have interchangeably used the term clinicians, SLP clinicians, clinical practitioners, and speech language pathologists. As we move forward, we will use the term "practitioners" to refer to speech language pathologists, teachers, and special educators as a whole in order to reconceptualize the teacher's role from a passive technology user to as an active participant.

Considering the Challenges and Recommendations of SLPs

The SLP practitioners and designers in our study believed that those who were implementing and designing apps had qualities that supported the process, like being open-minded and consistent. A teacher can reflect on the qualities they believe that they have and identify if these are similar. If they do not have these qualities, they can still be successful, it just may impact the implementation of using the mobile app because it may take the student longer to

learn the app due to the consistency of the administration of the app. It is important to note that they saw SLP's as leaders in technology, and practitioners should be mindful of their expertise in mobile apps that support speech and language learning goals. By connecting and collaborating with SLP's in the school, practitioners can be more successful at integrating speech and language apps in their teaching (Du et al., 2023).

When using apps during teaching, SLP practitioners noted that it is important to think about the student and to use professional judgment when selecting and implementing an app. Some students may become highly engaged with the technology and they may have a difficult time transitioning to another activity. Or another student may be distracted looking through the different word choices to select one to communicate with the teacher or classmate. Another example is when a student is requested to use the app, they shut down and refuse. It is important for practitioners to think ahead and create a plan to mitigate the potential behavioral issues that may occur with using a mobile app.

One way to address potential behavioral concerns is to partner with the family. A consistent theme in the data was the presence of a fourth stakeholder in addition to the clinician, the teacher, and the student -- the parents. Parents can be the hidden success factor in speech and language learning, so practitioners need to be mindful about providing directions for the families. Parents need to be able to look at an app and know how to use it. The SLP practitioners also noted that parents frequently purchased their own copies of apps to support their child's learning at home. To build on their continuum of care, practitioners can use apps to send activities or homework "home" to partner with families in a dynamic way.

Families need to be supported with training. Additionally, practitioners need to be cognizant of professional development opportunities that support learning technology since it is the practitioner's responsibility to remain up-to-date on evidence-based apps and teaching strategies. Technology is continually emerging, and apps are frequently updating and changing, so it is important that practitioners identify communities and organizations that research new developments in technology and their application to teaching and language learning. ASHA (American Speech Language and Hearing Association) and the Council for Exceptional Children are two organizations that provide multiple opportunities to engage in the most recent technology (e.g., blogs, updated policy, international conferences). Having information on the most up-to-date technology and teaching strategies will give the

practitioner the knowledge to support a variety of students with diverse learning needs.

The data collected in the interview study also provided reports on how there are challenges with utilizing apps among certain populations, such as those with autism or motor impairments. For example, for a student with autism, the SLP practitioner shared that it was overstimulating and that her client stimmed by clicking the same icon and repeating the same word each time they used the app. It was also noted that some apps don't work for the students who have severe motor impairments who may use eye gaze or switch scanning to communicate and interact with apps. As a practitioner, it's important to consider the strengths and needs of your student as well as the features of the technology to choose a mobile app that best supports their learning.

There is also the challenge of monitoring students when they are using an app that contains advertisements in order to avoid the child seeing inappropriate ad content or inadvertently purchasing something being advertised. There was one report of an SLP discussing how they had to be very careful that the student didn't tap on something and try to purchase anything. Free mobile apps are cost beneficial; however, the main drawback of utilizing free apps are the advertisements. Practitioners need to check district or school policy around mobile apps and technology. Verify yourself that app-level blocking features are enabled to stop ads and pop-ups during use. Free mobile apps also may contain inappropriate ad content such as violence and sexual content. Practitioners will want to preview free mobile apps prior to use to ensure that the content is appropriate. If you decide to use a free mobile app, understand that you will need to sit side by side with the student to protect them from inappropriate content.

Multiple school-based SLPs reported encountering challenges with accessing different forms of technology (i.e., iPads, computers, color printers),which reduced the uptake of technology in the school environment. There were reports of difficulty in using AAC technology as a tool to communicate with others across the school setting and how younger children may need extra assistance and time in learning how to use new technology. It is important for practitioners to select and implement technology so that students are able to interact naturally. This does take time not only for the practitioner to plan effectively but also consideration needs to be taken around the student's schedules which can lead to a limit in planning how to incorporate technology (e.g., taking videos).

In our data we saw multiple SLPs discuss concerns regarding automatic updates. For example, some SLPs mentioned how software updates can seriously disrupt teaching by overwriting or deleting valuable student progress data and history. There have been numerous incidents when an app is updated, whether it be iOS or Android, and access or data is lost due to the app update. It is important for practitioners to consider creating, maintaining and storing the information that they need outside of the app to avoid losing established student data.

iRPD Trio

In this research study, we explored how to reconceptualize the iRPD trio, in this case, SLP practitioners, mobile app designers, and technology researchers and the role of the teacher. Learning from the challenges experienced by SLP practitioners, multiple areas of support could be made available from the other two stakeholders, app designers and technology researchers (Du et al., 2023). Each stakeholder has specific roles and perceptions in selecting, implementing, designing, and developing mobile apps that are important to consider.

Practitioners

Teachers and SLPs wear multiple, often interchangeable hats when implementing technology tools to support learning and communication goals. In their role as practitioners, teachers integrate technology seamlessly into the curriculum, using tools and utilities such as Google Earth, e-learning platforms such as Brainpop, and permitting students to produce blogs, podcasts and videos for assignments (Light & Polin, 2010; Ventayen et al., 2018). In their role as practitioners, SLPs are fluidly integrating apps into therapy sessions (Du & Tekinbas, 2020) including language apps and articulation apps. SLPs also use technology tools such as digital video and audio recordings of students in speech sessions for feedback to students, or Youtube videos to demonstrate concepts. Often SLPs and teachers trade hats when implementing technology, such as SLPs working to update AAC devices with specific vocabulary to support academic goals, and teachers working to give opportunities for the child to use the new words on the device in the classroom (Rotheram-Fuller & Dixon, 2023).

Some teachers are not receptive towards implementing technology due to factors such as cost, training, and usability issues (Flanagan, Bouck, & Richardson, 2013). To address this

challenge, teachers need to advocate with administration, request professional development, and explore blogs for databases that collect information about useful apps (e.g., CIDDL, Edutopia). SLPs also need to provide in-service training, and set realistic expectations about how much they can adapt the teacher's curriculum materials and delivery methods. Additionally, developers need to be mindful of learning curves and classroom constraints to make the technology simple to implement for teachers.

SLP Practitioner Designers

As active practitioners with knowledge of the needs of the student and the strengths and weaknesses of the technology, SLPs and teachers also have the knowledge to participate in a user-centered design approach, called participatory design (Elizarova & Dowd, 2017). With the direct experience gained from using the technology with students in the classroom, teachers have valuable insight and feedback for developers that can improve the product. They can share how the app is performing in relation to a specific student goal, or ways that they use the app to collect data. In addition to feedback on the implementation of technology, teachers have insight on how the app or the tool is being received by the student. With that knowledge they are also in the position to represent the student's voice in the product design. For example, if a student is struggling to identify a specific picture with a word, the teacher can suggest other options to visually depict the image that may be more effective.

Non-SLP Designers and Developers

The findings from the multi-stakeholder interviews indicated that non-SLP app designers and developers can contribute valuable skills that can assist teachers and SLPs in facilitating effective technology-enhanced therapy sessions within classrooms. One key skill they can offer is the scalability of therapy apps across different technology configurations and languages. During our interview study, our non-SLP app developer participants mentioned how they provided technical support and quick releases of different versions of the same app that were compatible with various device configurations to make it accessible for students in the classroom and at home. This stakeholder group also has the skills to translate apps from one language to another so that they can reach multiple language communities. They can also leverage their technical skills to create more personalized apps by updating the in-app characters and voice tone used based on research, feedback, and cultural constraints of

potential users. Participants discussed how the involvement of non-SLP developers throughout the design process could be helpful in proactively integrating translation theory-driven therapy techniques into application features, game mechanics, or app storylines.

App developers would greatly benefit from close support from teacher and SLP practitioners in the creation of effective and engaging technology-driven lesson plans for students in classrooms. As part of the iterative design process, app designers and developers often benefit from evaluating the apps in a classroom setting to understand which application features are effective and which may need improvement. This application testing is also important to ensure that the app is meeting the therapy goals set forth initially.

Teacher and SLP practitioners can assist usability testing by providing access to app testers and classrooms and providing expert input based on prior experience of working with students in a classroom setting and working with similar apps. Teachers can explicitly discuss their thoughts on which types of application features worked and did not work well for specific therapy goals. Teachers can also provide concrete input on what additional features can be added to track student interaction with the app that could later be used to assess student improvement for a specific communication goal. Other strengths that teachers and SLPs can bring to the table include therapy materials, funding to conduct usability testing, specialized external support including icon collection. Overall, our interview data illustrates the unique role non-SLP developers can play in designing and developing scalable therapy apps for classrooms that accommodate students of different language groups and populations.

Researchers

The dynamic collaboration between research, development, and practice is pivotal in designing effective interventions (Olswang & Goldstein, 2017) as well as effective apps and technologies. The researcher ensures the app or tool has scientific rigor; the practitioner contributes expertise about the communication patterns and needs of specific populations, or specific educational practices. Practitioners are also mindful of the implementation and administrative issues likely to impact the use of the app or tool and can give the developer valuable insights in how to engineer the technology so that it fits seamlessly in the educational setting.

Conclusion

Understanding the student user is foundational in the process of selecting, implementing and designing an app. The more various facets of the student's needs and experiences are considered, the more likely the mobile app will be successful. With the holistic understanding of the student in mind, knowing specific mobile apps and their features is critical in the selection of choosing them to meet a specific goal or objective. We can learn from the speech language pathologists not only how to implement apps but also how to design apps that support language learning especially students with communication needs. This is mirrored in the iRPD model where they can be a practitioner and focused on their teaching practice and collaboration among key stakeholders especially speech language pathologists. They are also seen as a researcher, collecting student data and adapting their teaching based on the data.

Finally, they can be designers and make impacts to the field especially when it comes to developing technology to assist language learning. The key to this model is being able to identify how to work with different stakeholders and the unique assets that they, as teachers, bring as they move throughout the iRPD framework as practitioners, researchers and designers so that the students can have an internally consistent user experience. In the future a closer look at the non-practitioner developer data is beneficial to educate teacher practitioners on basic technology competency to become better collaborators and more independent designer partners.

Recommendations

Implementing Apps

It is important to consider different stakeholder needs when implementing apps to use with students. Based on the data from the stakeholders in this study and the foundations of the iRPD framework (i.e., shared epistemology, interconnected social factors, awareness of app affordances, child-centered pedagogy), we compiled a list of six areas to consider when implementing apps.

1. *Collaborate and Create a Smart Partnership*

The first step is collaborating, whether you are a teacher, special educator, speech language

pathologist. Sharing ideas and getting on the same page is critical. Teachers and special educators share a unique lens of the classroom and the day-to-day impacts that language and technology play within the classroom. It is also critical to collaborate with speech language pathologists because they hold a unique epistemology that can provide the teacher with a greater understanding of language and specific strategies and technology to support students and their teaching. Having a "smart partnership" where practitioners think "smarter not harder" is the key! Collaborating to exchange ideas, implement new technology, collect data, analyze the results is all a part of the partnership. The members can determine and assign each role and meet to continue working towards a common goal. Each partnership is unique and roles may vary depending on what is decided among the collaborators in the partnership.

2. Conduct a Holistic Review of the Student

Each student is unique and has different factors that impact their learning. It's important to learn their strengths and needs with the language and communication but also with the technology. An advanced organizer like a SWOT worksheet that identifies strengths, weaknesses, opportunities, and threats can help guide the practitioner in collecting information about the student. The SWOT analysis can be given individually to multiple people to gather data on a specific student, or it can be used in a meeting with a variety of stakeholders where they discuss each section to gain more knowledge about the student. During this process you want to involve the family and possibly the student if it is age appropriate. In collecting information about the student there may be some social factors (e.g., multilingual, diagnosed disability, school setting, type of service delivery) that influences the type of tool and where you will begin using the technology. For example, if a child is multilingual, is the app or technology offered in other languages? Or if the student is placed in an inclusive setting for part of the day and a self-contained setting for ELA (English Language Arts), it may be more appropriate to begin teaching the technology in a smaller setting where interaction can be supported and monitored more frequently. By gathering the information about each facet of the student, the practitioner can create more individualized choices in technology for the student and teach them in a child-centered way.

3. Connect to Goals and Objectives

Technology and the tools that are selected need to connect to academic content standards or

the specific goals and objectives that have been identified for the student. This may seem like a basic concept; however, there has been a direct connection to academic success and improvement in areas beyond the classroom. If the student has an identified disability in his or her IEP, there may also be technology considerations to be mindful of when implementing technology. For example, a student with autism may be distracted by an app that has flashing graphics and loud noises, or a student with cortical visual impairment (CVI) may require high-contrast visual design. If you choose to include the student in the process of setting and tracking the goals, it can help them learn important life skills like planning, organizing, and time management while also building communication skills, self-awareness, and confidence.

4. *Explicitly Teach the Technology*

Make sure that you have used the technology before. Test run it, conduct activities and practice utilizing the technology or the app like you plan to use with the student. Review and evaluate the special features and make appropriate selections based on the holistic review of the student and their goals and objectives. Then, think about exactly where, when, for how long you want to first introduce the device or app. You don't want to assume that younger children are digital natives and are able to quickly learn the technology.

5. *Integrate the Technology among Settings*

Once it is determined that this is the technology tool or app that is going to be implemented you'll want to provide professional development for others who interact with the student. This phase is where you can build on the partnership that you developed in step 1 of this process. Practitioners will collaborate with that team to identify key stakeholders for the training. This is particularly important for families and maybe even training multiple members if possible so that there is a larger support network for the student. Once the training has occurred among the key stakeholders, the team will also discuss gathering data for the generalization and maintenance of the tool for the student.

6. *Continually Evaluate*

Data collection needs to occur in each setting. This can be informal like observations, anecdotal records, and discussions with the student, family or other practitioners. It can also

be formal where you are directly observing the student or providing a survey to gather more concrete data that may not be able to be observed. The goal of continual evaluation in multiple forms is to monitor the effectiveness of the technology intervention and adjust to make changes if needed. There needs to be evidence that the intervention is effective. Sometimes the app or technology tool will have a data collection system; however, the participants suggested having the practitioner create their own tracking system to ensure the individual goals and objectives are being met. An additional tip that was shared, that is above and beyond, yet still critical advice from our participants was to connect to a tech community. They discussed the benefits of state, federal, and professional websites like National Council of Teachers of English (i.e., Connected Community website or blog), International Literacy Association, Council for Exceptional Children or American Speech-Language-Hearing Association). These websites can provide up-to-date policy changes, position statements, and lesson resources to support language learning.

