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Research Article

Analyzing the Impact of Digital Information Communication Technologies (DICT) on Literacy Development in Third Grade Primary School: A Case Study on Education

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ABSTRACT

This study aims to answer the question of how digital information communication is linked to students' literacy development during third-grade primary education. This study is significant considering the ongoing debate on how to deal with digital media in schools. Many schools are asked to include digital tools in their education. Literacy is one of the main aims of early education, with children starting to learn to read and write at school. Third-grade primary education was chosen in this study of decision-making alongside other years in primary education, as reading comprehension has become a new focus this year. The focus shifts from learning to reading. The teachers made use of digital tools to manifest the connection between new pieces of information and stored relevant background knowledge when stimulating their reading comprehension. This study directly examined the potentially significant influence of digital communication on literacy development. It is crucial to ensure that all elementary school educators receive training to responsibly and effectively incorporate technological advancements into the primary education curriculum. This study reveals how various digital platforms and tools may impact different aspects of literacy, such as reading comprehension, writing skills, and vocabulary acquisition. By investigating these relationships, educators can develop targeted strategies to leverage digital communication and enhance learning outcomes. Furthermore, the findings from this research could inform policy decisions regarding technology integration in elementary education, ensuring that digital resources are used to complement rather than replace traditional literacy instruction.

Keywords: DICL, Digital tools, impact, learning outcomes, primary education.

Introduction

There is consensus in today's educational debate that digital communication has marked societal development and that this also applies to learning and teaching in schools. This applies particularly to third-grade primary education; however, insufficient information is available on how digital information communication influences students' literacy development during the first years of primary education. This study sought to contribute to this knowledge (Purnama et al., 2021; Peng & Yu, 2022; Saddhono et al., 2024b).

Considering the potential of these digital information and communication tools, the majority of teachers in this study used of them in early literacy education (Setiawati et al., 2024). The digital information communication tools used were: the communication function in the e-learning platform and two knowledge and information open boards (He et al., 2023; Saddhono et al., 2024a). During digital information communication, literacy activities in reading and increased writing in texts that students could choose for their own period of interest are related information activities. However, the use of such writing literacy activities is challenging.

Sayaf et al. (2021) define literacy development as a complex, long-term process that is continuously required for further education, work, family, and community participation. The use of digital information communication technologies is considered to have a strong influence on learning and performance in educational situations. For over 30 years, computer have been involved in the education system and various studies have been conducted on the impact of computers on the learning process. In the pre-computer period, human brains were often said to be vast memory banks that are inherently rational and linear by nature. Thus, learning is considered the acquisition and retention of information. Educational practices tend to use direct instruction methods such as those involving teaching aids, memorizing information and supplementary textbooks (Judijanto et al., 2024; Ramadhani et al., 2024). We use the "tool to think" approach with a set of exercises that usually follow the textbooks that have been studied. This aligns with the cognitive constructivist psychological theory which views learning as an active construction of knowledge, an understanding of events and situations, and information (Timotheou et al., 2023).

Today, many students use digital tools in their everyday lives, unlike most educators, who do not use current technology and tools in their work because the existing tools are outdated. Research on the "hypermedia" medium, conducted over the past 15 years, has shown that learners of all ages can learn significantly from hypermedia and improve the functional literacy of elementary school students. It was found that students' literacy comprehension skills were better supported if they received explanations in stories and additional explanations, indicating that hypermedia readers performed better than textbook readers. Digital literacy has been recognized, and schools have implemented provisions to adapt to this new technology using it as a teaching aid. However, few primary school teachers can develop digital literacy among first-grade elementary students. This is the background of writing, equipped with the facts of writing for a journal literature review conducted in 2021 on literacy development in a group of third-grade elementary school students to produce good writing and an increasing number of valid structured texts. The reality is that digital literacy affects the way students learn, positively or negatively influencing learning performance. Educators should be aware of the implications of students' abilities to make effective decisions about the best teaching strategies that enable learning and intellectual growth simultaneously. Schools that respond to the needs of learning have now become relevant to technology devices such as computers and digital infrastructures. The danger of this tool is that it is not used in a pedagogically appropriate manner.

Theoretical Framework

1. Digital Information Communication Technologies in Education

Many new names and abbreviations that indicate digital instruments have appeared over the last 10 years. Some of these are computers, the Internet, e-mail, webcams, mobile apps, blogs, podcasts, wikis, SMS, videoconferences, chat rooms, blackboards, virtual campuses, online communities, forums, and coursesites, and so on. Various applications are available with digital tools. DICT can be a facilitator as an alternative for learning, teaching, and conducting assessments at school (Öhman et al., 2021; Kumpulainen & Seppänen, 2022).

