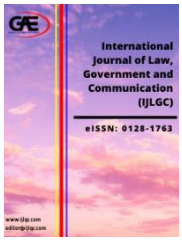
International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021



INTERNATIONAL JOURNAL OF LAW, GOVERNMENT AND COMMUNICATION (IJLGC)
www.ijlgc.com

SUMMATIVE EVALUATION OF EZCOMM: A COMMUNICATION BOARD MOBILE APPLICATION TO ASSIST COMMUNICATION DISABILITIES

Yong Yan Qi[1], Wilson Hew Wei Shun[2], Boo Li Wen[3], Ooi Gan Hong[4], Nassiriah Shaari[5*], Sobihatun Nur Abdul Salam[6]

[1] Pocca Dot Media
Email: yongyanqi0809@gmail.com
[2] Fusionex Corp Sdn Bhd
Email: wilson_hew@hotmail.com
[3] Branstorm Asia
Email: booliwen31@gmail.com
[4] Conquest Electronics Sdn. Bhd
Email: ganhongooi71@gmail.com
[5] Department of Multimedia Technology, Universiti Utara Malaysia, Malaysia
Email: nasiriah@uum.edu.my
[6] Department of Multimedia Technology, Universiti Utara Malaysia, Malaysia
Email: sobihatun@uum.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 16.10.2022
Revised date: 07.11.2022
Accepted date: 22.12.2022
Published date: 31.12.2022

To cite this document:

Yong, Y. Q., Hew, W. S., W., Boo, L. W., Ooi, G. H., Shaari, N., & Salam, S. N. A. (2022). Summative Evaluation Of Ezcomm: A Communication Board Mobile Application To Assist Communication Disabilities. *International Journal of Law, Government and Communication, 7* (30), 258-269.

Abstract:

People with communication disabilities like Amyotrophic lateral sclerosis (ALS), Stroke survivors, Apraxia, Cerebral Palsy, Down Syndrome, and others have problems in speech. It is hard for them to explain their thoughts or release their mood. The disability causes them limited or no opportunity to converse smoothly with others. In response, this paper introduces an application named EzComm as assistance for people with communication disabilities; by doing only one simple act, they can communicate with their family and friends. For example, the users tap the image or word buttons, and the system will read them aloud, besides adding them to a sentence that can also be read. A pilot study shows that EzComm enables them to communicate and increases their chances of making friends. Through the application, we hope that communication for communication disabilities problem could be improved.

Keywords:

Communication Disability; Interactive Application; Communication Board, Mobile Application

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

DOI: 10.35631/IJLGC.730021.

Introduction

Communication is essential vital for us to interact with each other. Communication is the process of understanding and sharing meaning (Pearson & Nelson, 2000), and it involves interaction between participants. However, some people need help communicating and interacting with other people. This problem is called communication disability.

A communication disability is impaired in receiving, sending, processing, and comprehending concepts or verbal, nonverbal and visual symbol systems (Tee-Melegrito, 2022). In other words, a communication disability may have a problem with hearing, language, or speech processes; it may range in severity from mild to profound and may be developmental or acquired.

There are people with communication disabilities like Amyotrophic lateral sclerosis (ALS), Stroke survivors, Apraxia, Cerebral Palsy that causes voice problems, Down Syndrome, and others who have problems in speech which is commonly known as speech or communication impairment (Gonzalez-Lopez et al., 2020). It is hard for them to explain their thoughts or release their mood. One characteristic of communication disabilities is unclear pronunciation, as mentioned in (Baldauf et al., 2018), due to the tongue not being as active as ordinary people's. The flaw causes the sufferer the opportunity to have a smooth conversation with others.

In order to help those with communication disabilities to have better communication with others, we proposed/developed a mobile application named EzComm, which is a communication board that allows those with communication disabilities to speak out their thoughts by using their fingertips. The users need to click on the provided words to make a sentence. In the mobile application, there are some daily used words to help communication disabilities to solve their daily communication. In this research, we conducted a usability evaluation to evaluate the usefulness of EzComm.