Designing Mobile Apps

It is possible to design mobile apps as a practitioner. Based on our research, we've compiled a list of recommendations with some supporting templates to further assist you in developing apps based on your insights and experience.

1. *Identify Gaps*

As you use your instructional materials, make note of any gaps in the materials and tools that you are using. A gap can be an opportunity to create a mobile app that will fill an important need. Before investing too much time, do thorough market research by searching for apps that might be solving the same or similar problems. You can search the iOS App Store and Google Play store, in addition to conducting web searches using keywords that describe your app idea, for example, "math facts AND mobile app." Specialized databases such as the *Educational App Store* might be helpful during this step.

2. *Draw Upon your Knowledge and Experience and Generate App Ideas*

Practitioners have valuable domain knowledge and experience that can be used as app creation ideas. Draw upon your knowledge and your teaching experience to generate app

ideas that will connect with your students. Some examples in our study included an SLP practitioner who saw a need for a categorization app to supplement her non-digital materials, and an SLP researcher who developed an app that made use of biofeedback technology being developed in her lab.

3. Identify Key Stakeholders in Your Setting and Collaborate

Identify and collaborate with stakeholders in your setting who can give input on app design and implementation, such as SLPs, paraeducators, parents, and special education teachers. Other stakeholders could include technology gatekeepers at the school, TOSAs (teachers on special assignments), and administrators who authorize curricula and purchases. Later, these stakeholders can also help you test and refine your app during development.

4. Collect and Analyze the Data

With different stakeholders identified in the previous step, the practitioner can conduct structured interviews on mobile app usage and design (e.g., asking the same predetermined questions to all stakeholders, in the same order). You will gather different data based on stakeholders' role and perspective, and this information will give you actionable insight for app implementation, app development and sales and marketing. For example, you could learn from a TOSA (Teacher on Special Assignment) who is assisting with English Language Learning that your school district is looking for apps that address a specific instructional area. To help structure the data collection and analysis process, we included the codebook (Appendix B) that we used in our research study. The codebook can provide ideas and themes that can assist you with your app design and development. There are quotes provided in the example that can be used as a guide as you analyze the interviews. Additionally, the codebook includes areas of influential factors that will affect and constrain your app, including financial, economic, political, social/cultural, and ethical/moral that you will want to consider as your design and develop your app.

5. Organize your Ideas

Use the *Persona Template* (Appendix C) to organize your ideas, such as app features and functions, student needs and characteristics, teaching goals and strategies, influential factors,

and stakeholder perspectives. Personas are a user-centered design tool that help designers consider the worldview of specific users (e.g., their professional backgrounds and challenges, their perceptions and attitudes, and their needs and desires). Personas can help focus the digital designer on the concerns of specific users in a holistic way. The *Persona Template* in Appendix C was directly designed from the codebook in Appendix B. It is a summary of the primary codes in the codebook, as well as the subcodes nested under the primary codes.

6. Connect to a Community

Many of the SLP designers in our data spoke of how lonely it can be to design apps, since app design is an entrepreneurial activity taking place outside of a practitioner's main job and professional community. These practitioner designers filled their need for support by reaching out to communities of app designers and other practitioners for ideas and encouragement. You can connect with like-minded practitioner designers yourself via social media (e.g., a Facebook group such as "Teachers With Apps"), technology blogs (e.g., https://www.helloteacherlady.com/blog), or industry groups such as International Technology and Engineering Educators Association. Informal, self-organizing conversations ("subreddits") of developers and aspiring developers can also be found on Reddit (i.e., www.reddit.com). Here are a few subreddits you can follow to start learning from others: r/AskProgramming, r/LearnProgramming, and r/Coding.

7. Develop your Team

Refer to the iRPD framework in Figure 1 to organize the app development process and all its key considerations, the team members and their interactions. Reach out to developers and researchers with your ideas. These individuals will need to have a highly collaborative mindset to be able to work dynamically with other team members, as illustrated in the iRPD framework.

8. Design, Test and Retest your Mobile App

Actively involve stakeholders in the research cycle, including the student. Take data on the prototype app and share information while you are in the design phase of the mobile app. Try ideas, test, and iterate.

9. Provide Feedback and Consider the Feedback of Others

Create an internally consistent user experience by considering feedback from your stakeholders and development partners. When each stakeholder perspective is considered and balanced with the others, the synergy assists in creating apps that reflect the needs of the student, the teacher, and the environment. Also, think through the feedback features of the app (Banihashem et al., 2022). What feedback do you want the app to give? What feedback do you want the teachers or SLPs to give? For example, the app could give the child feedback for a correct answer with an interactive sound or visual. In some cases, the practitioner will need to give the feedback themselves. For example, currently an app cannot judge if a speech sound is correctly produced so a practitioner must assess the speech sound and provide the feedback (in the future with artifical intelligence this may change). In some cases the practitioner and student will work together using the app and feedback will occur with the teacher as a guide to facilitate learning and feedback using the app. Using the articulation example above, the practitioner can reinforce the correct sound production of an "r" sound, and tell the student, "Give yourself a point." When the student "gives themselves a point" the app can provide feedback like sounds or visuals.

Getting Started

These prompts can be used to assist in improving your practice to support language learning.

1. Reflect on personal collaboration with SLP and make concrete goals on how to improve the collaboration or shared practices.
2. Explore a variety of apps utilized by SLPs (see Table 3) to support language learning and identify at least 1 to try to implement within your practice.
3. Analyze the dynamic interaction between stakeholders in the iRPD framework in your setting. Identify some opportunities and challenges of collaborating to create mobile apps.
4. Identify a developer (see Table 3) and reach out to him or her. Discuss ways that you can collaborate and support each other in your unique roles.

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Appendix A. Demographic Information of 37 SLP App Users and Designers and 13 Non-SLP App Designers and Developers

Participant ID	Work Setting	Location	Areas of Specialty
P1	Private Practice	OR, USA	General
P2	Public School	CA, USA	AAC
P3	University Clinic	WA, USA	AAC
P4	Children's Hospital	PA, USA	AAC
P5	Private Practice	MA, USA	Instructional Tech
P6	Public School	TX, USA	General
P7	Private Practice	AZ, USA	General
P8	Public School	TX, USA	General
P9	Private/Telepractice	CO, USA	General
P10	Cerebral Palsy Center	Malaysia, USA	General
P11	Public School/Telepractice	WI, USA	Telepractice
P12	Public School	OR, USA	General
P13	Hospital/Telepractice	NM, USA	Assessment

P14	Public School	CA, USA	General
P15	Public School	AZ, USA	General
P16	Private Practice	China	General
P17	Children's Hospital	OK, USA	General
P18	Home Health	TX, USA	General
P19	Public School	NY, USA	AAC
P20	Private Practice	CA, USA	Behavioral Intervention
P21	University Clinic	CA, USA	AAC
P22	University Clinic	OH, USA	Pedagogy and Games
P23	Private Practice	CA, USA	Telepractice
P24	University/Private Practice	NJ, USA	Fluency & Games
P25	University Research Lab	IN, USA	AAC
P26	Public School/Telepractice	OR, USA	Prosody
P27	Private Practice	TX, USA	Assessment (Bilingual)
P28	University Clinic	ND, USA	Articulation & Language

P29	Public School/App Company Owner	TX, USA	Articulation & Language
P30	Senior Product Management	WA, USA	Assessment
P31	Public School	CA, USA	Articulation & Language
P32	Research Lab (Telepractice)	NY, USA	Biofeedback
P33	University Research	TX, USA	Assessment (Bilingual)
P34	SLP/Graphic designers	UT, USA	Articulation & Language
P35	Private Practice	CA, USA	Auditory Processing
P36	Private Practice	MA, USA	Social Groups
P37	Hospital SLP/iOS Developer	Sweden	Articulation & Games
P38	Play Designer Children's Game Company	Sweden	Children's Games
P39	PhD Student Researcher	CA, USA	Speech Recognition Game
P40	Interactive Producer	Canada	Speech Recognition Game
P41	Parents with Disabled Children	WA, USA	Children's Games
P42	Web developer/Parent w/ Disabled Child	UT, USA	AAC

P43	Parents with Disabled Children	CA, USA	Speech Recognition Game
P44	iOS developer	Israel	Children's Games
P45	PhD Student Researcher	CA, USA	Speech Recognition Game
P46	PhD Student Researcher	TX, USA	Speech Recognition Game
P47	Director of Operations	NC, USA	Speech Therapy Apps
P48	Interactive Producer	Lithuania	Children's Games
P49	iOS developer	Sweden	Children's Games
P50	iOS developer	Sweden	Children's Games

*AAC = Augmentative Alternative Communication (AAC); P1 to P23: SLP App Users, P24 to P37: SLP App Designers, P38 to P50: Non-SLP App Designers and Developers

Appendix B. Interview Codebook with Codes, Themes, and Sample Quotes

Themes	Codes	Sample Quotes
Client Characteristics	**Age Group**, Type of Disability/Disorders, Levels of Ability	"Creating apps for kids, for little ones. The smallest from one year, for example, until the school age like preschool kids." (P44)
Clinician & Developer Characteristics	Clinical Setting, Clinician/Developer **Experience**, Non-clinical Roles	"I was always interested in technology, so I went and got a second master's in instruction tech, which I did online through a state college near here, Framingham State." (P5)
Clinical Practice	**Therapy Goals**, Therapy Environments, **Therapy Activities**, Therapy Materials, Therapy Techniques, Clinical Challenges, Case Management	"They think that they're just playing. Here I'm asking them questions like, "Where do you think the bee is going to be next?" I'm working on prepositions [laughter] and they're just coloring." (P28)
App Characteristics	App Names & Genres, App Use Techniques, **Design and Development**, App Features	"I couldn't find any app that did what I wanted it to do. I reached out to Barbara, and I said, "I have this idea, I want to do a categorization app. Here is what it would look like." She is like, "Absolutely, you make it up, and I will come up with how it looks." I spent the next, probably close to a year, in developing and researching how to teach categories, and why was it really important." (P28)

Therapy Tools	Non-digital Materials, **Online Platforms**, Software, Hardware, Database	"For fluency clients, we will go to websites, try to identify famous people who stutter, or watch videos of children who stutter just to help educate them and empower them." (P1)
Influential Factors	Sociocultural, Political, Ethical/Moral, **Financial**/ Economic, Motivating (to the clients)	"I probably wouldn't pay 30 dollars for a pronouns app you know what I mean. For a general sentence building app that I can use to make a bunch of different things I'd be more willing." (P6)
Support Systems	Stakeholders & Organizations, **Perception & Attitudes**	"I think the tech community, for the most part, really doesn't understand the education system, doesn't understand special education. And it's sometimes difficult to communicate with them." (P23)
Recommendation	**App Design**, System Design, Unmet Clinical Needs	"For some reason, [kids] just love to watch [game apps]. It would be really cool if there was an app component in there where they would have to say something to make him run or jump or whatever and using language in it." (P7)
Marketing	Distribution Channel and Methods, Advertising/Public Relations/Promotion, **Marketing Research**	"We realized here that we had to connect with people in different ways. So…I'm a member of groups on Facebook where teachers are, are talking about education and technology and iPads, special education and so on." (P50)

Appendix C. Blank Persona

CLIENT CHARACTERISTICS

Age	Types of Disability/Disorders	Levels of Ability
➢	➢	➢

CLINICIAN CHARACTERISTICS

Clinical Setting	Clinician Experience	Non-Clinical Roles
➢	➢	➢

CLINICAL PRACTICE

Therapy Goals	➢
Therapy Environments	➢
Therapy Activities	➢
Therapy Materials	➢
Therapy Techniques	➢
Clinical Challenges	➢
Case Management	➢

APP CHARACTERISTICS

App Names & Genres	App Use Techniques	Design & Development	App Features
❑	❑	❑	❑

TOOLS

Non-Digital	Online Platforms	Software	Hardware	Database
●	●	●	●	●

SUPPORT SYSTEMS

Individuals Stakeholders / Organizations	Perception & Attitudes
●	●

RECOMMENDATION

App Design	System Design	Unmet Clinical Needs
●	●	●

INFLUENTIAL FACTORS

Sociocultural	➔
Political	➔
Ethical/ Moral	➔
Financial/ Economic	➔
Motivating (to the clients)	➔

COMMERCIAL OPPORTUNITIES

Marketing	★

Author Information

Kathryn Lubniewski

https://orcid.org/0000-0002-8208-2358

Monmouth University

400 Cedar Avenue, West Long Branch, NJ 07764

USA

Contact e-mail: *Kathryn.Lubniewski@monmouth.edu*

Lori Price

https://orcid.org/0000-0002-3757-3780

Apple Tree Speech

12 Lummi Ky, Bellevue, WA

USA

Yao Du

https://orcid.org/0000-0003-2858-2420

University of Southern California

1975 Zonal Avenue, Los Angeles, CA 90033

USA

Nikita Soni

https://orcid.org/0000-0002-8231-0795

University of Illinois Chicago

1200 W. Harrison Street, Chicago, IL 60607

USA

Citation

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Chapter 8 - Social Constructivist Learning Principles for Designing Online Learning Environment

Yusufu Gambo

Chapter Highlights

- There are several challenges confronting educational institutions, including the COVID-19 pandemic, the transition from in-class teaching and learning to an online learning environment, and supporting, engaging, and motivating distant, remote, and isolated students in an online learning environment.
- Online learning systems may identify and collect students' real context of learning situations and interactions with the learning environment.
- The online learning environment can be supported using social constructivist learning for an active online learning engagement.
- There is a scarcity of a well-defined methodology for deriving social constructivist learning principles that can guide the design of an online learning environment for authentic learning experiences.
- This chapter explored the goal, principles, and framework of constructivist theory. After that, compared with the attributes of social constructivist learning to develop the learning principles.
- These thematic learning principles are multi-perspectives, collaborative, contextual, and reflective and can support active and authentic learning experiences in an online learning environment.
- These learning principles are useful for learning designers and those supporting students' active learning process in an online environment for personalized and inclusive learning experiences.

Introduction

Educational institutions face diverse challenges, including cost, the COVID-19 pandemic, and moving in-class teaching and learning to an online environment. Besides, the need to support, engage and motivate distance, remote and isolated students in an online learning environment to achieve learning goals (Egielewa *et al*., 2021; Sarkar *et al*., 2021; Temdee, 2020). However, an online learning environment is a complex process. It is changing the role of teachers from the source of knowledge to the facilitator of knowledge, requiring students to be active in their learning process to achieve their learning goals.

