The Development Of "Remine Me" Vibrating Watch Media
For Optimization of Interaction And Communication In Deaf Students

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Abstrak: This research was motivated by communication problems between lecturers and the subjects' peers who had difficulty calling and talking when studying offline. This happens because when you want to start communicating or simply call a subject, because the subject cannot hear you need to be approached first and "patted" so that the subject is sensitive and focused that someone wants to communicate with him. This research aims to produce a tool that can bridge communication between deaf students and stakeholders during learning. Therefore, the vibrating watch was designed to increase sensitivity in deaf students, this watch was named "Remine Me". This "Remine Me" vibrating watch works by capturing sensors with the help of a remote control, then the sensors will transmit stimulation in the form of vibrations to the hands of deaf students, so that if they want to communicate with the subject while they are still at a certain distance, this will make it easier for deaf students and lecturers. even with peers to be able to start communication without having to be "patted" first. The development in this research uses the R&D research method with the ADDIE (Analysis, Design, Development, Implementation and Evaluation) design. The research subject was a 3rd semester deaf student. The result of this development was a vibrating watch with remote control. The results of the development of "Remine Me" could be an alternative tool that can be used by every lecturer to make it easier to call deaf students in their class.

Keywords: Communication & Interaction; Remine Me; Vibrating Watch

Pengembangan Media Jam Tangan Bergetar *"Remine Me"*
Untuk Meningkatkan Interaksi Dan Komunikasi Pada Siswa Tunarungu

Abstract: Penelitian ini dilatarbelakangi karena adanya permasalahan komunikasi antara dosen dan teman sebaya dari subjek yang mengalami kesulitan memanggil dan berbicara jika berkuliah offline. Hal ini terjadi karena ketika ingin memulai berkomunikasi atau untuk sekedar memanggil subjek, karena subjek tidak bisa mendengar maka butuh di dekati dulu dan di"tepuk" agar subjek peka dan fokus bahwa ada yang sedang ingin berkomunikasi dengannya. Penelitian ini bertujuan untuk menghasilkan sebuah alat yang dapat menjembatani komunikasi antara mahasiswa tunarungu dengan stakeholder yang ada saat pembelajaran. Oleh karena itu, maka jam tangan getar di desain untuk meningkatkan kepekaan pada mahasiswa tunarungu, jam tangan ini diberi nama dengan "Remine Me". Jam tangan getar "Remine Me" ini bekerja dengan menangkap sensor dengan bantuan remote control, lalu sensor akan meneruskan rangsangan dalam bentuk getar pada tangan mahasiswa tunarungu, sehingga jika ingin berkomunikasi dengan subjek di kala masih dalam jarak tertentu maka ini akan memudahkan mahasiswa tunarungu dan dosen bahkan dengan teman sebaya sekalipun untuk dapat memulai suatu komunikasi tanpa harus "ditepuk" terlebih dahulu. Pengembangan dalam penelitian ini menggunakan metode penelitian R&D dengan desain ADDIE (Analysis, Design, Development, Implementation and Evaluation). Subjek penelitian adalah satu orang mahasiswa tunarungu semester 3. Hasil pengembangan ini adalah jam tangan getar dengan remote control. Hasil pengembangan "Remine Me" ini bisa menjadi salah satu alternatif alat yang dapat digunakan bagi setiap dosen untuk memudahkan memanggil mahasiswa tunarungu yang ada di kelasnya.

Kata Kunci: Jam Tangan Getar, Komunikasi dan Interaksi, Remine Me

INTRODUCTION

Inclusiveness is an educational alternative provided by the government to facilitate the widest possible opportunities for students with special needs to continue their education (Budiyanto, 2017), including when they are going to study in university. With the increasingly massive inclusive program

from the government, higher education institutions are also required to be ready to organize it. Nowadays, universities that have implemented inclusive education should be ready because the inclusive socialization from government has been done in almost all parts of Indonesia. With the implementation of inclusive education in tertiary institutions, it is hoped that students with special needs can maximize their potencies so that one day they will be able to be independent both morally and materially. In this case, cooperative attitudes are needed from various parties, teachers, schools, and universities have to work hand in hand to achieve the learning objectives by making some approaches both internally and externally to make the quality of learning better (Anif et al., 2020). Since the massive implementation of inclusive education in Indonesia, Muhammadiyah University of Lampung has accepted several students with special needs. Students with special needs who have been accepted are students with hearing impairments, visual impairments, motor impairments and cerebral palsy spread over several semesters.