Digital Literacy and Learning using DICT exposures to DICT is habitual and casual. People, even children, use this electronic device to obtain information they want or need. Maintaining, on this day and age, it is difficult to have a classroom full of primary students and digital practices have not been discussed. Indeed, children are new teachers as they are, more often than not, who must teach educators in schools how to effectively use this technology and incorporate it into new ways of learning (Selman and Dilworth-Bart, 2024).

Broughton et al. (2023) stated that the continual change, upgrading, and development of technologies provides a plethora of learning tools and possibilities for interpretation and utilization in the classroom. While there are some apparent disadvantages to the utilization of digital technology in education, such as disparities in schools and homes, equity of access, and the possibility of technology becoming a distraction, research has shown a range of positive outcomes that accommodate various teaching and learning practices (Saad, 2023; Widodo et al., 2024). It would be remiss for primary educators to omit the digital age in their imaginative approach to teaching literacy, and it is incumbent on initial teacher education to offer appropriate and imaginative options so that pre-service teachers are equipped to use digital instruments to enhance literacy (Ventista & Brown, 2023).

Educator Awareness while teachers are in a position to conduct educational practices that accommodate a range of digital instruments for the improvement of literacy skills, not all education faculties or individual schools provide the same opportunities for their students. Using digital instruments requires initial education in instructional capital systems and further regular in-service training to upskill teachers and educators, ensuring that they have self-confidence and competence to integrate digital learning seamlessly into the school curriculum, including literacy.

2. Sociocultural Theory

Sociocultural theory provides a useful theoretical framework for understanding how digital information communication influences literacy development (Sarmiento-Campos et al., 2022). The following are the major tenets of sociocultural theory: knowledge and higher mental processes have their roots in social interactions; learning is situated in particular social and cultural contexts; vocabulary occurs through joint social activities; sociocultural contexts of learning make available tools and instruments used by individuals; and learning is an intimate mix of influence between learners and surrounding communities. A primary implication of the sociocultural theory is that linguistic and language practices evolve from social interactions. Consequently, the more advanced the interaction that learners have in the language, the more proficient the speaker becomes. (Alkhudiry, 2022).

Sociocultural theory holds that the function of language extends significantly beyond simple information transmissions. Such thinking is profoundly linked to the work of Vygotsky, who proposed and named this theory. Most learning and higher mental functions operate in differentiated processes, with different outcomes. Social interaction and sharing of cultural knowledge play vital roles in human development and education. The concept is that the range of interactions available to a learner can have a chronic effect on his or her personal and unique development. Vygotsky argued that collaboration among peers offers superior opportunities for the development of both theoretical skills and interdisciplinary knowledge. Greater skill development can be achieved through activities that require interaction and change old ideas.

Sociocultural theory has been applied in various technology-based collaborative environments. Access to digital information has enable an unprecedented level of social interaction. Major social software tools include blogging, voice over IP, podcasting, social networking, instant messaging, and friend networking software, as well as multiuser meeting spaces. Digital information communication thus provides the possibility of new sociocultural learning; however transforming this potential into effective learning activities depends to a considerable extent on the decisions, judgments, dispositions, and skills of individual teachers. In this theoretical framework, teachers play a facilitative role. The learning process, while directly involving individuals, occurs in a joint activity involving not only the teacher and students, but also the wider community. Sociocultural theory regards individual learning as occurring through a particular community to which an individual belongs (Wu, 2023). This is especially apt when literacy practices are used as one of the best examples of comprehensive community practices that combine cognitive and social perspectives.

According to sociocultural theorists, any effective teaching of literacy with today's diverse student population must be responsive to the cultures of minority and low-income students, those who are working hardest to change the discourse in educational institutions in which digital communication, including reading and research, is an acceptable and rewarded practice. Effective teaching promotes students' abilities to succeed in reading and writing within the social context of the digital communication revolution. With a lens of acceleration, these children will use digital communication to make meaning in all areas of knowledge, at a pace that will surpass that of all previous generations. The assumption of this study is that in the digital communication classroom, all teachers need to be culturally responsive (Kilag et al., 2024).

Methodology

1. Research Design and Approach

The research in this study is qualitative, meaning that the methodological approach focuses on understanding individuals' specific events and activities in which people take part (Ansari et al., 2023). The objective ws to reveal experiences of involvement and subjectivity, both of the participants in a specific social setting and of the researchers themselves. To do so, a case-study or observational method was adopted, which closely resembles the ethnographic or field study in which an observer partakes in the daily lives of research participants. This approach allows for gaining rich, detailed information about participants in context and is thus very helpful in providing a nuanced account of participants' experiences that the present study employs. A case-study or close observational method provides opportunities for a range of sampling practices. Typically, qualitative researchers use non-probability methods of sampling inasmuch as they do not make assumptions about the population size, nor do they try to make generalizations based on strict divisions of the number of participants engaged in this or that characterization.