The increasing advancements in smart and mobile technologies are speeding up the development of an online learning environment. Through these technologies, an online learning system can detect and collect real learning contexts of students and their interactions with a learning environment (Egielewa *et al*., 2021; Temdee, 2020). Similarly, there is increasing use of online devices among students, which can support anywhere at any time learning process without restrictions on space and time (Egielewa et al., 2021; Menon *et al*., 2020). An online learning environment can be developed using smart technologies supported by a learning theory to take advantage of the characteristics of devices among students to enhance learning processes. One of the challenges facing the online learning environment is how to pedagogical design it using the existing learning theories to provide meaningful interactions and authentic learning experiences. Gros (2016) noted that "researchers and educators need to develop new thoughts about pedagogy based on existing theories, such as constructivism, cognitive load theory and new ones such as connectivism and networked learning".

Several learning theories have been used to support the design of a learning environment, including social constructivist learning, constructive learning, cognitive, socio-cognitive, etc. (Egielewa et al., 2021; Zhuang *et al*., 2017). However, educational institutions' current challenges require online learning environments that can provide support and interactions and motivate students to succeed in the learning process (Ranjbaran et al., 2023). Thus, there is a need to develop innovative pedagogies in online learning environments to support learning (see Noroozi & Sahin, 2022a, 2022b). It can support the knowledge content and provide opportunities for developing skills for authentic and meaningful learning experiences (Secore, 2017; Korkmaz & Toraman, 2020).

Human beings learn meaning through social and cultural interaction. Through this process, authentic and meaningful interactions can occur. Thus, social constructivist learning has been identified as having the characteristics needed to support students' active learning process and help them achieve meaningful learning interactions (Lave & Wenger, 1991; Mbati, 2012; McMahon, 1997; Secore, 2017). It can provide social learning and interactions for active learning engagement (Amineh & Asl, 2015; Smith & Berge, 2009). Several social constructivist learning principles were used in literature to support the design of learning environments, such as collaborative, contextual, reflective etc. However, there is a scarcity of well-defined work that derived these learning principles based on the theories underpinning social constructivist learning to support authentic and meaningful interaction in a learning environment. Thus, how can a social constructivist learning principle be derived and applied to design an online learning environment**?** This paper explored the goal, principles, and framework of constructivist theory and the attributes of social constructivists to develop social constructivist learning principles that can support the learning process in an online learning environment. These learning principles can support students' active and meaningful learning interactions for engagement and motivation in an online learning environment.

Theoretical Background and Related Works

(i) Constructivist Learning Theory

Constructivist learning theory claims that mental skills and actions build knowledge (Bada & Olusegun, 2015). Constructivism refers to how people use knowledge, resources, and other people's help to enhance their mental models and problem-solving techniques (Woolfolk, 2007). The constructivist education paradigm allows students to build objective reality and sharpens cognitive growth for higher-level intellectual development in social interaction with individual mediation.

Constructivist learning and teaching view students as "active in creating their knowledge" and that "social interactions are crucial in knowledge construction" (Bruning *et al*., 2012). Constructivists believe knowledge is gained via direct experience and reflection (Tam, 2000). Constructivists' core tenet is that learners create new information on top of existing knowledge (Oliver, 2000). Education becomes more about applying concepts and making connections than absorbing material. The teaching and learning processes have increasingly focused on using knowledge (Amineh & Asl, 2015; Arends, 1998). Students examine their

own experiences; therefore, evaluation is a part of the learning process (Bruning *et al*., 2012; Adams, 2006). Constructivist learning is classified into different sub-theories: trivial, socially constructive, radical, critical constructivism, etc. (Amineh & Asl, 2015; Adams, 2006, Tam, 2000). These sub-theories are used in various studies to explore how teaching and learning support students' active learning experiences (Baharom, 2013; Jonassen, 1999; Knuth & Cunningham, 1993).

The pedagogical goals of a constructive learning environment are to allow students to determine how they will learn. For example, Knuth & Cunningham (1993) summarized seven goals of a constructive learning environment, further explored and discussed by Honebein (1996) to support a learning process. Besides, Fosnot (1996) discussed and summarized the general principles of constructivist learning environments, which are useful in designing a learning process. Furthermore, Jonassen (1999) discussed and provided the framework of the constructivist learning environment, which is widely used in literature to support learning activities in a learning environment (Baharom, 2013). These goals, general principles, and frameworks are important foundations for developing learning activities among the sub-theories of the constructivist learning theory (Baharom, 2013; Duffy & Cunningham, 1996; Fox, 1997; Lefoe, 1998).

(ii) Social Constructivist Learning

Social constructivism is a sub-theory of constructivist learning theory and is a knowledge in sociology and communication theory that investigates how humans generate information and perceive their environments (Amineh & Asl, 2015; Adams, 2006). It is a subset of constructivist learning theory that stresses the collaborative character of much learning. It is heavily influenced by the works of Vygotsky (1896 - 1935), who noted that information is first created in a social setting and then internalized and utilized by people (Utami, 2016). Cultural and contextual understanding is important in comprehending what is occurring in society (Derry, 1999; McMahon, 1997). According to Kim (2001), the social constructivist approach is predicated on the simple assumptions of reality, knowledge, and understanding of the social environment. Palincsar (1998) noted that it "concentrates on the interconnectedness of societal and individual processes in the co-construction of knowledge". This concept implies that learning is understood as a process of socially created actions within a context when viewed through social constructivism.

Social constructivist scholars view learning as an active process in which learners should learn to discover principles, concepts, and facts for themselves, thus encouraging learners to think intuitively (Brown & Palincsar, 1986). According to Shunk (2000), social constructivist teaching techniques have stressed cooperative education, group communication, computational learning, problem-based training, online searches, grounded training, and other strategies that include learning with others. The social constructivist instructional models emphasize learner interaction and social professionals (Lave & Wenger, 1991; Mbati, 2012; McMahon, 1997; Secore, 2017; Utami, 2016).

Social constructive learning is a student-centered learning process; it generates knowledge and experiences through social interactions and collaborations within a learning environment and reflects upon experiences and progress using various digital learning devices (Adams, 2006; Shah, 2019; Mohammed & Romli, 2021; Morchid, 2020). Social constructivist learning is attributed to demonstration, lectures, social dialogue, interest, authentic problem solving, choice, collaboration, and reflection (Bonk & Cunningham, 1988). Thus, social constructive learning processes can support the active learning process. Social constructivists see motivation as extrinsic and intrinsic because learning is a social phenomenon. Learners are partially motivated by rewards provided by the knowledge community. However, because a learner actively constructs knowledge, learning also depends on the learner's internal drive to understand and promote the learning process (Morchid, 2020; Shah, 2019).

(iii) Social Constructivist and Online Learning Environment

Social constructivist learning is how students collaborate with other students, instructors, and peers to excel in the learning process. These processes mean students develop critical thinking, collaborative, communicative, and innovative learning strategies to support their active learning processes (Mohammed & Romli, 2021; Morchid, 2020; Shah, 2019). According to social cognitive theory, the learning environment and students' learning process are intertwined.

In addition to reading, writing, and computing skills, the global community thinks students should think critically, collaborate, communicate, and create knowledge (Lu & Jiang, 2016). Based on this concept, students' learning process will shift from passive acceptance and recall to active exploration and generation of information (see Banihashem et al., 2022a, 2022b).

The learning environment must be redesigned to support advanced cognition and skill acquisition, and an online learning environment is thought to help students learn actively (Lu & Jiang, 2016; Zhuang *et al.*, 2017).

Interaction is an essential element of effective teaching, and this is true regardless of the presence or absence of technology. Any learning environment requires interaction as a necessary component, whether in a traditional classroom setting, synchronous or asynchronous online education, or a hybrid of the two. The process of information acquisition, as well as the development of both cognitive and physical abilities, requires interaction as a crucial and basic step in the learning process (Barker, 1994; Zhuang *et al.*, 2017).

Therefore, providing interaction and improving its quality have been major study goals for instructional designers and researchers in Instructional Technology for a long time (Hannafin, 1989; Lu & Jiang, 2016; Noroozi & De Wever, 2023). We as humans are social beings who develop as a result of our social interactions with members of the communities in which we live. In recent years, an increasing number of teachers and other education professionals have come to recognize social constructivism's importance as a basis for building more efficient learning environments (Morchid, 2020; Shah, 2019). Individuals and society as a whole are seen by social constructivists as inextricably linked to one another. Social constructivists contend that students acquire their knowledge primarily through participation in the social practices of a learning environment, such as joint endeavours and group projects, as well as in the social practices of their immediate communities, such as daily life with their families and attendance at religious gatherings (Stage *et al.*, 1998; Shah, 2019).

The social constructivist learning approach is a good fit for learning theory for designing an online learning environment. It provides an opportunity for a conversation among peers in a real-world setting; it creates a space for a dialectical process to occur in a learning process (Lu & Jiang, 2016). The social constructivist method is also concerned with learning, which occurs due to the learners' experiences. Knowledge is not static or external; understanding is gained via social interactions (Hannafin et al., 1997). As a result, a learning designer is responsible for creating learning activities that support the learner's learning process in an online learning environment that accommodates various learning tools and styles to ensure students have an inclusive learning experience (Temdee, 2020; Zhuang et al., 2017).

Methodology

Social constructivism is a theory of knowledge development that has a long history as a sub-theory of constructivism (Duffy & Cunningham, 1996; Fox, 1997; Lefoe, 1998). The development of social constructivist learning principles followed the approach of Lefoe (1998). Doolittle & Camp (1999) noted that a social constructivist learning environment should encourage "social negotiation and mediation; Content and skills relevant to the learners; teacher serves a facilitator; learning in authentic and real-world environments; encourage multiple perspectives; skills should be constructed around prior knowledge; formatively, serving to inform future learning experiences; learners are encouraged to be self-regulatory, aware and mediated". These eight characteristics might be considered when determining how an online social constructivist approach to learning might function. Online learning also naturally encompasses all of these (*Secore, 2017).*

This paper review and compare pedagogical goals (Knuth & Cunningham, 1993), general principles (Fosnot (1996), and framework (Jonassen, 1999) of constructivist learning theory and compares with the list of attributes (Bonk & Cunningham, 1998) of social constructivist theory. According to Conole et al. (2004), matching the learning theory features with the learning environment may influence both theory and practice in a learning environment. This concept can be used to develop learning activities to build an online learning environment through the lens of social constructivism.

Thus, the processes for deriving the social constructivist learning principles are divided into two stages as follows:

(i). Review and compare the pedagogical goals (Knuth & Cunningham, 1993), principles (Fosnot (1996), and framework (Jonassen, 1999) to obtain the general principles of a constructivist learning environment, as shown in Table 1.

(ii). Compare the general principles of a constructive learning environment with the list of attributes for social constructivists (Bonk & Cunningham, 1998) to obtain the general learning principles of social constructivists, as shown in Table 2.

These processes enabled the social constructivist learning principles to guide the design of learning activities in an online learning environment for students' active, authentic and meaningful learning experiences.

Table1. General Principles of Constructivist Learning Theory

Honebein (1996) Pedagogical Goals	Fosnot (1996) Principles	Jonassen (1999) Framework	General Principles
Provide hands-on experience with the process of knowledge building. Students decide what topics or subtopics to study, learn, and solve difficulties, and the teacher should assist.	Learning progresses toward creating structures: Encouraging students to build principles (self-organization) across various experiences.	Constructive articulation and reflection: Students must express their reflection to incorporate observations into current mental models.	Student-focused learning activity encourages them to take responsibility for their learning
Provide experience and appreciate multiple perspectives: Problems in the real context rarely have one correct solution. There are typically multiple ways to think about solving problems. Students must engage in activities that enable them to evaluate alternative solutions to problems to test and enrich their understanding.			Activity that gives numerous perspectives using various resources
Incorporate learning into realistic and	Learning is aided by disequilibrium:	Authenticity in a complex and	Contextualized learning activity

relevant contexts: Students must relate what they are learning to the context in which they are learning.	Students must investigate and develop ideas that confirm or contradict their research.	contextual situation: Learning tasks should be embedded in natural environments.	
Encourage student ownership and participation in the learning process: constructivist learning is focused on the learner. Rather than the instructor deciding what students will learn, individuals investigate their interests and aspirations.	Learning does not occur due to development; rather, learning occurs due to students asking questions and formulating their ideas.	Active manipulation and observation: Involving students in meaningful assignments and observing their results.	Engaging learning activities for students
Embed learning in social experience: Social connections greatly impact intellectual development. Thus, learning should be a collaborative effort between instructors and students.	Dialogue within the community supports further thinking: Student-led discussions about defending, verifying, justifying, and explaining ideas to create shared meaning.	Conversation and collaboration lead to cooperation: Task collaboration is another learning method. It is through dialogue amongst learners in a learning community that learner develops thinking skills	Collaborative learning activity

Encourage the use of multiple modes of representation. Oral and written communication are the two most frequent modes of communicating knowledge in educational contexts. However, learning using these modes of communication limits solely how students perceive the world. Curricula should embrace new media, such as video, computers, photos, and sound, to give deeper experiences.			Multimedia learning activity
Encourage self-awareness of the knowledge construction process: Knowing how we know is a crucial result of constructivism. Understanding why or how students addressed an issue;	The driving force behind learning is a reflective abstraction, which includes reflection, multi-symbolic representation, and strategy discussion.	Intentional reflection and regulation for learning: Achieving goals and reflecting on the process helps learners create new knowledge. .	Learning activity that acknowledges the learner's reflecting process

analyzing how students constructed knowledge and processes.			

Table 2. General Learning Principles of Social Constructivist Learning

Bonk & Cunningham (1998) Attributes of Social Constructivist	General Principles of Constructivist Learning	Social Constructivist Learning Principles
	Student-focused learning activity encourages students to take responsibility for their learning	Multiple-Perspective Learning Principle
▪ Lecturer support by demonstration and explanation ▪ Several viewpoints	Activity that gives numerous perspectives using various resources	
	Contextualized learning activity	Contextual Learning Principle
▪ Problems that are real	Engaging learning activities for students	
	Multimedia learning activity	
▪ Team selection and interest ▪ Discussion and elaboration in the social sphere ▪ Collaboration & negotiation	Collaborative learning activity	Collaborative Learning Principle
▪ Process & reflection	Learning activity that recognizes the reflection process of the learner	Reflective Learning Principle

Thus, four major social constructivist learning principles are aligned with the development of the online learning environment based on the methodological approach. The four types of

learning principles are contextual learning principles, reflective learning principles, collaborative learning principles, and multi-perspective learning principles. These four categories established a theoretical foundation for active, authentic and meaningful interaction activities that might guide the future design of an online learning environment. However, the precise implementation of these online learning activities depends on several factors, including students' app preferences, learning styles, learning requirements, etc. (Baharom, 2013: Mohamad & Romli, 2021).