By accepting students with special needs of various types of barriers, of course the university must be ready to provide all the services needed by the students with special needs education which must also be adapted the needs of each student who has different character (Garnida & Sumayyah, 2015; Kustawan, 2012; Parker et al., 2002). In order to provide optimal services, all stakeholders at Muhammadiyah University of Lampung have also tried to maximize available resources, so that the academic and non-academic needs of students with special needs can be provided optimally.

During the new normal era, learning process at the University of Muhammadiyah Lampung still uses a "hybrid learning" lecture system that combines online lectures and offline lectures. Hybrid learning is carried out as a solution to break the covid chain (Noval & Nuryani, 2020)and also to develop the student's skills so they are more literate in technology. Hybrid learning is a method which combines two or more learning process (online and offline) in order to achieve optimal learning process (Hendrayati & Pamungkas, 2016; Makhin, 2021; Misesani, 2021; Sutisna & Vonti, 2020). In line with this opinion (Bonk & Graham, 2006; Fauzan, 2017; Makhin et al., 2021; Tayebinik & Puteh, 2013) state that hybrid learning is a combination of learning (e-learning) with face-to-face learning. Hybrid learning is also known as blended learning and mixed learning (Massoud et al., 2011) and according to (Rahmatillah, 2013) in her research, hybrid learning has an influence on student learning outcomes. Especially about tools, according to O'Byrne & Pytash (2015), hybrid learning is a pedagogical approach that combines face-to-face instruction with online-based computer-mediated instruction.

Before hybrid learning was implemented, schools and universities switched to online learning processes because of the Covid-19 pandemic. Based on the evaluation, it was found out the that the application of online learning has some positive and negative impacts both on student's learning outcome and on students' psychosocial (Yazid & Neviyarni, 2021). The positive impact that arises is that online learning can maximize interaction between lecturers and students through dialogue forums in the media. On the other hand, students can pursue the modules provided repeatedly without any time and place limits independently (Riyanda et al., 2020). In addition to these positive impacts, online learning is considered more effective and efficient because it already uses technology with the trend of the industrial revolution 4.0 (Huda et al., 2018). The fact is that online learning still cannot replace face-to-face learning, students still need direct direction and explanation from teachers about material (Riyanda et al., 2022) and some learning materials delivered online are very difficult for students to understand (Andini & Widayanti, 2020; Saputra et al., 2020; Utari et al., 2020). Besides problems related to the learning process that is not optimal, online learning also cannot cover the area of student learning ethics as a whole, because monitoring can only be done remotely (Andini & Widayanti, 2020).

Implementation is online using various learning platforms such as google meet, zoom, and google classroom (Agusti, et al. 2018; Roschelle & Hodkowski, 2020), does not make the learning process enjoyable for students, including for the deaf students. Lectures that tend to look like the lack of interaction, the learning environment is not conducive, and the delivery of material that is "teacher centered" has some negative impacts. This is because when the lecturers explain the material orally using lecturing method, of course the deaf student will not be able to listen eventhough the camera has been turned on and it is hope that the deaf students can read the lecturer lips when the video is turned on. Among some possible reasons are; the quality of video; the quality of internet connection, the speaking speed of the lecturer in explaining the material greatly affects the deaft students to be able to understand the spoken language. Another difficulty in the implementation of online lectures is the lack of participation of both parties in learning process communication so when an evaluation is carried out

at the end of the semester, the grades of the students are not satisfactory. This may raise complaints both from students and parents. Related to this condition, the lecturers also admit that it is very difficult to start communicating or interacting with deaf students during the online learning. In the online learning, the lecturers can only remotely monitors the learning process of their studets, without knowing that their students get great difficulty in understanding the circumstances and conditions around them and cannot understand the material presented by the lecturers. Lecturers from the special education study program also share this difficulty when teaching deaf students. The hope is that after the new normal era, everyone can meet face to face again so that deaf students can be conditioned more easily and the environment can be designed to be more conducive.