Mobile Application and Communication Disabilities

A mobile application or 'app' is a type of software designed to run on a mobile device, such as a smartphone or a tablet computer (Shroff & Keyes, 2017). Nowadays, mobile technology has proliferated in our society, especially for mobile applications. Mobile technology has become a need in our daily lives.

Mobile and assistive technology made augmentative and alternative communication (AAC) possible, which tremendously aids people with communication difficulties or those with communication disabilities. AAC include electronic devices such as speech-generating devices, tools like picture communication symbols on paper-based boards, or strategies such as gestures and head nods (Dada et al., 2022) to involve those with communication disability to communicate.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

People with communication disabilities refer to those with difficulty communicating with others. For example, people with Apraxia, Cerebral Palsy, and Down Syndrome may have problems with communication disabilities (Nyman et al., 2021). Apraxia is the inability to carry out such praxis movements without elementary motor, sensory or coordination deficits that could serve as the primary cause (Park, 2017).

Cerebral Palsy (CP) is a neurodevelopmental disorder characterized by muscle tone, movement and motor skills abnormalities and is attributed to injury to the developing brain (Gulati & Sondhi, 2018). If CP affects the part of the brain that controls speech, a person with CP might have trouble talking clearly or not be able to speak at all.

Down Syndrome is a genetic disorder characterized by distinct physical features and some degree of cognitive disability (Plaiasu & Vasilica, 2017). There are many more communication disabilities. Therefore, we would like to connect them with society without any difficulties.

Design and Development of EzComm Mobile Application

EzComm mobile application was designed to assist with communication problems of people with communication disabilities. The design and development process consists of 5 phases - planning, analysis, design, development, and testing. The first phase is planning; the main idea came from the internet news. There were people with communication disabilities who had difficulties communicating with people around them, such as family and friends, because their thoughts and emotions were difficult or complex for them to pronounce and express. Moreover, the use of mobile devices and applications is prevalent. Hence, the solution was to create a mobile application language board. The next phase was analysis; two similar applications were compared and analyzed to get ideas for the design and development of EzComm. During the design phase, storyboards and the user interface elements, including the buttons, images and texts, were designed and created using Adobe Illustrator and Adobe Animate. Then, the prototype of EzComm was developed using Adobe Animate. Lastly, the developers tested the mobile application to ensure it was functional.

EzComm was designed for easy use, and the interfaces, such as buttons, images and words, were simple designs for easy to understand. Figure 1 shows the screenshots of the main interface of EzComm.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

Figure 1: Screenshots of the Main Interface of EzComm

The user could select the symbol to be added to the sentence bar. There is a delete button to delete the symbol from the sentence bar if the user selects the wrong symbol or wants to say something else. There is also a play button to pronounce the symbols selected by the user in the sentence bar. Therefore, the user could form a simple sentence to tell others what they were looking for and trying to tell others. Figure 2 shows the screenshots of EzComm.

Figure 2: Screenshots of EzComm

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

Evaluation of EzComm

To evaluate the usability of the EzComm mobile application, we conducted a user trial involving individuals with communication disabilities. Data was collected using a set of questionnaires. According to (Vereenooghe, 2021), web-based research can help persons with various skills and disabilities gain access to research and make it more accessible. Therefore, we chose the method of an online survey by using Google Forms so that communication disabilities feel comfortable and easy for them to answer.

Participants

We recruited participants representing the target audiences - people with communication disabilities such as autism, stroke survivors, Apraxia, Cerebral Palsy, Down Syndrome and others with speech problems. Participants are limited to those in the age range of 11 to 45 years old. Participants are denizens of one disability centre in Malaysia. We first contacted the centre for their permission and assistance with our evaluation. Participation was voluntary and anonymous.

Instruments

The instrument consists of three sections - demographics, user interface, and usability. The questions were designed to be simple and easy so that our target audiences could easily understand them. The instrument tests the usability and interfaces of the EzComm application to ensure that the EzComm mobile application is suitable and convenient for those with communication disabilities. The questions were designed based on the discussion with the carers at the disability centre and a few lecturers who believed the questionnaire has to be as simple as possible, not too formal, but still able to measure the dimension tested. We understood that we should adapt or adopt renowned and validated questionnaires for better, valid, and reliable results.