Thus, the four themes of the social constructivist learning principles that can support the active learning process in an online learning environment to deliver meaningful learning interactions are discussed as follows:

(i) Multiple-Perspectives Learning Principle

Activities that enable students to explore knowledge from different perspectives and develop linkages and explanations can encourage high-order thinking (Dabbagh, 2005). Students can rearrange information to create new knowledge by exposing them to various experiences (Kim, 2001; Duffy & Cunningham, 1996). Spiro *et al*. (1991) emphasized the need for various circumstances and resources to develop knowledge due to exposure to various extra learning resources made available to students for meaningful interactions. From this standpoint, multi-perspective learning activities may be represented in various ways, including textual, visual, and auditory representations. Many learning contexts are intended to make learners aware that different views on issues are especially important in real-world situations (Dabbagh, 2005). It entails students considering multiple points of view to discover a meaningful solution to the issue, and it has the potential to provide new meaningful learning experiences.

(ii) Contextual Learning Principle

Contextual learning facilitates knowledge development and guarantees students access to resources to help them develop high-order knowledge (Kim, 2001; Palincsar, 1998). Activities might be developed for contextual learning, where real-world issues and tasks are within reach of their online device (Secore, 2017; Shah, 2019). According to Duffy & Jonassen (2013), learning activities "should help individuals make sense of their world as

they encounter it". Activities might be developed to utilize students' various settings. For example, undergraduate computer science students may be requested to take images and videos of their coding process and upload them to a virtual repository for a teaching aid bank. In other words, combining physical and digital artifacts can allow learners to experience phenomena, concepts, and relationships within a learning environment.

(iii) Collaborative Learning Principle

Working in groups can assist learners in enhancing their knowledge via argument, controlled conflict, and reciprocal learning, ultimately leading to a shared understanding of the subject matter (Wood & O'Malley, 1995; Dunlap & Grabinger, 1995). When learning occurs in a collaborative environment, students receive information from experts and fellow students. Peer interaction allows students to put their ideas to the test and assist one another in creating or refining knowledge systems (Dunlap & Grabinger, 1996). Collaboration efforts are required to report and present discoveries and negotiate and defend information obtained through learning settings (Oliver et al., 1996). Collaboration on problem-solving and knowledge-building appear to be common objectives when people cooperate or engage in social bargaining (Duffy & Cunningham, 1993). In addition to ensuring that learning activities are varied, a learning designer may facilitate peer teaching. Social interactions give mediated perceptions of events, but group communication facilitates learning about the world around you (Vygotsky, 1978). Learners must learn to maintain reciprocal relationships to succeed in their studies (Wenger, 1998). Besides, Dabbagh (2005) noted that social bargaining is necessary for every collaborative effort. Through discussion, learners may get insight into what it means to be in a social context. For example, using a discussion forum or other interactive tools, students may learn about taking turns in arguments, respecting opposing perspectives, and keeping a dialogue going in an online learning environment to support learning experiences.

(iv) Reflective Learning Principle

Reflective learning experiences encourage self-evaluation and insights into students' strengths and weaknesses. Duffy & Cunningham (1996) noted that when "one encounters or witnesses a circumstance in which previous beliefs are inadequate, the awareness of a current state of knowledge is enhanced," we are said to be in the process of reflecting. Furthermore, the

process of evaluating and interpreting what has transpired to offer new meaning to a situation or occurrence is known as the act of reflecting (Kim, 2001; Dabbagh, 2005). One type of activity, which might be adapted for use on an online device and created for reflection, allows learners to reflect on their knowledge and experiences and organize and reorganize information. Encourage students to evaluate their work, analyze their accomplishments, and draw comparisons with their peers to improve their learning (Shah, 2019; Wilson, 1996). Actions encouraging students to talk about their actions and understandings may result in real introspection. Online learning environments can be designed to facilitate inquiry-based activities through record-keeping and the promotion of reflective learning experiences.

Conclusion

Educational institutions face several challenges, including the COVID-19 pandemic, the transition of in-class teaching and learning to an online learning environment, and the need to support, engage and motivate distant, remote, and isolated students in an online learning environment to achieve learning objectives. On the other hand, an online learning environment is a complex process that presents problems for both students and teachers; it shifts instructors' roles from a source of knowledge to a facilitator of knowledge, forcing students to be active participants in their learning process to succeed and accomplish learning objectives.

Smart technology developments are hastening the development of an online learning environment. An online learning system may identify and gather the real-learning circumstances of students and their interactions with the learning environment using various technologies. Similarly, students increasingly use mobile devices, enabling an online learning experience not limited by place or time. An online learning environment may be created by combining online and mobile technology and a learning theory to capitalize on the growing number of online learning opportunities among students to improve learning processes. Several learning theories have been used to design a learning environment, such as social constructivist learning, constructive learning, cognitive, socio-cognitive, and so on. However, today's difficulties necessitate an online learning environment that can give students support, interactions, and motivation to succeed in an active learning process and minimize obstacles and future educational processes. The characteristics of social constructivist learning principles can enhance students' active learning processes and assist them in achieving their

learning goals. Active learning engagement enables social learning, interactions, and collaborative, multi-perspective, and reflective learning processes. However, there is a lack of a well-defined methodology for deriving these learning principles to guide the design of a learning process to support the active learning process in a learning environment.

This paper explored the goal, principles, and framework of constructivist theory and compared it with social constructivist learning attributes to derive the social constructivist learning principles. These learning principles are multi-perspectives, collaborative, contextual, and reflective, supporting the active learning process in an online learning environment. This process addressed how social constructivist learning theory can be derived and support an online learning environment that could encourage active learning experiences. These learning principles are useful for learning designers and thus support students' active learning process in an online environment for authentic and meaningful learning experiences.

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Author Information

Yusufu Gambo

https://orcid.org/0000-0003-1646-8567

Adamawa State University

Mubi

Nigeria

Contact e-mail: *yusufu.gambol@gmail.com*

Citation

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Chapter 9 - The Impact of Virtual Flipped Learning on Gifted and Non-Gifted Students' Motivation from L2 Motivational Self-System Lens: Does Giftedness Cause Distinct Motivation?

Kamal Heidari

Chapter Highlights

- COVID-19 has borne drastic effects on different areas of society, including the education area, in that it brought virtual education to the center of attention, as an alternative to in-person education.
- In virtual education, the importance of flipped learning doubles, as students are supposed to take the main responsibility of teaching/learning process; and teachers play merely a facilitative/monitoring role. Given the students' responsibility in virtual flipped learning, students' motivation plays a pivotal role in the effectiveness of this learning method.
- The L2 Motivational Self-System (L2MSS) model is a currently proposed model elaborating on students' motivation based on three sub-components: ideal L2 self, ought-to L2 self, and L2 learning experience.
- Drawing on an exploratory sequential mixed-methods research design, this study probed the effect of virtual flipped learning (via SHAD platform) on 112 gifted and non-gifted students' motivation based on the L2 MSS.
- This study uncovered that notwithstanding the point that virtual flipped learning improved both gifted and non-gifted students' motivation, it differentially affected their motivation. In other words, gifted students mostly referred to ideal L2 self, while non-gifted ones referred to ought-to L2 self and L2 learning experience facets of motivation.

Introduction

The disruption brought about by the outbreak of COVID-19 pandemic has borne huge effects on different areas, especially education. It pushed educational stakeholders, specifically teachers and students, to swiftly adapt to a gamut of novel situations and experiences. Technology substantially assisted educational stakeholders with dealing with critical situation. Over a relatively short period of time, educational centers had to move from in-person education to virtual education in which learning materials are delivered to students via internet (Van Puffelen et al., 2022). The advancement of technology, specifically technology-assisted learning in the last decade, has caused teachers to start to consider virtual learning as a way of promotng self-directed learning for students and engaging a larger group of students, in comparison with in-person education (Bao, 2020). This education method requires adjustment by both students and teachers to adapt themselves to novel learning situations, in which technological support and active learning are foregrounded (Sandhu, 2020).

In virtual education, compared with in-person education, teachers usually have less control over students' learning and performance (Flores & Gago, 2020). Students may announce their attendance in the class but doing other irrelevant tasks or disconnecting themselves intentionally and attributing it to technology-related issues. İn such a situation, students are typically expected to take more responsibility for learning and to manage their own learning. That said, motivation plays a pivotal role in virtual education, in that motivated students are more likely to manage their learning and take their classes more seriously.

Motivation

As correctly foregrounded by Noroozi et al. (2020), learning is a complicated phenomenon subsuming an ensemble of components, skills, and processes. Motivation is simply the force that pushes people forward. It is an underlying factor for managing to learn (Tăbăcaru, 2021), for it influences how students are likely to give up or move forward. According to Tăbăcaru (2021), motivation and learning go hand in hand, as they, directly or indirectly, affect each other. Motivation level is directly related to academic achievement and persistence (Anderman & Patrick, 2012). Having positive motivation for learning can drastically assist students in succeeding to achieve their learning goals. Similarly, motivation is of great

importance in learning a second language. Dornyei (1998, 2005) rightly asserted that motivation provides the primary impetus to commence language learning and sustain its long and challenging process. There is a great deal of research highlighting the importance of motivation in L2 learning. As one of earliest studies on motivation and L2 learning, Gardner and MacIntyre (1991) looked into the role of motivation in language learning of two groups of college-level students. While they told the students of one group that they would be awarded $10 provided that they do the vocabulary task correctly, the participants in another group was only told to do their best in doing the task. The study finally indicated that the former group spent more time on and attention to the task and was more successful in undertaking it, compared with the latter group. Although the study clearly focused on instrumental motivation, its findings generally revealed that motivation, of any kind, is an influential factor in L2 achievement. After that, many researchers reported positive effects of motivation on L2 learning. More recently, numerous studies (such as Alamer, 2022; Dörnyei & Chan, 2013; kim et al., 2017; Noels et al., 2019) have highlighted that motivation needs to be taken as a central factor of L2 learning by teachers.

To narrow down the role of motivation in virtual education, most of conducted studies (to name a few recent ones, Kruk, 2022; Papi & Khajavi, 2021) have reported positive impacts of virtual education on motivation of L2 learners. The study conducted by Wehner, et al. (2011), for example, showed that language-related activities performed through virtual classes generated higher-level motivation than the activities done by learners in in-person classes. Jiang et al. (2022) also explored the the effects of virtual learning on 200 L2 learners' three variables, namely, motivation, attitude, and anxiety. The study reported positive effects for virtual education on increasing the learners' motivation and attitudes, and mitigating their anxiety. The study by Banihashem et al. (2023) also reported that inclusion of virtual learning into common traditional learning might substantially boost students' motivation.

The L2 Motivational Self-System

Despite the above-mentioned simple definition, motivation has been found to be a complex phenomenon encompassing a number of sub-components/factors which, in turn, are interlinked in varying ways. Different scholars have offered models and frameworks to clarify the complexity of motivation. Gardner (1985, 2001), as an example, foregrounded the multicomponential nature of motivation by asserting that it is the combination of three major

factors: effort (making endeavor to learn), desire (being willing to achieve a goal), and positive affect (enjoying doing the intended task). More recently, the L2 Motivational Self-System (L2MSS) was proposed by Dörnyei (2005, 2009) as a model to study and understand motivation in the new century. The origin of the L2MSS can be dated back to the study by Dörnyei and Csizér (2002) in which they ran a nationwide survey of L2 motivation in Hungary (Csizér, 2019).

A basic assumption of the L2MSS is that when a learner conceives a difference between their current state and their future self-guide (i.e., ideal or ought), this difference might work as a stimulus in order to connect the perceived gap and reach the desired final state. L2MSS encompasses three components: ideal L2 self (referring to the L2 attributes that learners ideally desire to have), out-to L2 self (referring to the L2 attributes that learners think they must possess to meet expectations), and L2 learning experience (referring to learners' perceptions and viewpoints toward different aspects of L2 classes, including teachers, textbooks, etc.).

The first and foremost point about the model is that, as Dörnyei (2019) has also reiterated, all the three constituents of the model are of significance and need to be taken into account when elaborating students' motivation through the model. The literature have reported positive contributions for the model to varying facets of learning, in general, and L2 learning, in particular, such as motivation (Taguchi et al., 2009), proficiency (Papi & Teimouri, 2014), achievement (Dörnyei & Chan, 2013), writing strategies (Jang & Lee, 2019), and anxiety (Papi, 2010). As a concrete example, the meta-analysis by Yousefi and Mahmoodi (2022) demonstrated that the L2MSS might do the justice (conceptually and contextually) about motivation and learning interaction, in that it depicts L2 motivation as an intricated system that highlights the understanding of time scales and change patterns taking place in learners' motivation and learning (Dörnyei, 2020).

In general, despite the many studies conducted on the L2MSS (Dörnyei & Ryan, 2015), there are still some unexplored issues (Papi & Khajavi, 2021). Examining the motivation of students based on the L2MSS in different academic fields, specifically L2 learning, is a topic that is in need of investigation. Further, the interaction of the L2MSS and virtual education, especially virtual flipped learning, is among these unexplored areas.

Flipped Learning

It was Wesley Baker in the late 1980s who introduced the flipped classroom as an educational strategy (Segalsson et al., 2017). Because at that time, personal computer progress had not developed to a degree that permits complete fusing of his opinion, his idea was not credible. Since the use of technology potential boosted at the outset of the twenty-first century, particularly YouTube and the Internet in 2006, Baker's tips have been granted dominant importance by a vast range of educators. (Afzali & Izadpanah, 2021).

Flipped learning, also known as inverted learning, rethinks the traditional way of teaching as it inverts the traditional classroom procedure by introducing the intended materials and content prior to class, making it possible for teachers to use class time to direct students actively (Yough et al., 2017). It is an instructional method in which learners listen to and study the materials introduced by teachers at home, and discuss them at class time (Gopalan & Klann, 2017). Flipped learning, then, facilitates a more learner-centered and learning-focused view by asking learners to take a more active role for their learning. In particular, flipped learning is a convergence learning method focusing on interaction in the form of discussion-based and problem-solving lessons (Yoon et al., 2017; Jensen et al., 2015).

Based on Sarasyifa, (2018), there are many features pertinent to flipped learning: (a) Teacher-centeredness switches to students-centeredness in the flipped learning process (the students have the chance to investigate information and make an effort by his or her own); (b) the opportunity is provided for them to have access to download video from YouTube exercise sheet, read from the textbook, micro-lecture, etc., and (c) the role of the teacher as the sage on the stage" switches to the guide on the side in this kind of learning. To put it another way, the teacher is the facilitator for the students during the learning process, and not the major origin of the information. Accordingly, a number of advantages can be enumerated for flipped learning. Learners are often more motivated in flipped learning classes, in that they are more confident, have less anxiety, and feel more accountable to other peers for their contribution to activities. Further, learners read the materials before the class time. Thus, they attend the class prepared and with almost the same level of knowledge. Finally, learners are more likely to be engaged in classroom activities, as they have some prior knowledge about and awareness of what is going to happen in class and, because of this, have more confidence in class (McLaughlin et. al., 2014).