After several semesters carrying out online learning, nowadays UML switched to "hybrid learning" which combines online learning with offline learning (face-to-face learning). This is in a line with the opinion of (Karabulut-Ilgu & Jahren, 2016; Kifta et al., 2021) who state that hybrid learning combines virtual classes with conventional classes in which there is a proper learning design to be used as a feature of the learning system that will be completed by the students themselves, until the learning objectives can be achieved (Arifin & Abduh, 2021). With offline (face-to-face) learning, the deaf students are very happy to be able to directly engaged in learning. They hope to be able to meet face to face and be able to experience learning directly like what they experienced when they were at school. However, it is different from the lecturers who are still confused about starting interactions, especially when checking students' attendance and asking students to focus so they know that during the lecture, there will be a lot of material to be delivered (communication problems). Formerly, when the deaf student is still in high school, the teacher or friend who wants to communicate with him will definitely tap his shoulder first before starting the interaction or the teacher will look directly at the student at his desk. This can be done because in special schools the number of the students in the class is usually very limited, making it easier for the teacher to be able to communicate directly in front of his students. However, this condition cannot be carried out when students have entered the tertiary level, where there are many students in the classroom, so it is not possible for the lecturer to be right in front of the deaf student all the time and always go to his place to say something, because basically communicating is carrying out communication function (Prayitno et al., 2018) which ultimate goal is that both parties can understand each other the meaning/message of what is conveyed. In more detail, according to Prayitno et al. (2019) in communication, language is a tool for communication activities because language is a form of symbolic communication.

During the hybrid learning process which has been going on for several months, deaf students have had quite difficulty understanding "what is happening" in the classroom. The student had difficulty focusing, was uncomfortable and often asked his classmates to explain the situation in class. The learning process that takes place is only adapted to ordinary learning which does not provide adequate accessibility and mobility for deaf students. Lecturers and teaching staff admit that they are quite confused about being able to adapt learning for deaf students, even just to call, they are not able to master the "how", especially now that most of the teaching staff also do not master sign language. Another impact that arises is when the learning process between educators and deaf students is very passive. Another impact that is felt by deaf students is the quite high level of stress due to not being able to understand the lecture material, which then also has an impact on the results of their learning evaluations. Apart from the negative impacts that occur on deaf students, other impacts are also felt by parents or families. They complain that the learning system currently implemented is not friendly for their children.

Therefore, to make it easier for both parties, the research team agreed to design a tool called "Remine Me" in the form of a vibrating watch that can be used at a certain distance which can be an "alarm" for deaf students when someone is going to communicate, both lecturers and students. In this study, the first focus will be on the use of lecturers and deaf students. This vibrating watch works with the help of a remote control which if the remote control is pressed automatically the vibrating watch will vibrate as a reminder for deaf students if at this time they need to focus on something (attendance, delivery of learning and focus on lecturers) so that it is expected that the deaf students are more capable to controll themselves and adapt to the learning process.

METHOD

To development of device uses the Research and Development (R&D) method which aims to produce a product (Sugiyono, 2017). This R&D research uses the ADDIE model design which is very practical to use and its systematic implementation makes it easier for researchers to develop a product (Branch, 2009). The try-out subjects in this study was a deaf students. The research and development carried out refers to the ADDIE model which is limited to the third stage. These three steps are Analysis, Design and Development.

The development of the vibrating watch (Remine Me) underwent through the following stages according to the design of the ADDIE design R&D research method, namely:

1. *Analysis*

   At this stage the researcher identified and assessed learning in lectures through observation and interviews some students with special needs and 2 lecturers. These were done in order to obtain an overview of the learning process and learning outcomes obtained by these students. This analysis was also carried out to obtain complete and comprehensive information about the needs of each student. The next analysis was carried out on planning a device called Remind Me (vibrating watch) to facilitate interaction and communication. The analysis was carried out on the needs of deaf students who have difficulty responding and knowing what the lecturer is doing in front of the class, including at the beginning of lectures which begins with checking attendance. Therefore, we need a device that can facilitate students' sensitivity when participating in the learning process.

