



Utilization of Information Technology for Communication and Learning for Students with Hearing Impairments

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Abstrak

Teknologi informasi (TI) penting untuk memenuhi kebutuhan siswa penyandang disabilitas pendengaran di lingkungan sekolah khusus Indonesia. Tujuan dari artikel ini adalah untuk meneliti penggunaan dan pendapat TI untuk komunikasi dan pembelajaran dari siswa tunarungu di sekolah tunarungu. TI dalam penelitian ini meliputi perangkat informasi seperti handphone, telepon pintar, dan tablet. Penelitian ini menggunakan metode stratified random sampling untuk mendaftarkan partisipannya. Data dikumpulkan dari 56 siswa dengan gangguan pendengaran menggunakan kuesioner yang dikelola sendiri. Hasil menemukan bahwa sebagian besar siswa ini mengetahui tentang aplikasi obrolan, misalnya, Whatsapp, Facebook, Instagram, dan aplikasi percakapan tatap muka. Selanjutnya, sebagian besar siswa ini menghubungi orang-orang dengan masalah pendengaran dengan mengirim pesan melalui Facebook, Aplikasi garis dan tatap muka. Alasan utama mengapa mereka menggunakan TI adalah untuk kenyamanan dan percakapan umum. Sebuah studi tentang pendapat tentang penggunaan TI oleh siswa tunarungu menemukan bahwa sebagian besar dari mereka setuju bahwa perangkat TI berkontribusi pada partisipasi mereka dalam berbagai kegiatan, termasuk percakapan dengan kerabat dan teman mereka di jejaring sosial.

Kata Kunci: Teknologi Informasi, Komunikasi, Belajar, Gangguan Pendengaran.

Abstract

Information technology (IT) is important to meet the needs of students with hearing disabilities in Indonesian special schools. The purpose of this study is to analyze the use and opinion of IT for communication and learning of students with hearing impairment in hearing impairment schools. IT in this study includes information devices such as mobile phones, smartphones, and tablets. This study used a stratified random sampling method to register the participants. Data were collected from 56 students with hearing loss using a self-administered questionnaire. The results found that most of these students knew about chat applications, for example, Whatsapp, Facebook, Instagram, and face-to-face conversation applications. Furthermore, most of these students contact people with hearing problems by sending messages via Facebook, Line apps, and face-to-face. The main reason why they use IT is for convenience and general conversation. A study of opinions on the use of IT by students with hearing impairment found that most of them agreed that IT devices contributed to their participation in various activities, including conversations with their relatives and friends on social networks.

Keywords: Information Technology, Communication, Learning, Hearing Loss.

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1. INTRODUCTION

Information, communication, and telecommunications technology (ICT) has experienced rapid development and is integrally integrated with the era of media technology. This development has had a significant impact on people's daily lives, especially in the communication aspect. The increasing number of new media users in this era occurs through various communication and telecommunications channels (Sritanan, 2011; Widyastono, 2017). Even though the majority of people currently have access to and utilize new media, there are still groups, such as people with disabilities, the elderly, and underprivileged individuals, who have not been able to access or utilize this technology fully. Economic constraints and lack of opportunities become obstacles for them to develop as individuals and improve their quality of life through the use of technology (Mavrou et al., 2017; McGrath, 2012). This digital divide is a major problem faced in many countries, including Indonesia.

Indonesia's rapid movement into this technological era has enabled people to access information more quickly through communication channels. However, in order to encourage this technological progress, it is necessary to develop good information and communication technology (ICT) infrastructure as well as efforts to provide knowledge and skills to the community so they can use it effectively (Batubara, 2017; Fager et al., 2012). The education system has implemented digital competency development in the educational environment, which enables students with hearing impairments to develop skills in the use of information and communication technology (ICT) to search, store, produce, present, and exchange information. ICT has also become an object of study and is applied as a learning tool. Many education systems have attempted to increase the availability of devices such as computers, smartphones, iPads, tablets, and internet access in the classroom. These tools are effective tools for the learning process, valuable sources of information, and supportive support in teaching activities (Ambarsari et al., 2017; Flores et al., 2012). Communication is a fundamental need for human survival [6]. Various forms of communication, such as spoken, written, and sign language, have been developed in order to enable people to contact and understand each other. Communication channels through the five senses (taste, smell, sound, touch, and sight) can also be used by individuals to communicate. However, communication efficiency is limited when message recipients face sensory impairments, such as in hearing-impaired children who cannot hear or receive media that relies on sound elements (Nusir, 2019; Truscott, 2017). Hearing and speech disorders are obstacles that hinder the communication process and increase disability.