Procedures

Due to our limitation, we conducted a remote semi-moderated user. The evaluation was carried out in the first two weeks of April 2021. We made an appointment with the participants, through the disability centre, for the evaluation. Before we conducted the evaluation, we communicated with the workers in the disability centre, briefing them on the evaluation procedure. They were also asked and agreed to assist the participants in understanding the questions prepared in the Google Form. Participants were first asked to freely explore and use EzComm before answering the questionnaire. The evaluation was carried out online using Google Forms, consisting of a project introduction, instructions for evaluation, an informed consent form, and a survey questionnaire.

Data Collection

The data collected is presented in Google Sheets. Data analysis is carried out with the assistance of charts.

Results

Twenty respondents with communication disabilities participated in the trial. Descriptive statistic was used to analyze the result.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

Demographics

The first section of the questionnaire was the respondents' demographics, including gender, age, and communication disabilities. Of the 20 respondents, 55% were female, and 45% were male, as depicted in Figure 3.

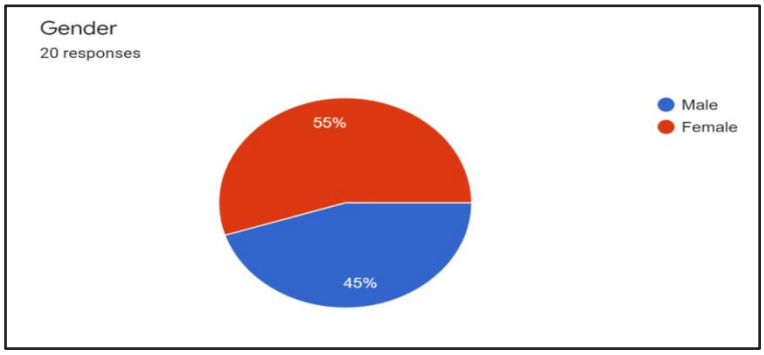


Figure 3: Gender of the Respondents

40% of the respondents were between 21-25 years old, 20% were in the age group of 16-20, 15% were in the age group of 11-15, and 10% were aged 26-30. And 5% in the age group of 31-35, 36-40, and 41-45, respectively. Figure 4 shows the age of the respondents.

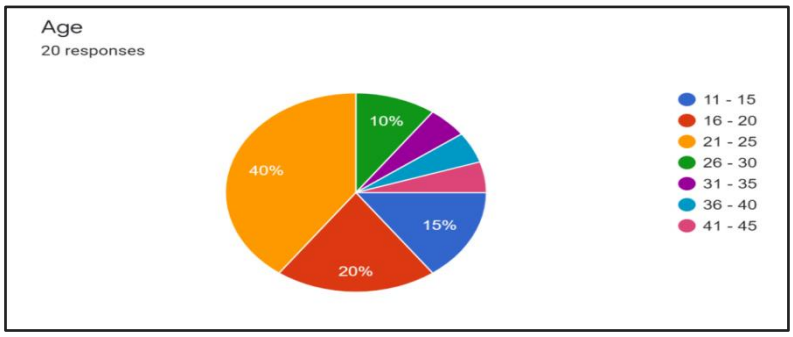


Figure 4: Age of the Respondents

To countercheck that the intended respondents answered the trial and questionnaire, we asked whether they are with communication disabilities. All the respondents were those with communication disabilities, as shown in Figure 5.

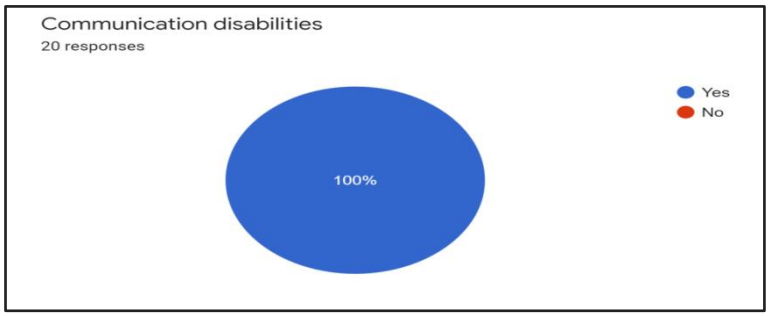


Figure 5: Communication Disabilities

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

Interfaces

The second section of the questionnaire is on EzComm's user interface consisting of button function, attractive interfaces, easy to control, and user-friendly.