Flipped learning has also been found to enhance students' attitude and motivation more than traditional learning. For example, in the study by Bakla (2018), flipped learning was practiced by giving students a set of activities such as taking preview notes, asking students to view teaching films in advance, establishing Google teacher–student collaboration platforms, and establishing an online evaluation system for students. The study showed that flipped learning drastically promoted the students' motivation. Lin et al. (2018) also compared a flipped classroom with a traditional classroom for mathematics learning in primary schools. The results uncovered that flipped learning increased students' learning motivation and interests more than traditional non-flipped learning.

Some studies have investigated the effect of flipped learning on varying aspects of L2 learning such as idiomatic learning (Chen Hsieh et al., 2017), speaking (Li & Suwanthep, 2017), reading (Abaeian & Samadi, 2016), and writing (Lee & Wallace, 2018; Shu, 2015).
In general, despite a bunch of research studies might be found in the literature dealing with the effect of flipped learning on motivation, no study, to the author's knowledge, has ever looked into the effect of flipped learning on L2 learners' motivation based on the L2MSS. Part of this study tries to address this lacuna.

Giftedness and L2 Learning

Reviewing the literature, a remarkable variation might be found in the definitions provided for giftedness (Sahragard & Heidari, 2014; Pfeiffer et al., 2018). While older definitions (such as Terman, 1925) took a uni-facet in nature and considered receiving very high marks on an intelligence test as the main criterion for giftedness, newer definitions (such as Sternberg, 2018 and Renzulli & Reis, 2018) are multifaceted in nature and consider a number of sub-components for intelligence and thereby giftedness or require high-level non-cognitive factors, especially motivation and creativity. Despite the considerable variation in the definitions of the concept, intelligence has always been an important benchmark for giftedness (Worrell et al., 2019).

It has been reported that many gifted students do not thoroughly realize their potential, despite the outstanding cognitive abilities characterizing these students (Stroet et al., 2013; Worrell et al., 2019). One reason for it has been found to be lack of motivation of gifted students, which, in turn, results in their underachievement (Snyder & Linnenbrink-Garcia,

2013). This lack of motivation might emanate from diverse reasons such as lack of suitable teaching approaches, methods, activities, and materials that can assist them with making the best use of their potentials. İn fact, one rationale for creating special schools for gifted students was that regular classes could not support and meet gifted students' needs and expectations. Studies comparing the motivation of gifted and non-gifted students reported that gifted students, on average, show higher intrinsic motivation than non-gifted ones (Agaliotis & Kalyva, 2019; Gottfried & Gottfried, 1996; Vallerand et al., 1994). Moreover, gifted and non-gifted students have been reported to show similar performance goals, which can be regarded as an external kind of motivation (Meier et al., 2014; Preckel et al., 2008). Although the conducted studies report that gifted students often have higher intrinsic motivation and similar extrinsic motivation, not all gifted students sound to be characterized by high-level quality motivation (McCoach & Flake, 2018). Therefore, further insight is required with regard to motivational differences between gifted and non-gifted students, specifically based on recent motivation models such as the L2MSS to reach a more fine-tuned understanding of the motivation of gifted and non-gifted students. Knowing about the differences of gifted and non-gifted students in terms of the three components of the L2MSS (that is, ideal L2 self, ought-to L2 self, and L2 learning experience) can raise the awareness of educational stakeholders, including material developers, course desighners, teachers, and even students, as to how they are generally motivated to learn. This understanding, in turn, might navigate them to utilize associated materials, methods, and activities to help them burgeon their potentials.

All taken together, there has been a bulk of research demonstrating the positive effects of virtual education on L2 learners' motivation. Despite these studies, there are still many areas that need to be further explored. One area is the effect of virtual flipped learning on motivation of L2 learners based on the L2MSS model. Additionally, the motivation of gifted and non-gifted students for L2 learning has not yet been academically investigated. To address such gaps, this study aimed to respond to the following research questions:

1) Does virtual flipped learning improve the gifted and non-gifted students' motivation?
2) Do gifted and non-gifted students significantly vary in their motivation based on the L2MSS model?
3) If yes, how the interview results reflect the differences?

Method

Gifted Schools and Research Context

This study was carried out in gifted and non-gifted high schools of two cities of Iran. Regarding gifted schools in Iran, their admission is selective and based on a comprehensive nationwide entrance examination procedure for students in grade 6 (elementary school) and grade 9 (middle school). A minimum GPA of 19 (out of 20) is required for attending the entrance exam. The entrance exam at each level includes a number of multiple-choice and written questions testing students' intelligence, math, and science skills based on what they have studied in previous years. The style of questions varies each year. In one type, questions describe a particular phenomenon and its related problems. Then, students are asked to provide solutions and reasoning. The evaluation of the answers is not based on the choice, but on the described reason, trying to distinguish students with higher reasoning abilities. In another type, students are given a succinct introduction on a certain complex scientific topic, which most students are not supposedly familiar with. Afterward, they are required to solve a specific given problem using mathematical calculations, reasoning, or their common sense.

Furthermore, SHAD is the application developed by the Iranian Ministry of Education after the outbreak of COVID-19 for deliverying and teaching course content to students. It provides teachers in Iran with facilities to help them connect and communicate with their learners. Teachers shared texts, videos, pictures, exercises, and homework with students online. İt is completely free for teachers and students to use.

Research Design

A mixed method study was designed to delve into the effect of virtual flipped learning on gifted and non-gifted learners' motivation based on the L2MSS. Mixed-method design was adopted because drawing upon both quantitative and qualitative data provides more insightful findings than using either of them (Creswell & Clark, 2011). More specifically, sequential quantitative-qualitative explanatory mixed-method design was used in that first in the quantitative phase of the study, the pre-test-posttest-control group design was used and after that, in the qualitative phase of the study, the perceptions of the participants regarding the flipped learning and its impact on their motivation was examined.

Participants

The participants of the study were 112 Iranian L2 students selected via non-probability convenience sampling procedure. They were both male (51) and female (61) with the age range of 16 to 18 years old. They were also both gifted (54) and non-gifted (58). The giftedness/non-giftedness of the participants was based on the Iranian Ministry of Education benchmarks and examinations. They all spoke Persian language as their native language; and their second language (that is, English) level was determined to be intermediate by running a Quick Placement Test (QPT). Finally, the participants were told about the study purposes and their informed consent was received.

Instruments

The following instruments were utilized to glean data of the study. First of all, the proficiency level of the students was checked by giving them the QPT of Syndicate (2001). It consists of 60 multiple-choice reading comprehension, vocabulary, and grammar items. It is a reliable, valid, and well-organized instrument to pinpoint English language learners' proficiency level (Syndicate, 2001). The test was administered to the learners in line with its guidelines.

After running the QPT, the questionnaire developed by Abdollahzadeh and Papi (2009) was given to the participants to examine their perspectives based on the L2MSS principles. The questionnaire comprises two main sections. The first part pertains to different demographic characteristics of the participants, involving age, gender, etc. The second part includes 24 items in five-level Likert scale (from agree to disagree) format. Although the questionnaire has already been validated by Abdollahzadeh and Papi (2009), the questionnaire was given to three University professors who were expert at testing and research areas to confirm its appropriacy for the present study purpose. Also, the reliability of the scale was .77 by running Cronbach's alpha ($\alpha = .77$).

The third instrument was a semi-structured interview run one week after the treatment to gain the students' perceptions toward the virtual flipped learning. It included several pre-planned open-ended and yes/no questions such as: "how do you feel about this way of learning?", "Did this new method increased your motivation to learn?", "Did this method make you more motivated to pursue your desired goals explain?", etc. The questions were then given to one

experienced University professor to feedback on their appropriacy, relevance, and clarity. Over the interviews, when necessary depending on the interviewees' responses, the interviewer could ask further impromptu questions. To check the credibility of the data extracted from the semi-structured interview, member-checking and peer-debriefing were implemented. For member-checking, six of the interviwees were asked to review their transcripts and emerging themes to evaluate the accuracy of the interpretations; and for peer-debriefing, two University professors were asked to review and comment on the respnses and their analyses.

Data Collection Procedure

The study had different stages. In the first stage, the QPT was given to the participants to measure their general English proficiency. In the second stge, the questionnaire by Abdollahzadeh and Papi (2009) was filled out by the participants prior to the commencement of the study. In the third stage of the study, the flipped teaching/learning process was implemented for the participants. Lastly, in the fourth stage, the questionnaire was again given to the participants after the treatment phase to respond as a post-test.

The students were assigned different materials including video clips, the files of readings, and other relevant materials via SHAD platform to practice before the next day class. During the class time, the students practice what they have learned from the materials and teachers played the role of guide or mentor to answer their questions or solve the ambiguities.

After completing the quantitative data collection, they were told to announce their willingness to take part in the qualitative part of the study (interview). From the whole participants, 22 (12 gifted and 10 non-gifted) volunteered to sit for the interview. Each participant was interviewed individually for almost 15 minutes. The interviews was audio-recorded for later analysis process.

Data Analysis Procedure

The quantitative data gleaned via the questionnaire was analyzed by SPSS (version 25), specifically descriptive statistics and independent t-test. As to the qualitative data, the interviewees' transcripts were blind re-coded for each participant. This stage of procedure

was carried out to double check the themes emerged in the study. Furthermore, 30% of the data was rechecked and reanalyzed independently by a second researcher (a Ph.D. candidate of applied linguistics) who was briefed about the purpose of the study and was also conversant with qualitative data analysis.

Results

The QPT Results

Before dealing with the research questions of the study, some primary analyses were conducted to check the descriptive statistics, homogeneity, and normality assumptions of the data obtained from the QPT. Table 1 presents the descriptive statistic pertinent to the QPT.

Table 1. Descriptive Statistics of QPT in Gifted and Non-Gifted Groups

Group	N	M	SD	Skewness	Kurtosis
Gifted Group	54	11.82	3.14	-.034	-1.201
Non-Gifted Group	58	10.91	3.06	.467	-.878

As it can be seen, the values of skewness and kurtosis in both gifted and non-gifted groups was within the acceptable range (-2 and +2), which, in turn, indicates that scores on the QPT were normally distributed. However, to ensure about the normality of scores, Kolmogorov-Smirnov (K-S) Test was also run on the data. Table 2 presents the related results.

Table 2. Test of Normality of QPT Scores

	Kolmogorov-Smirnov		
Test	Statistic	*df*	*Sig.*
QPT	.091	111	.210

Given the obtained significance value, that is Sig.=.21, it approved of the normality distributions of scores in the two groups.

Additionally, a *t*-test was also run on the scores of QPT in order to make sure that the two groups were not significantly different regarding their overall level of English proficiency prior to the main study. Table 3 shows the results of this test. According to the obtained Sig.

value in this table (Sig.=.17), there was no significant difference between participants in the gifted and non-gifted groups with respect to their scores on the QPT prior to the treatment. Thus, the homogeneity of the two groups were also confirmed.

Table 3. The Results of T-test on QPT Scores between the Two Groups

		Levene's Test for Equality of Variances		*t*-test for Equality of Means			
		F	Sig.	*t*	*df*	Sig.	Std. Err. Diff.
QPT	Equal variances assumed	.053	.717	1.251	111	.174	1.557
	Equal variances not assumed			1.252	111	.174	1.556

The L2MSS Results

The first research question was related to the pre-test post-test differences of each of the two main groups of study on the L2MSS scores. To this question, the descriptive statistics regarding the ought-to L2 self, ideal L2 self, L2 learning experience, as well as the total motivation pretest and posttest of the two groups are shown in Table 4.

Table 4. Descriptive Statistics of the Pretest and Posttest of the L2MSS Components of the Two Groups

Group	Variable	Group	N	*M*	*SD*
Pretest	Ought-to L2	Non-Gifted	58	13.44	2.92
		Gifted	54	12.16	3.31
	Ideal L2	Non-Gifted	58	11.29	2.25
		Gifted	54	16.09	2.07
	L2 learning experience	Non-Gifted	58	14.86	2.34
		Gifted	54	12.81	2.71
	Total	Non-Gifted	58	39.59	7.51
		Gifted	54	41.06	8.09
	Ought-to L2	Non-Gifted	58	15.15	2.74

Group	Variable	Group	N	*M*	*SD*
Posttest		Gifted	54	13.61	3.25
	Ideal L2	Non-Gifted	58	12.55	2.61
		Gifted	54	17.90	1.95
	L2 learning experience	Non-Gifted	58	15.49	2.74
		Gifted	54	13.73	2.55
	Total	Non-Gifted	58	43.19	8.09
		Gifted	54	45.24	7.75

This Table shows that the mean of the posttest in all the three sub-components of the L2MSS in both gifted and non-gifted groups was more than that of the pretest. It, then, indicates that the flipped learning could improve the motivation level of both gifted and non-gifted students.

The second research question of the study was associated with weather gifted and non-gifted students statistically vary in their responses to the L2MSS model. Descriptive statistics of L2MSS questionnaire for gifted and non-gifted groups is presented in Table 5.

Table 5. Descriptive Statistics of the Scores of the L2MSS Questionnaire

Group	N	Min.	Max.	M	Scale Mean (On a 6-point scale)	SD	Skewness	Kurtosis
Gifted	54	40	79	66.14	7.27	7.896	-.810	-.1.49
Non-Gifted	58	35	82	61.18	4.89	9.50	.363	1.079

Based on this table, the skewness and kurtosis values for both the gifted and non-gifted groups were also within the acceptable range of (-2 and +2). In addition, the higher mean belonged to the gifted group, as the mean for the gifted group was 66.14 (7.27 on a 6-point scale) while for the non-gifted group was 61.18 (4.89 on a 6-point scale). Now, to see wheher this difference is statistically significant, the results of the independent t-test is presented in Tabe 6. The table reveals that the two groups differed significantly in their scores on the L2MSS ($t = -.44$, $P < 0.05$).

Table 6. Independent t-test of L2MSS Scores in Gifted and Non-Gifted Groups

	t	Df	Sig.	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Gifted & Non-gifted on L2MSS	-.44	111	.03	-.39	.59	-1.58	.76

The Interview Results

The quantitative results of the study showed that first, virtual flipped learning had improved the motivation of both gifted and non-gifted students; and second, the two groups were significantly different in their motivation scores on the L2MSS questionnaire. Now, to respond to the third research question asking about what the differences between the two groups exactly lied, the results of the qualitative data (semi-structured interview) are discussed to reach more accurate, comprehensive, and objective findings (Silverman, 2006). Having transcribed the recordings of the interviewees from both groups, the researcher, with the help of N-vivo, extracted a number of themes and sub-themes from them. Table 7 shows the obtained results from the gifted interviewees.

