Journal of ICSAR
ISSN (print): 2548-8619; ISSN (online): 2548-8600
Volume 7 Number 1; DOI: http://dx.doi.org/10.17977/um005v7i12023p136

Development of Sign Language Application PESAN KULIAH With Material Substance Modification Based on Student Characteristics with Hearing Impaired

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Abstract: Lack of mastery of receptive and expressive language in students with hearing impairments affects the ability to compose scientific papers. Assistive technology for writing scientific papers can support students with hearing impairments in completing scientific paper assignments at various semester levels. This research aims to develop assistive technology that can make it easier for students with hearing impairments to participate in learning in tertiary institutions to create accessible learning for students with hearing impairments. Sign language application "PESAN KULIAH" (Guidelines for Writing Scientific Papers) is made by adjusting the characteristics of hearing impairments to make it easier to understand how to write various kinds of scientific papers. The method used in this research is R&D with ADDIE type. The results of the study show that the "PESAN KULIAH" application which contains explanation features about the types of scientific papers, writing systematics, and examples of scientific papers and is equipped with sign language videos by Sign Language Interpreters is proven to support the understanding of students with hearing impairments in understanding writing procedures and terms. contained in the preparation of papers, scientific reports, scientific articles, and theses.

Keywords: application of PESAN KULIAH, students with hearing impairments, scientific papers.

INTRODUCTION

The impact of communication experienced by individuals with hearing impairments affects education and learning processes (Amka & Rapisa, 2018), such as gaps in writing/typing skills compared to their hearing peers (Marschark, Lang, & Albertini, 2006). The lack of opportunity for students with hearing impairments to get language input affects their literacy skills (Lintangsari, 2014) so writing is a challenging and complex task as a result of the language barrier experienced (Schirmer in Karasu, 2017).

This research began with the results of assessments conducted through observation and interviews with deaf students who were studying at the Special Education Study Program, Faculty of Teacher Training and Education, and showed that students experienced difficulties in following the lecture process. Differences in patterns, ways, and media of communication are several factors that impede student understanding in the lecture process because most students with hearing impairments have inadequate language skills modalities to study at tertiary institutions.

At the university level, students with hearing impairments master simple and concrete vocabulary, while in the lecture process the vocabulary used tends to be abstract and its meaning is difficult to understand. This results in a limited understanding of the lecture process, especially work on assignments related to scientific writing such as writing papers, scientific reports, scientific articles, and final thesis assignments. Difficulties in compiling

scientific papers which are daily tasks in the lecture process have an impact on the learning outcomes of students with hearing impairments.

The development of language skills for students with hearing impairments needs to be developed through a variety of special services that suit their needs. One form of accessible service that can be provided to students with hearing impairments is through assistive technology (Utomo, Rapisa, Damastuti & Thaibah, 2021) to make it easier for them to obtain the same educational rights as hearing students. The use of assistive technology can build self-esteem, and increase competence and adaptability in the learning process (Harahap et al., 2017 & McNicholl et al., 2020 Andini, et al., 2021).

Development of an application based on Indonesian sign language (BISINDO) by presenting various menus related to scientific writing containing simple and easy-to-understand explanations regarding guidelines for writing scientific

papers, namely papers, scientific reports, scientific articles, and theses. Explanations are visualized by Sign Language Interpreter and supporting text and audio so that they can also be used by other students with disabilities. Each type of scientific writing contains a brief explanation of the meaning, systematic writing, and examples of scientific writing. This application is called Sign Language Application Pedoman Penulisan Karya Tulis Ilmiah (PESAN KULIAH).

This study aims to describe the use of the sign language application "PESAN KULIAH" which is made by adjusting the characteristics of hearing impairments so that it is easier to understand how to write various kinds of scientific papers. There are several assistive technology studies aimed at students with hearing impairments such as Herviani, et al (2022) regarding the development of "Dif-Able Apps" assistive technology for students with visual and hearing impairments which shows that these applications help visually impaired students and students with hearing impairments in accessing academic and non-academic lecture services within the Muhammadiyah University of Malang and Surabaya State University. Saputro (2022) researched the design of the "SAPA" application based on Computer-Mediated Communication (CMC) for the effectiveness of student communication with hearing-impaired students, the results of the study showed that this application was proven to be effective in solving communication problems for students with hearing impairments, visual impairments, non-disabilities, and subject lecturers, to create effective communication in lectures. This research is different from previous research because the use of the application aims to facilitate the needs of students with hearing impairments in compiling scientific papers at various levels of lecture semesters.

METHOD

This research is Research and Development (RnD) research, which is a method that aims to develop a new product or improve an existing product. Maksum (2012: 79) suggests that product terminology can be interpreted as hardware or software. This research educational research and development which aim to develop software in the form of an Android-based Sign Language Application Guidelines for Writing Scientific Papers "PESAN KULIAH". The types of R&D used in this study are analysis, design, development, implementation, and evaluation (ADDIE), the assistive technology development stage of Sign Language Application 'PESAN KULIAH" uses the ADDIE model as follows:

- Analysis, namely conducting needs analysis through assessment to determine the needs of students with hearing impairments in understanding scientific writing.
- Design, namely the stage of designing the required application based on the results of the assessment, namely the BISINDO-based sign language application for students with hearing impairments.