90% of the respondents believed that the EzComm buttons functioned well. Only 10% of the respondents felt the buttons might function well. No respondents believed that the buttons could not function. Figure 6 illustrates the perceived functioning of EzComm buttons.

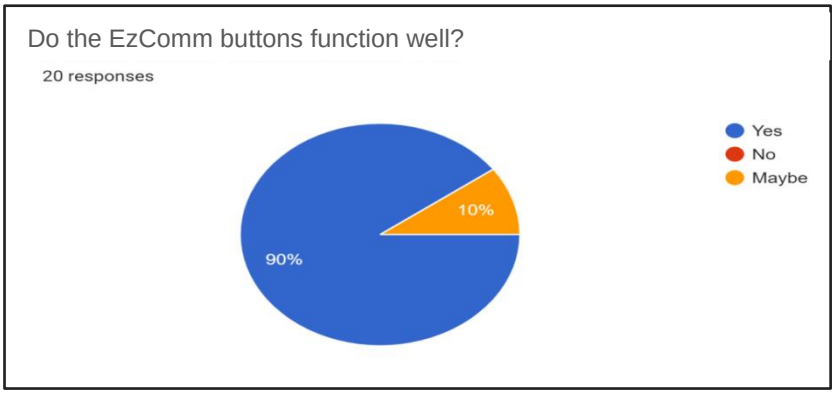


Figure 6: EzComm's Button Function

As for the attractiveness of EzComm interfaces, 85% of the respondents believed that the interfaces were attractive, while 5% could not give a definite answer; none of the respondents found the interfaces unattractive.

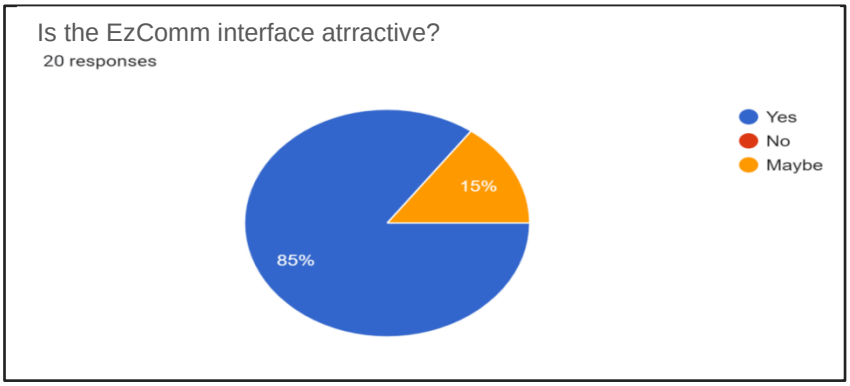


Figure 7: Attractive Interfaces

As shown in Figure 8, 95% of the respondents thought that EzComm was easy to control, while the rest were unsure if it was easy to control.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