Table 7. Extracted Themes and Subthemes from the Gifted Interviwees

Themes and Subthemes	f	%	Related Subcomponent
1. General benefits of knowing English • Being more successful in society • Being more important in society	13	25.13	Ideal L2 self
2. Personal interest in learning English	11	21.25	Ideal L2 self
3. Confidence feeling by learning English	9	15.26	Ideal L2 self
4. Being a fluent English speaker	8	14.07	Ideal L2 self
5. Understanding English movies and songs	8	14.50	Ideal L2 self
6. Passing the final course exam	5	4.54	Ought-to L2 self
7. Making teachers and parents happy	4	4.02	Ought-to L2 self

Themes and Subthemes	f	%	Related Subcomponent
8. Not being mocked by peers when making a mistake	3	1.23	L2 Learning experience

The table clearly reveals that gifted students mostly referred to points that were pertinent to ideal L2 self component of the L2MSS. They mentioned issues such as "interest in speaking English like a native speaker", "being a more important and successful person in society", and "understanding English movies and songs", which are all related to ideal motivational sources. As an example of the gifted students' comments, one of them said that:

> *"Virtual flipped learning was a good way for me to learn English. İt can help me to like English language more. I was sure that if I say something wrong, nobody mocked me. But in real classes, when I make a mistake others laugh and mock me. Virtual flipped learning helped me to be more confident and interested in English language. Of course, it had some problems too. For example, I had many problems in installing and using the program."*

Table 8 presents the main themes extracted from the non-gifted students' interviews.

Table 8. Extracted Themes and Subthemes from the Non-Gifted Interviwees

Themes and Subthemes	f	%	Related Subcomponent
1. Personal interest in learning English	1	.93	Ideal L2 self
2. Being better than others (friends & classmates)	15	23.43	Ought-to L2 self
3. Passing the course with a good score	14	20.60	Ought-to L2 self
4. Makıng teachers and parents happy	11	18.38	Ought-to L2 self
5. More chance of getting a good job in the future	9	14.66	Ought-to L2 self
6. Not being mocked by classmates	8	12.45	L2 Learning experience
7. More guidence from teacher	5	9.55	L2 Learning experience

In contrast to the previous table, the results of this table shows that non-gifted students often referred to ought-to L2 self and L2 learning experience motivational factors. As an example, one of the non-gifted interviewees mentioned that:

> *"Virtual flipped learning was good. Because it helped me to get better support from my teacher and understand the lesson better. I also did not feel bad when I made a mistake. I should get a good score because I know it can make my parents and also my teacher happy. This method also increased my interest to English. Now I like to learn English more and be better than my cousins."*

In general, these two tables show that whereas gifted students refer to ideal L2-self as the main source of motivation, non-gifted ones mention ought-to L2 self and L2 learning experience as their main motivation source.

Discussion

This study uncovered that notwithstanding the point that virtual flipped learning improved both gifted and non-gifted students' motivation, it differentially affected their motivation. While gifted students mostly referred to ideal L2 self motivation, non-gifted ones referred to ought-to L2 self and L2 learning experience aspects of motivation in virtual flipped learning. As with the positive impact of flipped learning on motivation improvment of both gifted and non-gifted students, some studies have similarly reported the rewarding impacts of flipping the classroom procedure on students' learning and motivation. Reviewing a number of studies on flipped learning, Nguyen (2014) concluded that flipped learning can augment students' motivation and autonomy, as well as their learning achievement in different subjects. Schultz et al. (2014) and Kvashnina and Martynko (2017) also reported that students mostly had positive attitudes toward flipped learning, referring to advantages such as the ability to pause, review, and rewind materials, and increased individualized learning and teacher availability. To explicate this finding, the basic focus of flipped learning has repeatedly been said to be making students fully engaged in active learning rather than passively receiving knowledge delivered by teachers (Hamdan et al., 2013; Li et al., 2015). It requires that students actively receive instruction and assess their understanding in preparation for class time. This active anticipation and increased responsibility that flipped learning transfers to students would make them more motivated to undertake their responsibility successfully. İt also creates a sense of cooperation (Strayer, 2012) among students, motivating them to implement their tasks well. Furthermore, another precept of flipped learning is that students attend the classes with prior partial knowledge about and awareness of the class content (Hung, 2015), which mitigates their negative feelings,

particularly stress. Reduction of stress, in turn, enhances their confidence and motivation and even causes them to increase their active agency in class. On the other hand, there are also few studies that reported negative effects of flipped learning on motivation. Fassbinder et al. (2014), Alzahrani (2015), and Strayer (2012) revealed that although students initially showed high motivation toward flipped learning, their motivation eventually diminished, largely due to their students' difficulty in completing their pre-classroom tasks. İn fact, it might be argued that if students are adequately technology literate and become well aware of the process of flipped learning, flipped learning may desirably affect their motivation.

Another finding of this study was that gifted and non-gifted students were differentially motivated by virtual flipped learning. While gifted students were inclined toward ideal L2 self motivation, non-gifted students explained their motivation by ought-to L2 self and L2 learning environment motivations. No study, to the best of author's knowledge, has previously dealt with flipped learning from giftedness and the L2MSS lens. However, this finding may be explicated by findings and results of some previously-conducted studies.

Motivation has always been one of central components in education, especially gifted education. İn the oft-cited three-ring model of Renzulli (1977, 1986) on gifted behavior, motivation has been highlighted in the "task commitment" ring, which is defined as person's, motivation, willingness, and persistence to achieve a task. Different studies such as Curby et al. (2008) and Hornstra et al. (2020) have suggested that gifted-students show higher task committment (including higher-level motivation) than non-gifted ones. Differentiated Model of Giftedness and Talent (DMGT) by Gagne (2005) also place a high value on the role of motivation in gifted education. According to this model, high-level motivation and success are tightly interrelated in gifted students (Kover & Worrel, 2010; Sak, 2011). Gifted students often have higher-level motivation than non-gifted students, which result in their being more successful in achieving their learning goals (Gottfried & Gottfried, 1996; McCoach & Flake, 2018). These findings, then, rationlize the present study finding that gifted-students were more inclined to the ideal L2 self than the two other components of the L2MSS. Moreover, gifted students have been characterised more independent, autonomous, and self-regulated learners, compared with non-gifted students (Obergriesser et al., 2013; Tortop, 2015). Gifted students have also been reported to be more self-regulated than non-gifted counterparts (Tortop, 2015, p. 43). Self-regulation in learning simply refers to the ability to set learning goals, organize learning activities, manage time for learning, and self-assess learning

achievement (Zimmerman, 2001). Part of self-regulation is the ability to motivate themselves for learning. Given the features of self-regulated learners and those of gifted students, it might be argued that gifted students are more capable of not only quantitatively but also qualitatively motivating themselves for learning (Hornstra et al., 2020, p. 2). To put it more clearly, gifted students tend to provide themselves with a wider number of motivational sources and strategies. They are not also simply motivated by lower-level motivational incentives, such as passing the course with a good score, in that they are likely to get good scores. Rather, they need to be motivated by highe-level motivational incentives for their learning; and because of this point, their tendency to mention the ideal L2-self component of the L2MSS is justified. On the other hand, non-gifted students are mostly concerned about their achievement during the course and try to get a good score on the exams. They are also more likely to experience stress in traditional classes, as they are afraid of making mistakes and being either punished by teacher or mocked by peers. Thus, it stands to reason that their motivation about flipped learning be in line with the ought-to L2 self and L2 learning environment components of the L2MSS. This is somewhat consistent with previously conducted studies (e.g., Meier et al., 2014; McCoach & Flake, 2018; Preckel et al. 2008).

Conclusion

The study aimed to explore the effect of virtual flipped learning on motivation of L2 learners based on the L2MSS model. Additionally, the motivation of gifted and non-gifted students for L2 learning has not yet been academically investigated. The study uncovered that notwithstanding the point that online flipped teaching improved both gifted and non-gifted students' motivation, it differentially affected their motivation. In other words, gifted students mostly referred to *ideal self* motivation while non-gifted ones referred to *ought-to* and *learning experience* self motivation. This finding can have some pedagogical implications to different groups of educational stakeholders, especially material developers and teachers. Considering the results of this study by material developers can aid them to develop materails that accord with the factors that can promote the gifted and non-gifted students. Teachers can also take advantage of this study findings. Knowing about gifted and non-gifted students' motivational differences can assist them with adopting teaching methods and activities that are in accordance with their motivational attitudes, which, in turn, would result in boosting their enthusiasm about and interest in learning the intended materials.

Recommendations

Given the findings of this study, some recommendations might be made for future research. First, further studies with different participants and research contexts are recommended to be undertaken on the same issue so that the present study findings would be strengthened. Second, although this study had both males and females as the participants, their differences were not examined. Thus, gender differences as far as giftedness and motivation based on the L2MSS model are concerned is another potential topic that needs research to determine whether or not gender can be taken as a factor in explaining the gifted and non-gifted students' motivational differences. Finally, undertaking studies with the same topic on different language skills and domains (reading, speaking, vocabulary, etc.) can also be a good issue to be taken into account for interested researchers. Examining the gifted and non-gifted students' learning of language skills and domains and exploring their perceptions and motivations can provide finer tuned insights on the effectiveness of virtual flipped learning. Finally, the interaction of teacher-related factors and virtual learning is also a potential avenue for further research. Although there are some studies (such as Van der Spoel (2020)) that have dealt with this issue, there is still limited understanding as to how teachers' varying traits and features, especially teacher cognition, might come to influence gifted and non-gifted students' motivation and learning.

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Author Information

Kamal Heidari

https://orcid.org/0000-0002-5807-9941

Victoria University of Wellington

Kelburn, Wellington

New Zeland

Contact email: *k_86_tefl@yahoo.com*

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Chapter 10 - Integration of Mentimeter into the Classroom: A Scoping Review

Fatemeh Ranjbaran, Abdullah Al-Abri, Hadi Sobhanifar

Chapter Highlights

- This scoping review investigated the integration of Mentimeter in the educational context to determine its effectiveness for both teaching and learning processes.
- The included studies were screened for only those that investigated the use of Mentimeter in the classroom, while including peer-reviewed journal articles, conference proceedings, short articles, book chapters, and review articles from 2015 to 2022 that were available in English without limitation on discipline.
- The 57 publications that met the eligibility criteria were coded for various characteristics, the most significant of which are discipline, geographical region, publication type, research method and outcomes.
- Our results reveal the numerous merits gained from integrating Mentimeter in educational settings, including: 1) benefits not only to enriching student-centered pedagogy, but also encapsulating a diverse audience of cultural backgrounds and competencies; 2) providing immediate feedback for anonymous student responses; 3) enhancing student motivation; 4) engaging students' active participation.
- The results of this study provide initiatives for teachers and educational researchers to conduct further research on various educational technology platforms, and highlight the advantages of integrating technology into the educational setting.
- While teachers and practitioners persevere to transform the learning experience through technology, we emphasize the necessity for continuous research to investigate different learning platforms that considerably improve learning outcomes.

Introduction

A growing body of research has emphasized that the conversion of teaching methods, from purely passive to more lively learner-centered, yields an abundance of satisfaction and engagement among students (Mayhew, 2020). Students are expected to capitalize on such an engaging learning environment to share their ideas, collaborate with others, solve problems creatively, and more importantly, reflect on the learning experience that takes place. Yet, the current generation of students is more likely willing to be engaged in learning settings that are built on a diversity of ICT tools. One pattern to introduce technology into learning is through the adoption of student response systems (SRS) like Kahoot, Vevox, Crowdpurr, and Mentimeter. These platforms generate a more driving discussion empowering students with concerted attention on understanding rather than memory, and reasoning rather than answering (Beatty, 2005).

Mentimeter is a cloud-based interaction tool that can be employed to engage a large number of participants. It is available on web browsers and can be freely installed on mobile devices. Teachers can register at *https://www.mentimeter.com* and use various features that the platform offers like making an 'interactive presentation'. This platform is mainly used in higher education to convey the lecturing of the theoretical sessions in courses to more engaging and interactive discussions (Quiroz Canlas et al., 2020). The basic drive that stirs lecturers to implement this technology is to diminish the boring one-way communication implanted in the traditional lecturing where lecturers speak only and students remain passive. Thus, Mentimeter helps students to maintain concentration by enhancing participation in the learning process (Mayhew, 2019). For example, students can use their mobile phones to answer digital questions and no doubt this leads to a more inclusive learning environment.

One vital feature of Mentimeter is keeping anonymity. Lecturers can anonymously display students' answers or responses to the class, thereby building a friendly and collaborative environment (Gokbulut, 2020). In addition, teachers who use Mentimeter in their teaching can get an instant assessment of the students' understanding and progress, and therefore provide their feedback to the students accordingly. Students also get a safe status to raise concerns and make suggestions. Thus, teachers can seek feedback from students for the purpose of modifying the instructions and improving the teaching quality (Elliott, 2003). In this study, we reviewed a considerable amount of research conducted on the use of

Mentimeter to determine the exact effectiveness of Mentimeter as a Student Response System (SRS) for both the learning and teaching processes.

Purpose and Research Questions

With the transition to online teaching with the start of COVID-19, teachers and educators have come across a number of obstacles that hinder the teaching and learning process. One of the major challenges faced with in virtual classes is the concept of student interaction and engagement. With this in mind, the researchers felt the need to investigate what digital tools can best be integrated in the classroom in order to overcome these challenges. Therefore, this study has attempted to conduct an in depth research on the use of Mentimeter to facilitate teaching and learning in the classroom. We are specifically interested in the points that overlap in the use of this Student Response System (SRS) in enhancing interaction in the classroom.

The rationale behind this examination is two-fold. First of all, technology enhanced teaching and learning has been identified as having a significant impact on student engagement (Batır, & Akçay, 2022; Cakir et al., 2019; Graham et al., 2007; Kouchou, 2022; Ozturk, 2023; Ozturk et al., 2023; Unlu Sinnett & Akçay, 2021), motivation (Dunn & Kennedy, 2019), and overall achievement (Daniella et al., 2018; Balacheff et al., 2009; Mohmmed et al., 2020). Second, following the growing shift to virtual teaching and learning worldwide, it has been deemed necessary to implement new technological tools to facilitate the process of teaching, whether it be to enhance student engagement, motivation, or learning skills (Mayhew, 2019; Kuritza et al., 2020; Pichardo et al., 2021; Skoyles & Bloxsidge, 2017; Wood, 2020; Vallely & Gibson, 2018; Mayhew et al., 2020; Wong & Yunus, 2020; Muñiz-Rodríguez et al., 2020; Lin & Lin, 2020).

The converging point of technology enhanced learning and innovative tools being used in the classroom today brings us to this area of inquiry. Mentimeter, a tool that has been extensively used in the educational context of the 21st century classroom, requires careful investigation. Therefore, the present scoping review aims to investigate: (1) study design; (2) methodology; (3) learning outcomes; and (4) learning factors influenced by the use of this educational technology. With this purpose in mind, this scoping review is guided by the following research questions:

1. What were the substantive features of the included studies, such as discipline, type of publication, and region of the world the study was conducted?
2. What were the methodological features of the included studies, such as the research methods employed and data collection approaches?
3. What is the impact of Mentimeter on learners' learning outcomes?
4. How does Mentimeter help the teacher in the process of teaching?
5. What learning factors are being influenced by integration of Mentimeter in the classroom?