- Development, namely development in the form of the process of realizing the design that has been designed, namely making a sign language application "PESAN KULIAH".
- Implementation, namely product trials that directly involve students with hearing impairments in the use of applications that have been developed as a concrete step to use the products that are being made.
- Evaluation, namely the process of viewing and assessing products and making improvements to the results of trials that have been carried out so that the application becomes feasible.

RESULT AND DISCUSSION

Result(S)

The results of a needs analysis were conducted through an assessment regarding the ability to understand the scientific writing of students with hearing impairments, it is known that students in the seventh semester or class of 2019 students are familiar with general terms regarding papers, observation reports, journals, and theses. For detailed terms such as systematics of writing scientific papers, students with hearing impairments have not been able to recognize the meaning of specific terms in the systematics of scientific writing, such as introductions, problem formulation, literature review, methods, discussion, and others. Students with hearing impairment who are in semester five and semester three have not been able to know specifically about all scientific writings. Students only know the types of scientific writing related to what has been done, such as papers and reports on observations or activities as well as conclusions and suggestions. In the more detailed meaning of words, students are not yet able to understand so in carrying out scientific writing they are very dependent on the help of volunteers. The majority of students with hearing impairments have not been able to recognize the full meaning of words in scientific writing. Words that are recognized are limited to words that are familiar and they have worked on in the lecture process such as papers, journals, and observation reports. However, for specific words regarding chapter 1, chapter 2, and chapter 3 and complete systematics the meaning of the word is not yet known. Therefore, based on the results of the assessment, it is known that students with hearing impairments have not been able to understand writing scientific papers so they are very dependent on the presence of volunteers. Students with hearing impairments need aids in understanding the guidelines for writing scientific papers. Therefore, the development team designed an application for writing guidelines for scientific papers that can help students with hearing impairments in carrying out lecture assignments within the scope of scientific papers.

Sign Language Application Design "PESAN KULIAH" with Innovation in the form of an android application for guidelines for writing scientific papers complete with explanations of each type of scientific paper and Sign Language Interpreter as well as descriptions of BISINDO hand gestures. In addition, examples are included in each scientific paper that can be used as a reference for students with hearing impairments in writing scientific papers. The explanation in the Sign Language application "PESAN KULIAH"

was agreed upon through a Focus Group Discussion (FGD) so that it fits the characteristics of the user, namely students with hearing impairments. The Focus Group Discussion (FGD) was attended by students with hearing impairments, volunteer students, alumni students with hearing impairments, and DPD GERKATIN KALSEL members with an agenda to discuss the contents of Papers, Journals, and Observation Reports, Qualitative and Quantitative Thesis.

Figure 1. Display of the Application

Figure 2. Display of the Main Menu

Figure 3. Display of the paper sub-menu list

Figure 4. Display of the sub-menu on the Papers menu

The efforts made by researchers to find out the feasibility of using the application "PESAN KULIAH" for students with hearing impairments, is to conduct trials attended by grant teams, IT experts, student volunteers and students with hearing impairments. The Trial begins with introducing and explaining the Sign Language Application "PESAN KULIAH" to volunteers and students with hearing impairments. The next stage is students with hearing impairments and volunteers installing the "PESAN KULIAH" Sign Language Application on their respective cell phones. However, there are problems in installing the application, because this application requires space or a large memory capacity, which is 548 MB, so the installation process takes a long time. In addition, the new "PESAN KULIAH" application is available in the Android OS version, there is no version for IOS users yet.

Table 1 Summary of Test Results for the "PESAN KULIAH" Application based on a Volunteer User Survey Questionnaire

No	Name	Score	Category
1	Volunteer 1	90%	Very Good
2	Volunteer 2	90%	Very Good
3	Volunteer 3	90%	Very Good
4	Volunteer 4	90%	Very Good
5	Volunteer 5	90%	Very Good
6	Volunteer 6	90%	Very Good
7	Volunteer 7	90%	Very Good
8	Volunteer 8	90%	Very Good
9	Volunteer 9	100%	Very Good
10	Volunteer 10	80%	Very Good
11	Volunteer 11	90%	Very Good
12	Volunteer 12	90%	Very Good
13	Volunteer 13	90%	Very Good

Table 2 Summary of the Test Results of the "PESAN KULIAH" Application based on a Questionnaire Survey of Students with Hearing Impairment