2. *Design*

   The consideration in choosing a vibrating watch is because students can respond immediately if they are called or there is something that the lecturer will convey. The design of this device uses a watch that is designed in such a way that it can capture signals from a remote control held by a communicant who wants to convey something to deaf students. So, to use the vibrating watch, it is enough to press the button on the remote control, the wrist watch worn by the deaf student will vibrate and the student will automatically be more aware of the surrounding environment, especially in the learning process.

3. *Development*

   The final stage is the development stage, where at this stage valid teaching aids will be produced. There are 2 steps at this stage, namely validation and revision. The data collection technique used in this research is a questionnaire sheet. Questionnaire sheets are used to validate products from media experts and material experts. The analysis tool used is a vibrating watch called "Remine Me". This vibrating watch is considered worthy if it gets a score in the good or very good category. Vibrating watch quality categories are obtained from validation data. Data analysis of the validity test results of the vibrating watch being developed was carried out by giving a score.

   Data analysis of the results of the validity test of the vibrating watch was carried out by giving scores. The suspension criteria are score 1 (Very Low), score 2 (Low), score 3 (Fair), score 4 (High), score 5 (Very High). After getting the score, calculate the percentage of the suspension using the formula:

$$\text{Validity level} = \frac{\text{Score obtained}}{\text{Highest score}} \times 100\%$$

Tabel 2. Interpretasi Data Validitas Jam Tangan Getar

No.	Interval	Kriteria
1.	81 % - 100 %	Very High
2.	61 % - 80 %	High
3.	41 % - 60 %	Fair
4.	21 % - 40 %	Low
5.	0 % - 20 %	Very Low

RESULTS & DISCUSSION

The first stage of this research is Analysis. At this stage, what is carried out is an analysis of the interaction needs of deaf students with educators so that conducive learning can be established. Based

on the results of the needs analysis, it shows that students' interaction skills can be developed through the use of vibrating watches. So that students' interest in learning will increase and understanding will arise. Vibrating watches can be a solution when learning takes place offline, which can make it easier for educators to manage communication with deaf students. The vibrating watch is designed so that it can be used by every educator in every course taken by deaf students.

The second stage is design, researchers and programmers analyze and look for the tools needed to make a vibrating watch. There are 3 steps at this stage, namely preparing the design, namely making the remote control and making the vibrating watch. The choice of materials and tools to be used is selected in such a way, because to obtain a good connection, appropriate tools are needed. The selection of tools such as watches that match the installation size of the tools to be inserted must be appropriate. Therefore, the selection of tools and materials must be done carefully. In making the design, researchers and programmers make a rough idea which can be seen as follows:
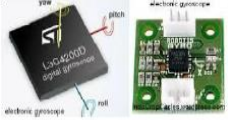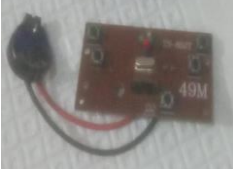
The cycle is as follows:

1. Initial Design
    Voice (People calling/starting a conversation) the audio sensor → vibrating watch → the deaf students see the vibrating direction in the watch → the deaf students respond
2. Design after analysis
    Several obstacles were experienced when the assembly of the device was started because it was difficult to implement the audio sensor. This happened because there were too much other sound distractions that made the device unable to clearly capture the audio that was intended for the deaf students. Then the initial design was changed to be as follows:
    Remote control (held by the communicant from a certain distance) →signals →the watch vibrate and shows the direction of the vibration →the deaf student respond

To develop vibrating watch, there are tools was used. You can see in this table.

Table 1. Spare Parts for Making *Remind Me* and Their Uses

No.	Name of Material for Making *Remind me*	Material picture	Utility
1.	Arduino Pro Mini	Sources: google.com	To determine the sensor distance
2.	Vibrating Motor	Sources: google.com	Generate Vibration
3.	Wearing (Cable)	Sources: google.com	Tool connector
4.	Project Board	Sources: google.com	Board for tools
5.	Regulators IC-505	Sources: google.com	Tool link

6.	Gyros		Vibration booster
		Sources: google.com	
7.	PCBs		Coding
		Sources: google.com	
8.	Watch		Vibrating watch
9.	Remote control transmitters		The tool on the remote control which has 4 buttons to detect the direction of front, back, left, right and how to read it like looking at a clock.