In its development, modern technology has transformed from an era without communication media to an era of self-delivery through the development of simple media, such as postal systems and telecommunications, until it reaches the current level of use of advanced technology (Solihin, 2022; Wulandari et al., 2019). Communication over telephone networks has improved the quality of the medium with increased transmission speed, clarity, and connectivity with modern devices such as pagers, faxes, the Internet, and smartphones. It enables more efficient communication in a variety of formats, such as audio, text, and images (Adzkiya & Suryaman, 2021; Tondeur et al., 2007). Therefore, communication via the Internet and mobile phones has become an integral part of the daily lives of children and teenagers, who depend on these technologies to communicate and express their thoughts, ideas, and feelings. It is as true for children with hearing loss as it is for any other individual (Sutrisni et al., 2022; Zulkaida et al., 2005). Even though information technology (IT) in communication has experienced rapid development, its use is still mostly aimed at individuals who can hear. Currently, IT has not been specifically developed to meet the needs of individuals with hearing disabilities in Indonesia, so they experience difficulties in living independently. This condition causes many individuals in this situation to face obstacles and obstacles in communicating and contacting other people, which results in delays in sending information. When they cannot contact others, they may have to incur additional time and expense in face-to-face meetings or rely on help from hearing people (Dewi & Hilman, 2018; Hardiyana, 2016). In addition, it is important to ensure that IT is used and integrated in communication and learning processes. Student motivation and disposition influence the ability of individuals with disabilities to engage in interactive communication and learning, and the boundaries between communication on platforms such as WhatsApp and the learning process are becoming increasingly blurred (Dishon & Gilead, 2020; Lersilp & Lersilp, 2019). Many individuals use the Internet to create profiles, send messages, and share information. They also use their mobile devices to connect to the Internet at home, work, and the homes of relatives and friends, as well as locations such as shopping centers, restaurants, cafes, and airports that provide wireless Internet access. Apart from social networks on the Internet, other technologies are also frequently used by young individuals, who can learn how to use

these technologies independently at any time or anywhere via mobile devices with data plan services (Agca & Bagci, 2013; Zepke & Leach, 2010). In addition, other research found that the most important reasons for using mobile devices were communication and interaction at 81.3%, entertainment focus at 11.3%, and internet search/research use at 6.2% (Aytekin & Sutcu, 2013). In the same study, monthly time expenditure on mobile devices by age group showed that the 15-40 year old age group had the highest usage percentage at 26.5%. These findings indicate that mobile device use is more dominant in the young to middle age group.

Considering this, researchers are interested in exploring the use of information technology in communication by students with hearing disabilities. Therefore, this research aims to explore the use of information technology in communication and learning by students with hearing disabilities in Indonesia, as well as measure their level of acceptance of the use of this technology in the secondary school environment. This information can be a guide to improving or overcoming existing barriers in communication and making the learning process more comfortable for these students. Apart from that, this research also aims to encourage the improvement and development of information technology to meet the needs of groups of people with hearing disabilities. These basic needs are important in efforts to develop quality of life and create an equal society where individuals with disabilities can live to their full potential.

2. METHODS

This case study aims to find out how IT is used for the needs of students with hearing impairments. It also measures the level of agreement of deaf middle school students regarding their use of IT for communication and learning. It is quantitative research conducted with students who have studied at special schools in East Java. Data for this article was taken from a thematic questionnaire answered by participants who were students with severe (70-89 decibels) to profound (90+ decibels) hearing loss. They have studied in grades 7 to 12 in different special schools during the 2021 academic year. The stratified random sampling method was used for their selection. Each class assessed in the five special schools was randomized. Students in each class were sampled. A total of 56 students with hearing disabilities took part in this research. The students consisted of 31 boys and 25 girls aged between 12 and 19 years. In addition, they have two types of hearing loss, namely deafness (83.33%) and hard of hearing (13.54%). A general description of students with hearing impairment is shown in Table 1.

Table 1. General Description of Hearing-Impaired Students

General information		N	%
Jenis Kelamin	Man	31	55.21
	Woman	25	44.79
Age (Years)	12-13	6	
	14-15	12	
	16-17	30	
	18-19	10	
Types of hearing impairment	Less with (70-89 decibel)	7	13.54
	Tuli (90 desibel ke atas)	49	86.46

Furthermore, the thematic questionnaire for this study was developed by the researcher and processed for content validity through advice from three relevant specialists. The questionnaire also includes a section related to the student's general background. No student names were used in the questionnaire. IT in this research includes applications and mobile devices such as smartphones and tablets. Information devices are a type of assistive technology that can help students with disabilities access information for learning, for example, equipment, materials, or objects, as indicated in the