Therefore, the term 'purposive sampling', which is used here, is often referred to as typical in qualitative studies because participants are usually selected on the basis of their potential to offer rich, descriptive information about the phenomenon being investigated. In qualitative research, data collection can begin, and under certain

conditions, methods can be added to be more diversified, or less so, as necessary (Rony et al., 2024). The qualitative research design can be flexibly applied, allowing for increased focus on participant or researcher observations within a given context. The design, implementation, and ethics of the study will be continuously refined in light of emergent findings. The extent to which the selected approach is relevant in providing data towards a 'rich description' in response to the research questions will be critically examined.

2. Participants

This context provides detailed information about the participants involved in the study. The information shared included age, amount, gender, ethnicity, and geographical and socio-economic context. The selection of participants was consistent with the educational absorption index. The objective is to discover what those in their third year of primary education think about their digital, informative, and communicative practices and what they do with digital screens for leisure and play. The oldest in the group is also part of the triad they work with at school workshops. The participants, aged 8 to 9 years, from different socio-economic sectors, are now busy in media workshops that are part of their undergraduate degree. The objective is to know what those in their third year of primary education think about their digital, informative, and communicative practices and what they do with digital screens for leisure and play.

3. Instruments and Procedures

The data collected in this research study stem from instruments used in an existing international large-scale study. The data comprised the results of several assessment tools: orthography, phonological awareness, fluency, vocabulary, reading comprehension, spelling, persuasive text, and digital communication logs. The construct validity of the testing instruments is argued because reading comprehension draws on ideas drawn from experiences over time, which may include genre structures and graphotactic probabilities. Furthermore, three field-based tests were chosen because in a standardized test environment, these tests have been used to measure basic reading skills and approaches to learning. Because one of the tests was used for validation purposes, it was assumed that sound learning-based evidence existed that the test construct would generate reliable reflections of basic elements in reading. Both online and on-paper tests can show cut-offs for valid items to measure a construct, which then generates data that definitely show that children do or do not read and write a location.

The interviews in the classes are dynamic research instruments that enable researchers to gather various perspectives. The interviews were conducted shortly after the testing phase of the orthography, the text production (in- and expository text were discussed), and the scan of the narrative generation epoch, which has occurred over the past years in schools and their applicability. For this study, the following interviews are relevant: the orthographic interview, which was used to identify the orientation of the hypothesis that Spell Read children, i.e., the spelling was not used in children who read age-/grade-appropriately, was still based on sound spelling knowledge. The orthographic interviews demonstrated the phonological nature of word knowledge in the children of the group.

4. Data Collection and Analysis

A procedural solution was proposed to gain insights into the research question. Interviews were held with primary school teachers to explore their knowledge of the child's unpolished writing and how they dealt with it. Furthermore, a drawing survey was conducted with third-grade students to explore their experience with digital information communication. The final procedure dealt with participant observation in the third-grade classroom to learn about the driving question and to observe the development of the child's digital information communication in class with one's unpolished writing. This report on the results is based on all three research methods because using different data improves the study's findings.

This paper presents participants' experiences with the use of digital information communication as part of the driving question of unpolished writing. When focusing on the driving question, purposive data collection directed at a specific group was carried out, which makes this qualitative inquiry a critical case study. The purpose of this critical case study is to reveal the experiences of unpolished writing and digital information communication, and our different research methods provide us with highly rich data. Interviews with teachers and participant observations were conducted with six children in a primary school classroom in order to answer the research question: 'What is the impact of digital information communication on the development of literacy in primary school pupils?' Thematic analysis, which can be used in both interpretive and technical paradigms, informed our analysis of the interview and

drawing data obtained during data collection. The theoretical framework constructed is used as a link between the research process and the eventual findings.

Findings and Discussion

First, we provide a summary of the study findings, followed by a discussion of the findings and their potential implications for educational practices. By analyzing the ideals of both theoretical perspectives and looking at the analysis conducted, we can draw conclusions regarding the potential benefits and limitations of placing more emphasis on digital information communication in developing literacy and associated skills. Student choice over ICT tools utilized in a bid to personalize literacy learning served to increase student engagement and motivation in learning and literacy, and support student interaction with both the teacher and classmates. Student writing was perceived by the teacher and can be evidenced from students' digital discussions as at times being of higher quality when compared to that produced through no involvement with various ICT.