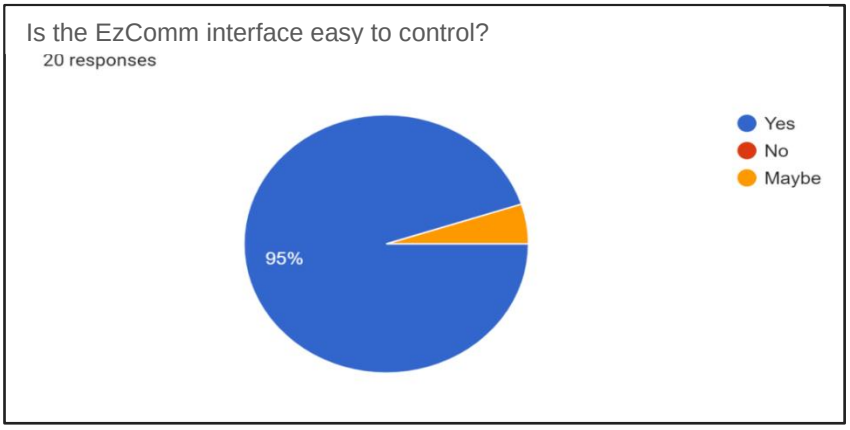


Figure 8: Easy to Control

As illustrated in Figure 9, most (95%) of the respondents considered the interface of EzComm user-friendly. This result is because minimalist design principles were used in the interface design. Only the remainder 5% of respondents were still determining.

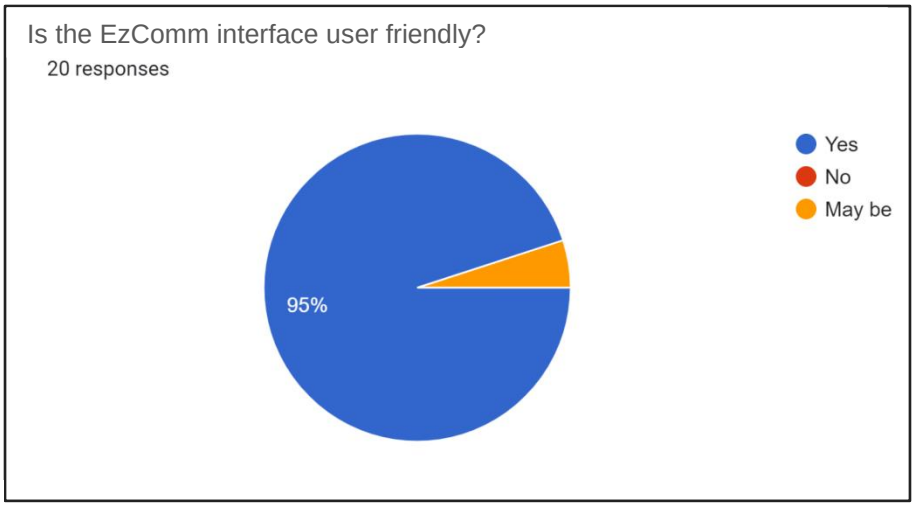


Figure 9: User Friendly

Usability

The third section is about the usability of the EzComm application. As shown in Figure 10, most (75%) respondents believed that the EzComm application could help them in their daily communication. In comparison, the remaining 25% doubted the application could help them in daily communication.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

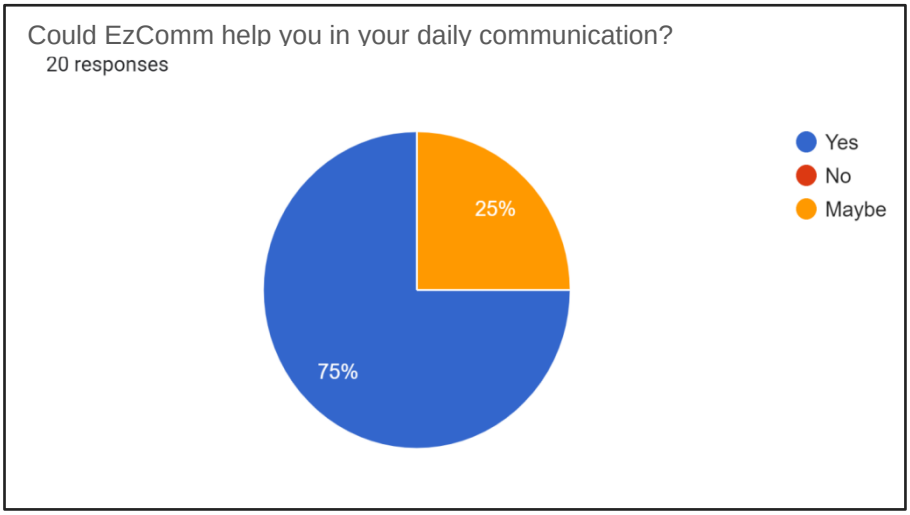


Figure 10: Help in Daily Communication

75% of respondents agreed that EzComm could solve their communication problems, and 25% were unsure, as illustrated in Figure 11.