Indonesian Regulation on Promotion of Education for Persons with Disabilities (McNaughton & Light, 2013). The questionnaire was developed in Indonesian. Furthermore, a group of students only used Indonesian sign language for communication. Other studies have successfully used Indonesian sign language as a response option (Shane et al., 2012). In this research, research on IT for communication is applied to all of the above processing methods, as well as adding several techniques. These techniques were innovated, including arranging the questionnaire format, choosing the language to be used according to the perception of students with hearing impairment, interpreting the questionnaire into Indonesian sign language, and responding to the questionnaire in written Indonesian and Indonesian sign language. The participants were informed about the purpose of the questionnaire, as the data would be used for research purposes. Each school received permission to collect data from the student teachers. Consent forms were given to all participants, scheduled by the researchers and teachers from each class and school. The analysis used is descriptive statistics, which includes frequency, percentage, mean, and standard deviation.

3. RESULTS AND DISCUSSION

Result

Questionnaire data were analyzed using the SPSS program, with descriptive statistical analysis as the dominant quantitative component in this research. A general description of students with hearing impairment using information technology is shown in Table 2.

Table 2. General Description of Hard of Hearing Students Using Information Technology

	Pernyataan	%
Knowing Information Technology	E-mail	50.00
	Computer	71.88
	Laptops	63.54
	SMS via chat application (Whatsapp, Facebook, Instagram)	88.54
	Face-to-face conversation app (Video Call, Video Chat)	84.90
Students who have Information Technology	Computer	34.38
	Laptops	45.83
	Smartphone	92.19
Internet-connected place	House	31.46
	School	76.46
	Smartphone	89.06

This study found that students with hearing disabilities were aware of Chat applications (i.e., WhatsApp, Facebook, and Instagram), with 88.54% and 84.90%, respectively. Additionally, these students have their own set of information. When considering information devices, it was found that students with hearing impairment owned smartphones (92.19%) and Laptops (45.83%). When considering Internet-connected locations, it was found that students with hearing impairment used the Internet on smartphones (89.06%), while only a few connected at home (31.46%). This research focused on the level of agreement between middle school students and students with hearing impairment regarding the use of IT for communication and learning, as shown in Table 3.

Table 3. Review of Opinions Arranged from Highest to Lowest Level by it Items Used for Communication and Learning

Statement	Domain	%
IT enables participation in various activities, including conversations with relatives and friends on social networks (such as Facebook, Whatsapp, Instagram, etc.)	Communication	80.00

Statement	Domain	%
using IT devices.		
IT is a learning medium that facilitates communication between hearing-impaired people.	Study	71.88
It can be used for classes and learning activities.	Study	61.46
IT can respond quickly to send messages to a recipient.	Communication	58.33
IT is a fast learning medium for sending and receiving information/text messages.	Study	56.26
It has privacy when sending and receiving messages/information.	Communication	56.25
It is convenient for teaching and learning, for example, group discussions about learning activities and sharing files/information for class presentations	Study	50.73
It helps reduce loneliness	Communication	46.99
IT is a source of knowledge to search websites and learn through Whatsapp lessons on IT devices.	Study	43.23

Table 3 shows the survey results, which include four and five items from the communication and learning domains, respectively. The results of this study revealed no significant differences between participants with hearing loss who rated the communication and learning opinion items. The total mean for the communication and learning domains is 61.33% and 55.96%, respectively, with both being classified as high. Apart from that, if we look at the opinions and statements in the communication domain, which has the highest percentage (80.00%), it is found that students are helped in participating in various activities, including conversations with relatives and friends on social networks using IT devices. They were also helped in reducing loneliness (46.99%). The learning domain is a medium that facilitates communication between the hearing impairment at the highest percentage level (71.88%), while the source of knowledge for searching from websites and learning through WhatsApp lessons on IT devices is the lowest (43.23%). Thus, the overall results of students' opinions and statements show that they agree or are neutral and that IT or mobile applications can be used for communication and learning. The data is calculated and organized based on each item from the following domains. They are arranged to rank the list in ascending order from highest to lowest, with the top five items highlighted in bold. It was found that three of the top five items perceived by 96 participants fell under the learning domain. They paid attention to (1) participation in various activities (80.00%), (2) learning and communication facilities between the hearing impairment (71.88%), and (3) learning media that can be used for classes and learning activities (61.46%).