Research Design

This study uses a scoping review method to explore the existing research on the use of the Student Response System, Mentimeter, in the classroom. Compared to a systematic review, in which the objective is to evaluate findings across studies, the purpose of the scoping review is to summarize the studies that have been conducted, with specific focus on the range of content identified in order to report a certain issue or recommendation. This scoping review follows the six-stage methodological framework developed by Arksey and O'Malley (2005). The key concept behind the scoping review framework is replication of the search strategy and enhancing reliability of the study findings (Pham et al., 2014).

The framework includes the following stages:

1) identifying the research question;
2) identifying relevant studies;
3) reviewing and selecting studies for relevance;
4) charting the data;
5) collating, summarizing and reporting the results; and
6) consulting with stakeholders to validate study findings for quality assurance.

Sampling and Relevance Criteria

We sampled articles by searching the *Web of Science (WoS), JSTOR,* and *ERIC (EBSCO).* Considering that the use of Mentimeter has recently gained insight, and in order to expand our scope to all cases of its use in the context of education, we extended our search to include review articles, book chapters, short articles, and conference proceedings in addition to peer-

reviewed journal articles. Since educational technology has a very wide scope, in order to limit our search to only Mentimeter, we only included the keywords *Mentimeter*, *teaching*, and *learning*. The Boolean operator AND was used to combine the search terms for each of the three main keywords. The search was modified for each database, and encompassed a period from 2015 to 2022, because Mentimeter was founded in 2014 and studies on its application began to emerge the following years, with over 90% of the studies carried out between 2020-2021. After the initial electronic search phase, searches were conducted using the Google Scholar search engine, and a snowball method was undertaken by inspecting the reference lists of the included articles.

Inclusion and Exclusion Criteria

The included studies met the following three criteria:

1. The included studies examined the use of Mentimeter by teachers in the classroom. Articles were excluded if they were about the use of any other digital tools other than Mentimeter.
2. The included studies were peer-reviewed journal articles, conference proceedings, short articles, book chapters, and review articles from 2015 to 2022 and were available in English. Articles published in languages other than English were excluded from the study.
3. Included studies were those which reported both empirical and non-empirical research on the effect of using Mentimeter in the classroom, and were not limited to any specific discipline.

Data Collection and Analysis

The search process, screening and final eligible articles in this scoping review are presented in Figure 1. After elimination of duplicate articles, the database searches retrieved 290 articles. First, two researchers screened the articles based on title and abstract considering the inclusion criteria. In this phase, 133 articles were eliminated as irrelevant. Second, the researchers screened the full text of the remaining 195 articles to identify whether they met the inclusion criteria. After the full text screening, 57 articles met the inclusion criteria and were included in the study. Figure 1 shows the flowchart of the article selection process.

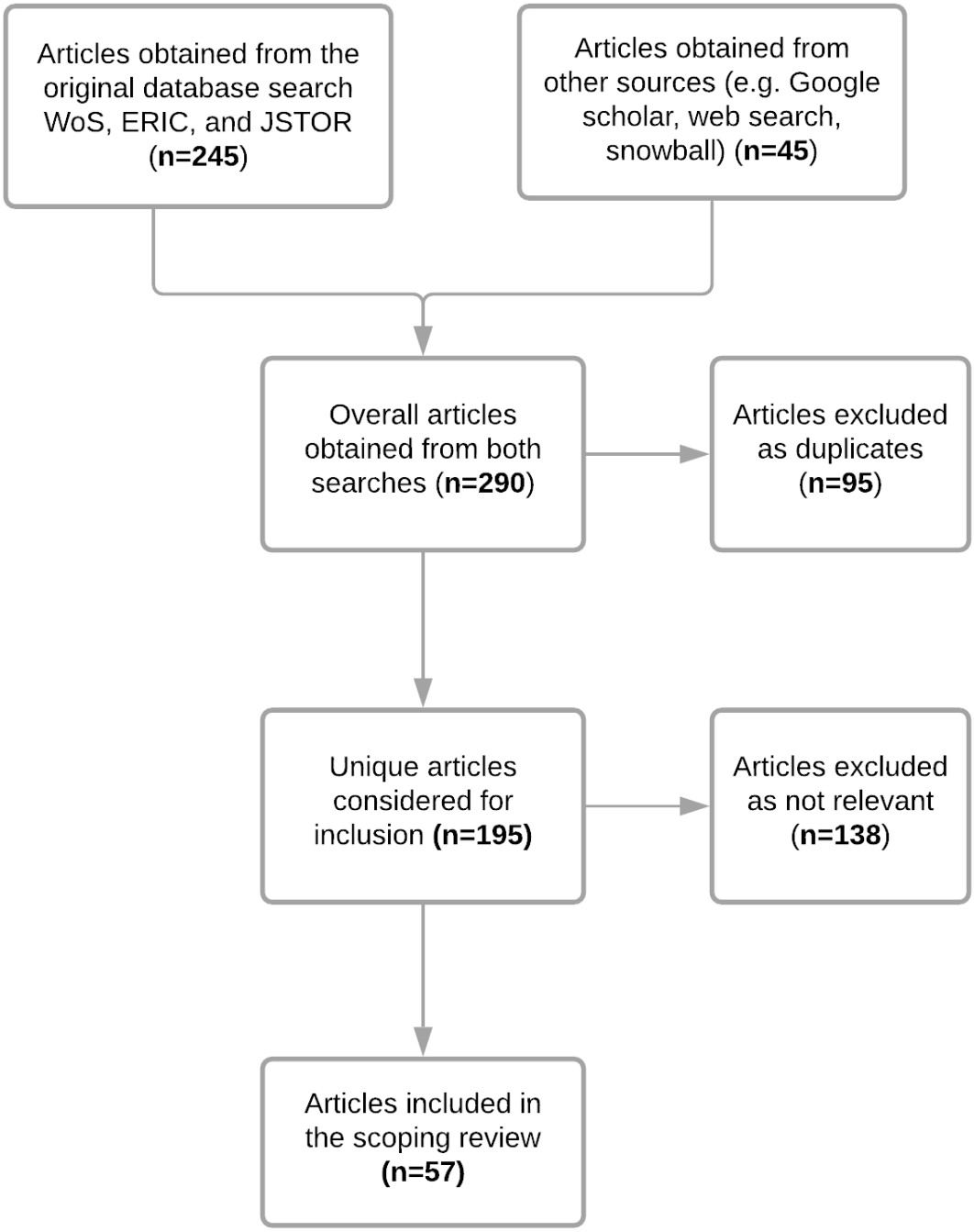

Figure 1. Flow Diagram of the Article Selection Process

Coding Scheme

After the search process was complete, we designed a detailed coding template to organize the articles and facilitate information retrieval. The coding template, developed in Microsoft Excel, encompassed substantive and methodological features. The following dimensions

from each study were included in the spreadsheet: 1) authors' names, 2) year of publication, 3) country of publication, 4) type of publication (research article, review, conference proceeding, thesis, book chapter), 5) discipline, 6) education level (elementary, secondary, or higher education), 7) sample size (number of participants), 8) study design (qualitative, quantitative, case study, mixed methods design), 9) data collection tools (survey, interview, observation, think-aloud), and 10) outcomes of the study.

Frequency distributions were created for the items. Then each thematic category was closely evaluated considering the article content and major areas addressed were summarized. The data set was examined using a content analysis approach. Specifically, descriptive statistical analyses were conducted to answer the research questions stated previously.

Findings

Since Mentimeter was founded by a Swedish company in Stockholm in 2014, it has gained over 400 million users worldwide. Applications of Mentimeter are not limited to the educational context, but also extend to business, medical sciences and entrepreneurship. The objective of this study, however, was to focus on research conducted in the educational context, specifically to pinpoint the effects of Mentimeter on teaching and learning. Research on the use of educational technology has risen sharply over the past 2 years, and the use of Mentimeter is not an exception. Each year has yielded an increasing number of publications, which mirrors the way Mentimeter application in the classroom has grown since its development. Our search yielded a total of 290 articles through the beginning of 2022, with an overall 57 articles in English and directly related to Mentimeter use in the classroom.

Disciplines

The main disciplinary categories that appeared in the overall search are classified in Table 1. It was found that the majority of studies conducted on using Mentimeter in the classroom were in the ELT context (18 studies/32.5%). This discipline was followed by the Sciences at 19.6% (11 studies), Mathematics, Political Sciences, and Education at 7% (4 studies each), Engineering, and Language & Literature at 5.3% (3 studies each), IT, Management and Multidisciplinary studies at 3.6% (2 studies each), and Geography, Sociology, Industrial and Computer Sciences at 1.8% (one study each).

Table 1. Categorization based on Discipline

	Discipline	Number	Percentage
1	**English Language Teaching**	18	32.5%
2	**Sciences** (Physiology/Dentistry/Health & Social Care/Public Health/ Life Sciences)	10	19.6%
3	**Mathematics**	4	7%
4	**Political Sciences**	4	7%
5	**Education**	4	7%
6	**Engineering**	3	5.3%
7	**Language & Literature**	3	5.3%
8	**Information Technology**	2	3.6%
9	**Multidisciplinary**	2	3.6%
10	**Management**	2	3.6%
11	**Geography**	1	1.8%
12	**Sociology**	1	1.8%
13	**Industrial Science**	1	1.8%
14	**Computer Science**	1	1.8%

Geographical Region

Articles were also coded by region, reflecting the locale of the study context and participants. The majority of the relevant articles were situated in Europe at 35.7% (20 articles) (including countries such as the UK (13), Germany (2), Spain (2), Norway (1), Sweden (1), and Ukraine (1). This was followed by Asia with 33.9% (19 articles) (including Indonesia (19), China (2), Hong Kong (1), Malaysia (1), and South Korea (1). The Middle East had 8 articles with 14% of the retrieved articles and North America had seven articles with a total of 12.5%. Studies done in the Middle East were mainly from Turkey (2), Iran (1), Cyprus (1), and Oman (4). North American articles included six from the US. Two articles were reported from Australia, and one from Brazil, bringing South America a share of 1.8% among the retrieved articles. It is important to note that the relative dearth of articles found in certain countries, and generally in comparison to the population, does not mean that Mentimeter is not being used and researched in these regions, but rather that the findings are not being published in journals and conference proceedings. As an example, we can refer to its use in the higher

education context of the Netherlands (Academic Skills Training Course conducted in the University of Wageningen, the Netherlands, January 2021); however, the research findings here do not confirm this claim because the results of such applications have not been published. It is quite probable that more research focused on Mentimeter use in education has been published nationally and regionally, in the language of the target users and school contexts, where it may have the greatest relevance and impact on practice.

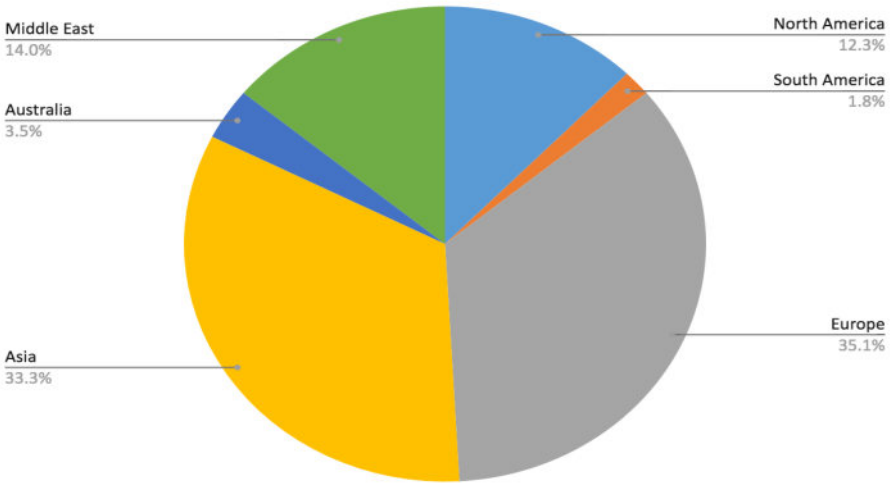

Figure 2. Distribution of Articles based on Region

Publication Type

Among the articles studied, the majority of studies (54.4%) were empirical research articles (31 articles), while 16 were conference proceedings, six were review articles, two were book chapters, and two were theses, respectively.

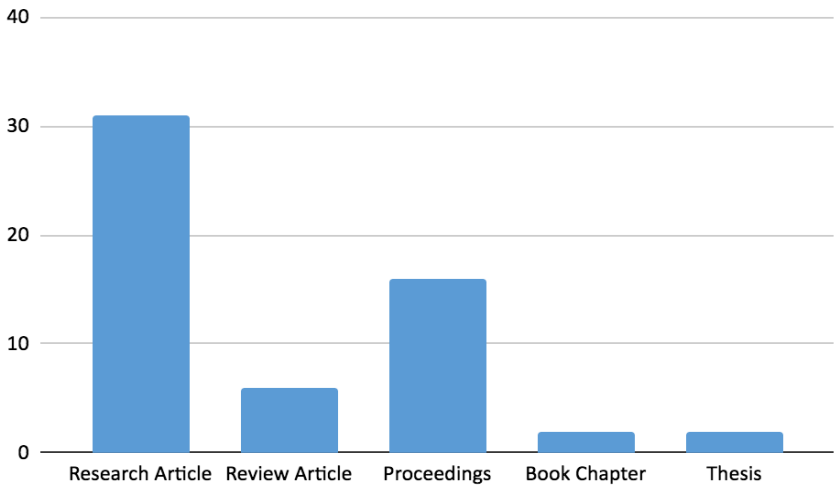

Figure 3. Distribution based on Publication Type

Research Methods

Overall, the majority of studies employed a qualitative research design at 35.1% (n=20). 22.8% (n=13) of the studies were quantitative, and 21.1% (n=12) incorporated a mixed method design. Among the 57 studies, 12 (21.1%) were non-empirical studies, including review articles, conference proceedings, and book chapters (Fig. 4). As part of our analysis, we also identified the type of data collection types used within each research method for the 57 included studies (Figure 5). Having a higher number of qualitative studies was the norm for evaluating technology integration, with a greater focus on teachers and students' perspectives on the use of new technology in the classroom (Brinkmann et al., 2014; Lune & Berg, 2017). However, it is suggested that triangulation of data should be considered for more reliable outcomes (Flick, 2018), and is at an average rate among these studies, as seen in Figure 5.