Here is the final vibrating watch:

Picture 1. Vibrating Watch

Picture 2. Remote Control

After the vibrating watch is done. The researcher will test the use of the device on various component functions on the watch and on the remote control. After testing the functionality of the device, trials will also be carried out on its use for deaf students and their communicators who will communicate and interact.

In more detail, testing will be carried out on:

1. Barrier Distance Detection Test
   The test is aimed to determine the distance of obstructions such as walls, objects or obstacles that may slightly interfere with the remote control signal. This is done in order to make sure that the use of the remote control and vibrating watch can be used comfortably by the communicant and the deaf student. Based on the test results, the efficiency of the watch against barriers is that the watch can be used within a distance of 4 meters without any obstacles such as walls or different rooms.

2. Spot Position Detector Testing
   Aimed to find out the position of the deaf student and the communicant who will communicate so that the deaf student can detect where the communicant who will communicate and interact with her. Based on the results of testing the direction of the remote control holder, lights were added to

the watch according to the cardinal directions, namely north, west, east and south. All directions work 100% well.

Final step is developing vibrating watch. The firts step is preparation of a vibrating watch assessment instrument. The instrument prepared for evaluating vibrating watches is in the form of a validity sheet, consisting of a validity sheet by media experts and a validity sheet by material experts. This validation aims to determine the validity of the props that are made and can be used. The following is validation carried out by media experts and by material experts. The results are:

Media Evaluation by Validators

$$\text{Validator 1} = \frac{20 \times 100\%}{25} = 80\%$$

$$\text{Validator 2} = \frac{21 \times 100\%}{25} = 84\%$$

$$\text{Validator 3} = \frac{20 \times 100\%}{25} = 80\%$$

From the validation results by the three validators, an average of 81.3% was obtained in the very high category. This has met the validity indicators, so it can be concluded that the development of a vibrating watch can be said to be valid and efficient to use.

Based on the research results above, it shows that media is an alternative that can be used to support learning for students, especially students with special needs. Media is also something that can be used to help interaction and communication for everyone. In this case, the important point is that communication must be able to convey the message that one person will convey to another (Prayitno, et al (2009). However, this is different for individuals who are deaf, whose way of communicating is also special. Usually they use language signs, oral language and there are also some of them who already use total communication. These three ways of communicating that deaf individuals have are certainly not all of which can be mastered by people in general, especially if deaf individuals only use sign language. This is experienced by one of the deaf students at the University of Muhammadiyah Lampung, who based on the results of the assessment he was only able to communicate using sign language, which made the learning process less understandable to him. Lecturers and educators explained that ordinary learning was not adapted to the student's abilities. During this learning communication and interaction between educators and deaf students is not well established. Just calling and asking students to focus is already difficult for educators. Therefore, to make it easier for educators to start interactions, researchers developed a vibrating watch.

Vibrating watches were developed to increase student sensitivity during the learning process, namely when to be called by the teacher, in what direction and for what purpose. Vibrating watches are equipped with a remote control which is used by educators and vibrating watches are used by deaf students whose use is very practical. The remote control gives a signal to the watch, then the watch will vibrate and you will see the direction of the light where the remote control is used. According to the validation results from media experts, it is proven that the validity efficiency of this vibrating watch is 81.3%, which shows very high validity. So it can be concluded that the efficiency can be said to be good.

CONCLUSION

The development of this vibrating watch was motivated by the difficulties of deaf students and lecturers in interacting and communicating especially during the learning process. It started with attendance, starting lessons, teaching and learning activities and closing. Often deaf students don't seem to understand every process carried out in class, the same thing is felt by lecturers that they are also confused about where to start to explain each process to these deaf students. With the existence of a vibrating watch, it is hoped that it can be an alternative solution that can be used by lecturers to be able to start communicating with these deaf students.

Vibrating watch namely "Remine Me" was developed with three stages of ADDIE, there are analysis which includes analysis of needs and analysis of potential needs of deaf students and lecturers as well as analysis of the usability of the tools to be developed, the second stage is design which intends to define product design, the third stage is development or production which intends to develop product.

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Vibrating watches are one of the tools that can be offered to help interaction and communication with deaf students. This watch focuses on helping increase sensitivity for the deaf to people around them who will communicate but are limited by distance. Vibrating watches make it easier for the deaf to be more responsive when called from a considerable distance.

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PROFIL

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