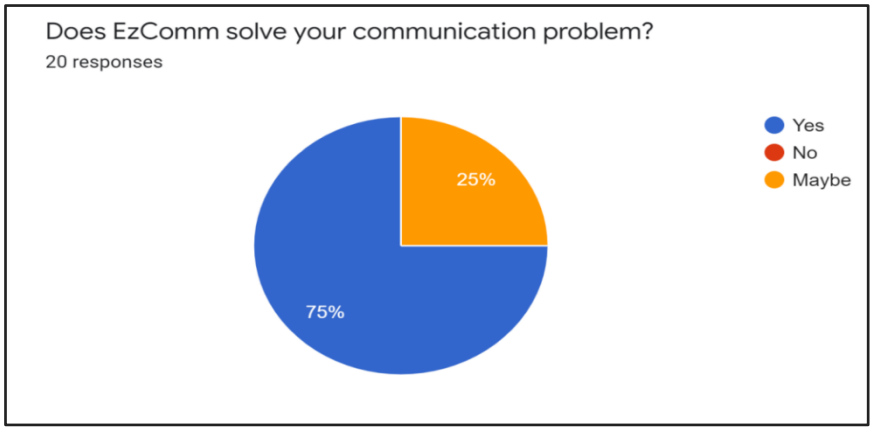


Figure 11: Solve the Communication Problem

Figure 12 shows that 85% of respondents believed using the EzComm application could help them release their feelings, while 15% still determined if it would help them.

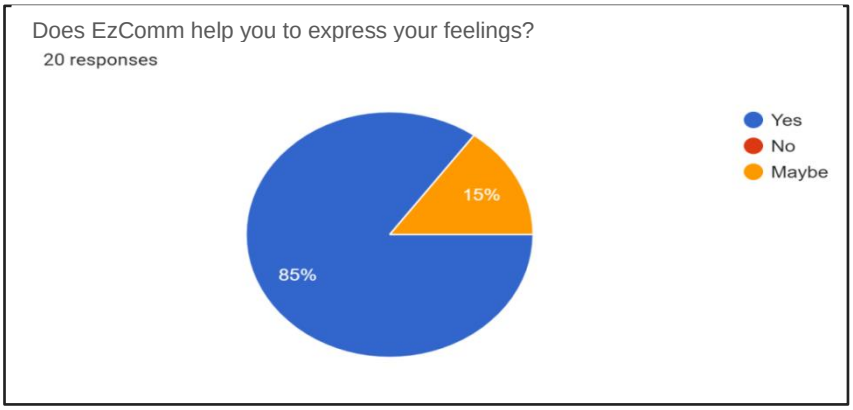


Figure 12: Help to Express Feelings

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

Figure 13 shows that 75% of respondents believed using the EzComm application could help them learn pronunciation, while the remaining 25% were uncertain about this help.

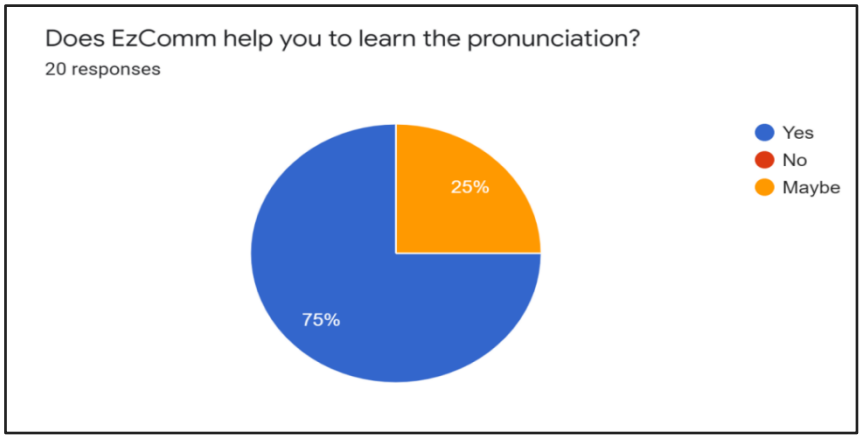


Figure 13: Help to Learn the Pronunciation

As shown in Figure 14, of the 20 respondents, 75% felt that the available words in EzComm were enough, 20% were not sure if they were enough, 5% thought that they were not enough, and more words needed to be added to EzComm application.