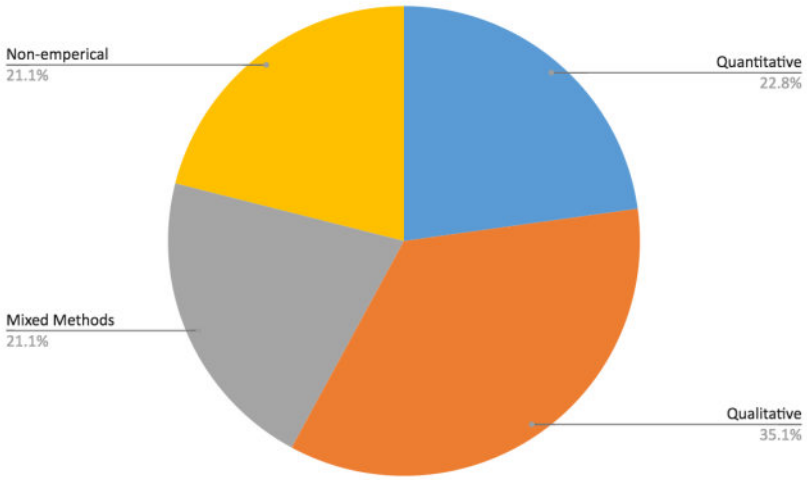

Figure 4. Distribution by Study Design

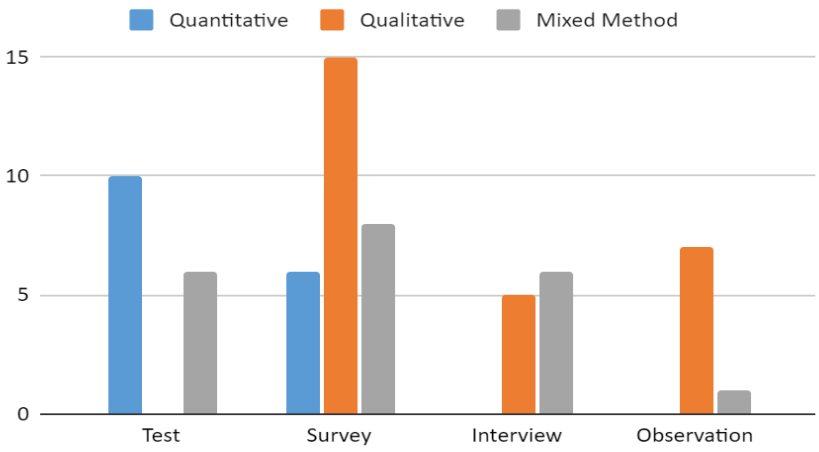

Figure 5. Distribution of Research Method by Data Collection Type

Discussion

The growth of research in educational technology over the past decade is not surprising, and the use of SRSs have been gaining more interest in the educational domain. The researchers have attempted to pinpoint the numerous merits of using this platform in both online and f2f classrooms, and to investigate how Mentimeter can help teachers and students overcome the current barriers in the teaching and learning process.

A number of studies have evaluated the use of Mentimeter to assess the perception, development and future possibilities of online collaboration and awareness – raising the topic of sustainability in a digital learning environment, and hence resulting in a feeling of community, through interaction (Westerman et al., 2021; Blyznyuk et al., 2021; Lima et al., 2020; Santos et al., 2019; Lilleker & Thompson, 2019). One of the major benefits of this platform is obtaining student responses and increasing participation. Many students refrain from answering in class because they are shy or afraid of giving the wrong answer. Mentimeter allows for anonymous responses, hence increasing student participation. In several studies, (Musliha & Purnawarman, 2020; Little, 2016; Langley et al., 2021), results showed that the use of Mentimeter in eliciting the students' responses in formative assessment helped to overcome the students' fear of giving responses.

Mentimeter allows instructors to adopt an active, student-centered pedagogy and, in doing so, has the potential to increase attention, engagement, motivation, peer learning and attainment within the discipline (Mayhew, 2019; Skoyles & Bloxsidge, 2017; Chinaza, 2020; Annie Prud'homme-Généreux, 2016; Hill, 2020). This is while Mentimeter is also a useful tool for real-time formative assessment and exam preparation in clarifying difficult concepts (Dong, 2021; Kuritza et al., 2020; Puspa & Imamyartha, 2019). In a study by Ahmad (2020) more than 80% of students found the active learning sessions met their expectations or far exceeded their expectations.

Pichardo et al. (2021) conducted a very comprehensive study in which they evaluated the effectiveness of mentimeter from both the teachers and students perspectives. Twelve teachers were invited to a focus group with the objective of evaluating their experience and describing the potential of Mentimeter for teaching and learning, the strategies they developed, the difficulties they encountered and how they had overcome them, together with

tentative suggestions to optimize its use during online and face-to-face classes. Educators completed a survey to explore the teachers' high levels of engagement in the project and their satisfaction with Mentimeter after their experience. Then a survey was given to the students to extract their impressions of using Mentimeter in class. Students and educators both highlighted the inclusive potential of Mentimeter, as it allows participation from a diverse audience with different backgrounds and capacities, ensuring inclusive and equitable education for all.

In another study done in a South Korean school, the researchers evaluated the results from both students and teachers perspectives. From the students' perspective, Mentimeter helped students become more focused, it was fun to be able to do activities with friends, even during virtual classes, students felt like they were taking classes together, and it was good to see the results of the learning activities. From the teachers' perspective, it was possible to express each other's thoughts and opinions in a video class where a large number of people participated, it was possible to check each others' learning outcomes and to send and receive feedback. Since the real-time interaction was visually displayed, the student's learning deviation was less, it was possible to develop the same class as offline even in a physically separated online learning environment (Shin & Eom, 2020).

The utilization of an ARS, specifically Mentimeter, was overall well-received by medical students. Mentimeter could be a beneficial tool for educators to use, especially when preparing for exams or assessing students' understanding of challenging concepts. The students commented on the value of these tools appreciating the Mentimeter quizzes that provided instant real time feedback on their knowledge retention and potential areas to review before exams (Kuritza et al., 2020). Similar results were obtained regarding the positive impact on students' attitude and performance, while providing real-time feedback to students in other disciplines (Mohin et al. 2020; Blyznyuk et al., 2021; Dong et al., 2018; Aryal, 2021; Patterson et al., 2020; Mara et al., 2021).

Mayhew et al. (2020) reported the student satisfaction of Mentimeter, as it increases student enjoyment, enhances the student voice, and can help to improve student learning. Benefits and challenges surrounding the staff experience include:

- The 'inclusive potential' of Mentimeter, 'giving a voice' to students who are less likely to participate due to the influence of culture, gender, disability and other factors.

- Improved attendance
- Disciplinary variance
- Optimized class management.
- Timely feedback
- Staff also identified the potential of adopting a more agile approach to teaching and, where time allows, session content.

Sari (2021) also evaluated Indonesian students' perspective of using Mentimeter through an open-ended survey. Students' positive perception towards Mentimeter included it being amusing and fun, its anonymity, attractiveness (with regard to presentation and various types of activities), practicality (paperless, simple method, class is not noisy), and freedom (not having to speak in public). Students' negative perception of Mentimeter included Internet connection problems and that it is not accessible in all smartphones. The study showed that Mentimeter significantly impacts the students' engagement in English learning.

Wood (2020) studied student and staff reactions and perceptions of Mentimeter use in large lectures. Students said that Mentimeter allowed them to gauge their understanding of the material, made class more interactive and exciting, allowed them to compare their understanding of the material with their classmates, and overall made them feel more involved in their own learning. Meanwhile, lecturers found Mentimeter useful for teaching although they warned against doing it without a clear plan. They also mentioned the need to learn how to use SRS as well as how to integrate it into existing lecture material.

Razzaqul Ahshan (2021) used Mentimeter frequently to assess the students' understanding of the previously discussed materials or any new materials being delivered in the lesson. They proposed a framework that provides student–student, student–instructor interactions and ensures social presence during the remote/online sessions due to the active learning activities implemented by this tool. Synchronous teaching pedagogy adopted in the proposed framework was practical in active student engagement, aligning with the lesson outcomes.

Vallely and Gibson (2018) propose training more students to use this technology in their group presentations; in fact, some of the teacher-training students have been inspired enough by Mentimeter that they have gone on to use it in school. This study discusses, with reference to recent literature, the advantages and disadvantages of Mentimeter as a form of student

engagement; it shares three key multi-disciplinary strategies that can be supported by Mentimeter to engage students: ‘gauging opinion’, ‘engaging discussion’ and ‘voicing concerns’. The authors offer their ideas for future plans for the tool, with the hope of inspiring other colleagues in higher education to trial Mentimeter or integrate it further into lectures and seminars to promote student engagement and enhance the teaching and learning experience.

Gokbulut (2020) did an experimental study with teachers to assess whether Mentimeter-based instruction had an effect on the attitudes of prospective classroom teachers for e-learning and found that there was a large effect size on e-learning as a result of Mentimeter-supported education. In a study by Sari et al. (2020) the most remarkable usage of online applications such as Mentimeter was for real-time exercise in the classroom. They also took benefits from those applications that were for establishing communication, encouraging students’ self-study, improving the assessment, motivating the students and improving the teaching instructions.

Rudolph (2018) review the use of Mentimeter as a Student Response System and highlight seven main features: 1) Mentimeter offers six different types of questions, 2) data can be collected anonymously, 3) Data can be stored for analysis, comparative purposes and educational research, 4) improved attentiveness of students, 5) increased knowledge retention, 6) anonymity, 7) it is freemium (i.e. free and premium versions are available).
Pratama (2021) came to the conclusion that students prefer Mentimeter to Google Form in teaching listening for specific purposes, because it makes the lecture more interactive and inclusive, while Prasad (2020) found that integrating Mentimeter increases student outcome and satisfaction and helps to ‘bridge the gap’ between generations.

Law and Masterton (2021) pinpoint some of the benefits of Mentimeter use in a school of veterinary medicine. It is useful as it allows students to receive focused peer feedback and relevant response statistics, achieve high levels of student interaction and generate stimulating clinical discussions amongst staff and students. In addition, students have gone on to use their Mentimeter data as evidence in their professional portfolios, and found that using Mentimeter also cuts down on administrative demands for staff on the rotation.
Crump and Sparks (2018) found that mentimeter positively improves the level of attention and participation in the classroom environment, supports quality learning through

encouraging interaction and discussion from even the most introverted students, and gives useful feedback to both the instructor and students. Students do not have to reveal their votes publicly, so the feedback is assumed to be more honest than a paper vote or show of hands. Students also value real-time feedback given immediately after presentations are delivered.

Canlas et al. (2020) evaluated the effectiveness of the Mentimeter App integration model to computer science lecture classes. They highlight the many positive outcomes of Mentimeter as follows: 1) ease of use of the application; 2) level of participation in the class; 3) ability to express oneself without being afraid of embarrassment; 4) motivation; 5) recalling past topics; 6) preparation for the next sessions; 7) retention of salient points of the discussion; 8) class engagement and coping with boredom; 9) obtaining immediate feedback on learning; and 10) recommendation to integrate Mentimeter with other teaching content.

Coyle's (2021) study showed the innovative blending of technology - Mentimeter, Powerpoint, and videos - with panel-style, tutor-led discussions, to be effective in integrating well being into the teaching and learning of law. In another instance, Göthberg and Nilsson (2021) conducted a study to deliver guidelines for the design of inspirational user experience for Mentimeter and drew on the benefits as increasing user satisfaction and level of inspiration.

A number of experimental studies have shown students improvement in communication abilities and overall achievement when comparing pre-test and post-test scores after integrating Mentimeter in the teaching process (Sirajudin & Hasan, 2021; Ranjbaran et al., (in press); Wong & Yunus, 2020; Kemberley et al., 2020).

Mohammadi et al. (2021) evaluated the application of the Mentimeter educational tool based on cooperation element, compared to Kahoot educational tool based on competition element, and found that Mentimeter has a more significant effect on student's learning and approach on motivation in the gamified environment, indicating that gamified environments based on cooperation are better than the competition-based milieu.

Moorhouse and Kohnke (2020) also found that there are several pedagogical benefits of using Mentimeter in the EAP/ESP classroom, including increasing interaction and engagement, soliciting opinions, and formatively evaluating student understanding. Andriani et al. (2019)

observed that it is necessary to develop learning media based on blended learning to improve students' creative thinking ability by using Mentimeter.

Overall, the results of the studies indicated benefits for both the learners' learning outcomes and the teachers' teaching process. The two main factors that are repeatedly observed in all studies is that Mentimeter enhances student interaction, engagement and motivation in the classroom, while creating a better learning experience. From the teachers' perspective, Mentimeter provides a more dynamic approach to teaching, by providing real-time feedback and increasing emphasis on teacher-student and peer-peer dialogue inline with dialogic teaching approaches.

Conclusion

This scoping review shows that the application of SRS is gaining rapid interest in the field of ELT and education. The main purpose of the study was to broadly investigate how Mentimeter, a cloud-based interface, has improved teaching and learning in different educational contexts across the globe, and specifically identify the methodological features and learning outcomes of using this educational technology in these domains. We investigated these domains to contribute to our understanding of how Mentimer has recently been applied within educational technology environments and bring attention to the significance of designing courses that are technology enhanced.

It was observed that using Mentimeter in the educational context has many advantages, and both students and teachers can benefit from the learning experiences created by such an interactive tool. Its merits expand from adoption of an active student-centered pedagogy, allowing participation from a diverse audience with different backgrounds and capacities, anonymous elicitation of student responses, engaging students' active participation in an otherwise tedious, lecture-based virtual classroom, enhancing student motivation, and providing immediate feedback of the learning outcomes. Teachers and practitioners can consider the outcomes of Mentimeter enhanced lectures when designing courses and revising learning initiatives across their lesson plans.

This study has implications for future initiatives of educational researchers to evaluate the uses of Mentimeter in contexts other than teaching, such as business, medicine, healthcare,

commerce, and tourism and address the impact and challenges of using interactive technological tools in different settings. One of the areas that requires further investigation is the use of digital tools such as Mentitmer for overcoming cultural barriers in the classroom, especially in the Middle East region. Furthermore, since most studies thus far have implemented a qualitative research design, it is suggested that mixed methods design be implemented when evaluating the use of educational technology, in order to triangulate the data and gain higher validity and reliability of the findings.

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Author Information

Fatemeh Ranjbaran
https://orcid.org/0000-0001-9326-4475
University of Technology and Applied Sciences
Nizwa
Oman
Contact email:
fatemeh.ranjbaran@nct.edu.om

Abdullah Al-Abri
https://orcid.org/0000-0001-7198-9643
University of Technology and Applied Sciences
Nizwa
Oman

Hadi Sobhanifar
https://orcid.org/0009-0002-5684-4432
University of Technology and Applied Sciences
Nizwa
Oman

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Welcome to the world of technology-enhanced learning, where the boundaries of education are continually expanding, reshaped by the dynamic interplay of pedagogy, learning theories, and cutting-edge technology. In an era characterized by rapid advancements in digital tools, rapid developments of AI, and the ever-evolving needs of learners, this book aims to explore the transformative potential of technology in education.

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