Discussions

This research aims to obtain information about students' with hearing impairment perspectives on the use of IT in secondary schools for the hearing impairment. With the increasing number of students in secondary education, their educational needs, especially information and communication technology, must be met for learning activities and classrooms. After collecting data from 56 respondents in this study, several interesting findings were documented from descriptive information. Results show that students with hearing loss utilize IT for different purposes, including communication and learning. Although most IT is designed for hearing people, students with hearing loss use technology to overcome their impairment by using their remaining senses. They can read messages instead of listening, use vibrations instead of sound signals, and communicate with sign language via video calls instead of talking.

The first aim was to explore the background of IT use by students with hearing impairment. The results found that most of them are aware of and use IT to their advantage, for example, using social media/Chat apps and face-to-face conversation apps via mobile devices (i.e., WhatsApp, Facebook, and Instagram). These results are consistent with surveys about strategies to improve quality of life and promote lifelong learning for people with disabilities (Istifarroh & Nugroho, 2019;

Putri, 2020), and reported that 67.54% of their sample had access to and use of new media through devices such as smartphones, and laptops. At the same time, these disabled people have these devices and also have accounts with IT, which involve Facebook, Instagram, and WhatsApp. Additionally, smartphones are used by students with hearing impairment mostly for internet connection. This finding is in accordance with studies by other researchers who found that 92.30% of these students used smartphones to connect to the Internet, and 76.92% of them also used laptops (Ari & Inan, 2010). It is in agreement with research that states that no effort has been made to integrate communication access for individuals who require AAC so that they can use various functions more effectively, rather than having to switch between programs when they use applications for communication (Kagohara et al., 2013; McNaughton & Light, 2013). Use of the Internet, watching films, speaking output to support face-to-face interactions, writing to meet educational needs, multimedia to share experiences, the Internet to access a variety of information, SMS to promote social relationships, social media to connect with friends, and so on.

On the other hand, when participants with hearing disabilities were asked why they liked using IT, they answered that it was for general conversation and convenience when contacting other people. The study is in accordance with what was mentioned above that IT makes communication more efficient by using various formats (Wegmann et al., 2018). Communication via the Internet and mobile phone technology has become part of everyday life for children and teenagers. It is also in accordance with research conducted by other researchers, which states that communication access should not be limited (Williams et al., 2008). It should, therefore, be accessible to voice output to support face-to-face interactions, writing to meet educational needs, and multimedia (e.g., photos and videos) to share experiences. The Internet must be accessed quickly to provide a wide range of information and social media to network with other people via SMS and cell phones (Montrieux et al., 2015; Tezer & Yildiz, 2017; Wong et al., 2006). One of the main reasons for IT use given by students with hearing impairment is the need to use it for teaching and learning resources in the classroom. These results are in accordance with research reporting that the use of new technology in the classroom is very important to provide opportunities for students to learn in the information age (Bingimlas, 2009). By teaching information technology and computer skills in elementary schools, students are prepared to face future developments based on proper understanding. Other research suggests that new technology can play a role in supporting face-to-face teaching and learning in the classroom (Wong et al., 2006).

Regarding the use of IT for communication and learning, including the level of agreement on the use of IT for communication and learning among middle school students with hearing impairments, no significant differences were found between the communication and learning domains. The main reasons and level of opinion for using IT are in line with research, which states that learning with technology requires more than just making learning activities digital (Montrieux et al., 2015). It is also about creating learning contexts that use information technology in an integrated and meaningful way to enhance knowledge production, communication, and the dissemination of ideas. Similarly, the study found that 92% of the total participants agreed that IT had enhanced their learning, and 64% indicated that it was very useful for learning (Ismael & Al-Badi, 2014). Other studies also emphasize the evolution of technology to improve the teaching and learning process (Wichadee, 2011). WhatsApp learning via computers and mobile technology helps promote independent learning skills for learners who can learn based on their abilities and interests.

This research can make a significant contribution to increasing educational accessibility for students with hearing loss. Through information technology, they can have better access to learning materials and communication. In addition, the development of this research can encourage further development of special technological solutions that support learning and communication for students with hearing loss, such as special applications or hardware designed for them. However, this study may have limitations in terms of period. The results found may only be valid for a certain period and do not include technological or policy changes that may occur in the future.

4. CONCLUSION

The research results show that students with hearing impairment have a strong need and desire for IT for communication and learning. Although most means of contact have similar percentages of IT usage between contacting hearing, hearing impairment, and hard of hearing others, the application of face-to-face conversation is very different. They expressed the challenges involved in adopting new IT, such as WhatsApp, Facebook, Instagram, and face-to-face conversation applications, etc. in their daily life and education. Regarding the reasons for using IT, many students with hearing impairment stated that it promotes better communication as well as making it more enjoyable. It also helps these students to communicate and learn more easily and improves their overall communication and learning performance.

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