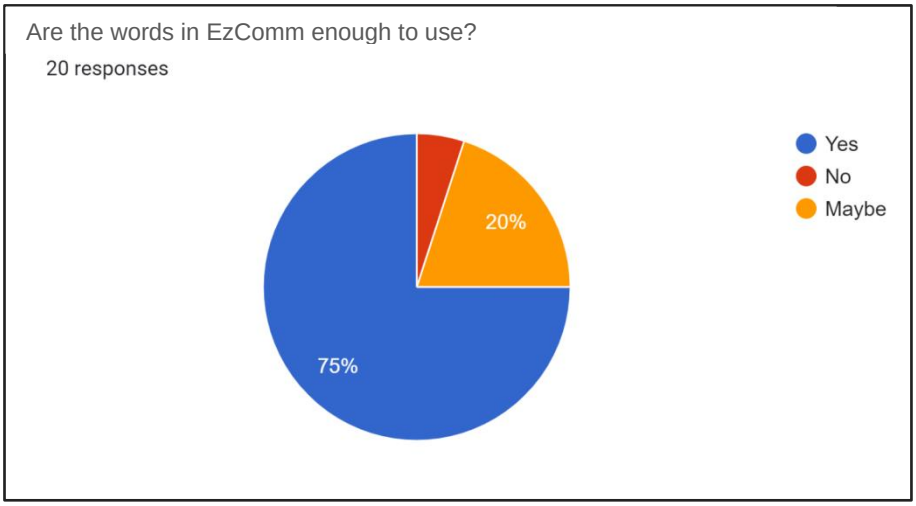


Figure 14: Words Enough to Use

Implications and Future Research

EzComm is a mobile application that can help those with communication disabilities to voice out their mind and thoughts. It could be a social skill rehabilitation for communication disabilities. In future research, we could be focused on the technologies that can be implemented in EzComm, such as augmented reality and artificially intelligent. Besides, we could be concerned with improving the functionality, usability, and accessibility of EzComm for communication disabilities.

Conclusion

EzComm is a mobile application that enables communication disabilities to easily communicate with others, anywhere and anytime, by clicking on the buttons. During the

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

evaluation, we found that most of our respondents liked the interface of our mobile application. Of 20 respondents, 18 think the mobile application's button is functioning well. Meanwhile, 17 think our mobile application's interface is very attractive, and 19 think our mobile application's interface is straightforward and user-friendly.

For the usability part of our app, 15 of them agreed that the mobile application could help them in their daily communication and solve their communication problem with other people. Next, 17 of them agreed that the mobile application could help them to express their feelings better. Finally, 15 of them agreed that the mobile application could help them learn the pronunciation of the words and that the words in the mobile application are enough for them to use.

A small percentage of participants also gave "maybe" and "no" answers to some questions. That is likely because individuals are different, and their needs also differ. EzComm may still need to meet their requirements. Following up with them for their reasons is necessary.

As a result of users' evaluation, EzComm has an interactive and functional design and interface. Although the number of respondents is small and no authoritative claim can be made, overall, the evaluation gave positive feedback towards the EzComm mobile application. The insightful findings of this study are well-accepted and similar to other research (Fichten et al., 2020; Wojciechowski & Al-Musawi, 2017; Zhang et al., 2020) findings. In a nutshell, we would keep our effort to work on the development of this communication board for communication disabilities.

Acknowledgement
We want to thank all the participants and the workers in the disability centre who helped us answer the survey done for us.