Given that the English spelling, grammar, and word-decoding instruction remained constant across the focus and comparison groups of students, it is possible that improvements may be attributable to the use of digital information communication and not explicit instruction. The long-term benefits of repeating such an approach enable a student to undergo a constantly changing learning environment that will improve and support the acquisition of the aforementioned ICT along with literacy development and the questioning needed to improve it. Therefore, when implementing a learning environment that focuses on the development of literacy and associated skills through the use of digital technology at the training, primary, and secondary school levels, we must be aware of the larger impact of these technologies. Therefore, we must support students in their development of the ability to use digital technologies alongside their development of literacy skills.

1. Impact of Digital Information Communication on Literacy Development (DICT)

The results show that both less skilled and more skilled third-grade students gain in reading and writing competencies through instruction that focuses on developing knowledge about DICT, including metacognitive knowledge. The results also showed that the use of DICT in the first instructional year for reading and writing texts fosters reading and writing performance in the second school year. The type of DICT available in a classroom seems to depend on the degree to which third-grade students have access to DICT and the support they receive. Although boys and girls who do not have access to DICT in the classroom differ in their writing performance, the engaging character of technology and expertise of the father or other siblings do not have a direct effect on the relationship between the differential use of DICT instruction and literacy attainment. Girls who are less skilled in reading experience problems in writing through ICT because they generate subparagraphs. However, sixth-grade students and their fathers or brothers, younger boys and girls, and their mothers more often have second-order ethical and poetical options and access to DICT at home.

The use of DICT is not 'curative' for achievement problems in third-grade reading. However, the use of DICT is not equally related both reading and writing under all circumstances. First, the level of DICT availability and expertise of people at home seemed to be related to reading and writing achievements. This availability and use of computer systems are preconditions for extra reading and writing activities at home. Second, engagement with DICT is related to oral and literacy development. Children who engage in DICT activities show less reluctance to read and write assignments and experience fun in making a text. The findings indicate that engagement is an important part of home literacy activities that influence literacy. For children who experience problems in understanding text, for more girls than boys, engagement with DICT is not correlated with reducing this problem; on the contrary, it is related to more writing problems. Reading and writing proficiency were unrelated to playing reading or writing games.

2. Implications for Practice

Relevance to educational research and practice. The following strategies can help support the systematic implementation of digital information communication in literacy instruction:

a. Professional development at the level of teachers' digital competencies and didactic school-based and subject-related competencies, with a focus on individual support and accompaniment and the body of research on formative assessment.
b. Integration of learning based on discovery, product orientation, and collaborative knowledge exchange in the primary school learning environment.
c. Teaching that addresses diversity.

The addition of digital elements to the curriculum can be organized in the form of units based on existing curricula, where additional digital literacy content is treated in more detail and includes elements of word processing, effective internet searching, database management, and regulation. Site usage and design of the technical elements of a website are also important. Teaching addition can also take the form of cooperative project work, where groups of students design their own websites on topics of personal or school-related relevance. For cooperation between schools and other stakeholders at the local level, it is important that various levels of the education system are involved in the project to ensure that communication at the level of information exchange continues at multiple levels. Such broad collaboration can draw the interest of various stakeholders. When parents are informed of their child's use of information communication technology at the third-grade level, they may have positive effects on the acceptability of the study. In conclusion, we would like to shed light on the means of facilitating the digital inclusion of information in primary education.

Conclusion

This study explicitly addressed the potentially large impact that digital information communication might have on the effective development of literacy. It is vital that provisions be made to ensure that all teachers in primary education are trained to effectively and responsibly integrate these changes into the primary school curriculum. In conclusion, future directions for literacy education include the following:

1. The need for young people to develop basic skills in spatial, visual, and aural literacy.
2. Developments and trends in the internet and the information society will mean continuing evolution in how to interpret and create virtual realities.
3. The rapid evolution in learning and communication methods means that teachers alone should no longer determine the learning material.
4. Emphasis should be placed on individual inquiry and learning, critical thinking, problem solving, description, exposition, and argumentation.
5. Primary educators should keep adapting teaching and learning structures and methods for learners in an increasingly dynamic, individualized information society.

We recommend that further studies be conducted to provide an ongoing and developing understanding of the dynamic changes in literacy education as young people continue to learn as they work and play with digital technology. Longitudinal studies in this area will need to continue over the next 10 years, as the nature and role of literacy among children continues to shift. The increasing use of the internet for commercial, political, and other purposes will mean that we will need an ongoing understanding of how readers and writers interpret web-based texts if they are to remain critically aware of emerging trends in information, values, images, and texts.

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