No	Name	Score	Category
1	The student with hearing Impairment 1	100%	Very Good
2	The student with hearing Impairment 2	100%	Very Good
3	The student with hearing Impairment 3	90%	Very Good
4	The student with hearing Impairment 4	90%	Very Good
5	The student with hearing Impairment 5	100%	Very Good
6	The student with hearing Impairment 6	90%	Very Good
7	The student with hearing Impairment 7	90%	Very Good
8	The student with hearing Impairment 8	90%	Very Good
9	The student with hearing Impairment 9	90%	Very Good
10	The student with hearing Impairment 10	90%	Very Good
11	The student with hearing Impairment 11	70%	Good
12	The student with hearing Impairment 12	90%	Very Good

Evaluation of Sign Language Application Development "PESAN KULIAH" is included in the Very Good category. The advantages of this application can make it easier for students with hearing impairments to understand terms used in scientific writing such as the meaning of papers, journals, observation reports and theses. Apart from that, this application also has systematics in the preparation of Scientific Writing which is equipped with a Sign Language Interpreter and examples of Scientific Work so that it can make it easier for Students with hearing impairments in compiling Scientific Work.

Discussion(s)

The results of a needs analysis conducted through an assessment regarding the ability to understand scientific writing of students with hearing impairments, it is known that students with hearing impairments are familiar with general terms regarding papers, observation reports, journals and theses. It's just that in detailed terms such as the systematics of writing scientific papers, students with hearing impairments have not been able to recognize the meaning of specific terms in the systematics of scientific writing, such as introductions, problem formulation, literature review, methods, discussion, and others. Hearing impairment in students with hearing impairment affects their ability to understand language. The hearing barrier experienced by a person has an impact on the development of his language (Amka & Rapisa, 2018). The difficulties experienced as a result of hearing impairment are receptive (understanding spoken language) and expressive (expressing language orally and speech) language skills (Sharmita in Rapisa, 2020). Hearing impairment greatly affects the function of language, emotion, social, personality, creativity, and intelligence in children with special needs so there is a need for verbal communication education, learning media, and supporting training to overcome the delays in the process of education and learning in individuals with hearing impairments at various levels of education. Haliza, Kuntarto, & Kusmana, 2020).

At the tertiary level, students with hearing impairments experience some difficulties in following the lecture process. Differences in patterns, ways and media of communication are one of the factors that hinder the teaching and learning process, and most students with hearing impairments have inadequate language skills as a provision for obtaining lectures in tertiary institutions (Amka & Rapisa, 2018). Students with hearing impairments need accessible services to make it easier for them to attend lectures while at the same time developing receptive and expressive language through the use of Indonesian sign language (BISINDO).

Accessible services are provided with the aim of developing the understanding of students with hearing impairments in participating in lecture activities in tertiary institutions so that they obtain the same educational rights as hearing students. These conditions can be overcome by using appropriate assistive technology and according to student needs. Therefore, in order to help students with hearing impairments understand scientific writing, a Sign Language Application for "PESAN KULIAH" was developed. Sign Language Application "PESAN KULIAH" is an assistive technology that can help students with hearing impairments follow and complete coursework.

Assistive technology can be in the form of goods, tools, or products made by teachers/lecturers, which are designed to improve students' functional abilities (Akpan & Beard, 2014). The "PESAN KULIAH" application is an android application for guidelines for writing scientific papers which is equipped with an explanation of each type of scientific writing and Sign Language Interpreter as well as a description of BISINDO's hand gestures. In addition, examples are included in each scientific paper that can be used as a reference for students with hearing impairments in writing scientific papers.

Based on the results obtained, it can be seen that the "PESAN KULIAH" application is proven to be able to increase the understanding of students with hearing impairments in understanding various writing of scientific papers so that this application also helps develop receptive language skills and expressive language in students with hearing impairments. Akpan & Beard (2013) said that assistive technology allows students with special needs to have the opportunity to explore, explain, elaborate, broaden ideas, evaluate, and actively participate in a problem-solving environment without any obstacles that can disrupt their focus. This is also recognized by Setyawan, Tolle, and Kharisma (2018) that the design of this Android-based application will be able to help all people, including individuals with hearing impairments, to receive information. Book, ICT (Yasin, Tahar, Bari, & Manaf, 2017) and

multimedia animation videos (Astuti, Pertiwi, & Santoso, 2022) are recommended reference material augmented in all integration program in special education.

CONCLUSSION

Based on the results of the study it can be concluded that the development of the Sign Language Application "PESAN KULIAH" can help students with hearing impairments understand terms in scientific writing and write scientific papers such as Papers, Journals, Observation Reports and Thesis. The increased understanding of students regarding various terms in the preparation of papers, journals, observation reports, and theses shows the development of receptive and expressive language skills in students with hearing impairments in the Special Education study program.

ACKNOWLEDGMENTS

This research can be carried out smoothly with the help and support of various parties. for this reason, the researcher would like to thank Direktorat Pembelajaran dan Kemahasiswaan, Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi who has provided financial assistance in developing assistive technology for students with hearing impairments so that they can produce Sign Language Application "PESAN KULIAH and scientific and this scientific article.

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