References

Baldauf, M., Bösch, R., Frei, C., Hautle, F., & Jenny, M. (2018). Exploring requirements and opportunities of conversational user interfaces for the cognitively impaired. *MobileHCI 2018 - Beyond Mobile: The Next 20 Years - 20th International Conference on Human-Computer Interaction with Mobile Devices and Services, Conference Proceedings Adjunct*, 119–126. https://doi.org/10.1145/3236112.3236128

Dada, S., May, A., Bastable, K., Samuels, A., Tönsing, K., Wilder, J., Casey, M., Ntuli, C., & Reddy, V. (2022). The involvement matrix as a framework for involving youth with severe communication disabilities in developing health education materials. *Health Expectations*, *25*(3), 1004–1015. https://doi.org/10.1111/HEX.13445

Fichten, C., Olenik-Shemesh, D., Asuncion, J., Jorgensen, M., & Colwell, C. (2020). Higher education, information and communication technologies and students with disabilities: An overview of the current situation. *Improving Accessible Digital Practices in Higher Education: Challenges and New Practices for Inclusion*, 21–44. https://doi.org/10.1007/978-3-030-37125-8_2/COVER

Gonzalez-Lopez, J. A., Gomez-Alanis, A., Martín Doñas, J. M., Pérez-Córdoba, J. L., & Gomez, A. M. (2020). Silent speech interfaces for speech restoration: A review. *IEEE Access*, *8*, 177995–178021. https://doi.org/10.1109/ACCESS.2020.3026579

Gulati, S., & Sondhi, V. (2018). Cerebral Palsy: An Overview. *Indian Journal of Pediatrics*, *85*(11), 1006–1016. https://doi.org/10.1007/S12098-017-2475-1/METRICS

International Journal of Law, Government and Communication
EISSN : 0128-1763
IJLGC
Volume 7 Issue 30 (December 2022) PP. 258-269
DOI 10.35631/IJLGC.730021

Nyman, A., Strömbergsson, S., Lindström, K., Lohmander, A., & Miniscalco, C. (2021). Speech and Language in 5-year-olds with Different Neurological Disabilities and the Association between Early and Later Consonant Production. *Developmental Neurorehabilitation*, *24*(6), 408–417. https://doi.org/10.1080/17518423.2021.1899327

Park, J. E. (2017). Apraxia: Review and Update. *Journal of Clinical Neurology*, *13*(4), 317–324. https://doi.org/10.3988/JCN.2017.13.4.317

Pearson, J., & Nelson, P. (2000). *An introduction to human communication: Understanding and sharing*. McGraw-Hill.

Plaiasu, V., & Vasilica, P. (2017). Down Syndrome – Genetics and Cardiogenetics. *Mædica*, *12*(3), 208–213. /pmc/articles/PMC5706761/

Shroff, R. H., & Keyes, C. J. (2017). A proposed framework to understand the intrinsic motivation factors on university students' behavioral intention to use a mobile application for learning. *Journal of Information Technology Education: Research*, *16*, 143–168.

Tee-Melegrito, R. A. (2022). *Communication disorders: Definition, types, causes, and symptoms*. Medical News Today. https://www.medicalnewstoday.com/articles/communication-disorders#causes

Vereenooghe, L. (2021). Participation of people with disabilities in web-based research. *Zeitschrift Für Psychologie*, *229*(4), 257–259. https://doi.org/10.1027/2151-2604/A000472

Why Is It Important to Communicate Well? – Business Communication for Success. (n.d.). Retrieved January 9, 2023, from https://open.lib.umn.edu/businesscommunication/chapter/1-1-why-is-it-important-to-communicate-well/

Wojciechowski, A., & Al-Musawi, R. (2017). Assistive technology application for enhancing social and language skills of young children with autism. *Multimedia Tools and Applications*, *76*(4), 5419–5439. https://doi.org/10.1007/S11042-016-3995-9/FIGURES/9

Zhang, L., Qu, Y., Jin, B., Jing, L., Gao, Z., & Liang, Z. (2020). An Intelligent Mobile-Enabled System for Diagnosing Parkinson Disease: Development and Validation of a Speech Impairment Detection System. *JMIR Med Inform 2020;8(9):E18689 Https://Medinform.Jmir.Org/2020/9/E18689*, *8*(9), e18689. https://doi.org/10.2196/18689