Development of Evernoted Learning Media Center as Learning Innovation and Assistive Technology for People with Disabilities

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	Abstract
Received : November 5, 2024 Revised : December 14, 2024 Accepted : December 30, 2024	The development of Evernoted Learning Media Center aims to introduce inclusive learning innovations for people with disabilities. This study presents the design and implementation of an Evernoted-based learning platform with accessibility features. Employing the Research and Development (R&D) method, a need analysis was initially conducted through interviews with teachers and principals at three Special Needs Schools (SLB/*Sekolah Luar Biasa*) in Malang City. The analysis results were used to design an appropriate Evernoted Learning Media Center design. The platform incorporates accessibility features, including alternative text, contrast settings, and layer readers. Findings revealed that Evernoted could be configured into an effective learning medium, offering flexibility, personalization, and ease of users access with various types of disabilities, especially deaf people. The analysis results demonstrated that Evernoted Learning Media Center could be an effective alternative for meeting the varied learning needs of students with disabilities, particularly deaf people, through two versions: an augmented reality (AR)-based Android application and a virtual tour-based website. Validation results indicated the platform's feasibility at 83.17%, categorizing it as very feasible to be tested on students with disabilities.

Keywords:	Augmented Reality, Disability, Evernoted, Learning Media
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INTRODUCTION

Inclusive education is a central issue in today's education world. A primary in realizing inclusive education is meeting the learning needs of students with disabilities, entitled to equal access to all educational types and levels. The state's guarantee and recognition of their rights to obtain educational services are stated in the 1945 Constitution, Law Number 39 of 1999 on Human Rights, Law Number 4 of 1997 on Persons with Disabilities, Law Number 20 of 2003 on the National Education System, and along with other regulations in the form of government and ministerial regulations (Amalianita et al., 2021; Mustika & Pradikta, 2022). Judging from several aspects that may be included in this regulation, it begins with identifying and evaluating disabilities, which explains that the regulation must require an accurate disability identification and evaluation process and is related to the need for special accommodation for each student with disabilities (Hasugian et al., 2019; Oktadiana & Wardana, 2019).

Regulations should facilitate processes for requesting and approving reasonable accommodations by students with disabilities and the responsibilities of educators and educational institutions in considering requests for such accommodations. It is the obligation of educators and educational institutions. Regulations should strengthen the obligations of educators and educational institutions to provide reasonable accommodations and develop a more inclusive quality of education for students with disabilities (Lovat et al., 2011; Toutain, 2019). There are several things to meet the accommodation needs of people with disabilities, including individual, effective, and flexible accommodation. Individual accommodation means that each person with disabilities has different needs from one another. The second thing is that accommodation must be effective, which means it must help people with disabilities achieve their goals. The third point is that accommodation must be flexible, which means it must follow changes in individual needs over time (Römhild & Hollederer, 2024; Smith et al., 2021) By providing appropriate accommodations, we can create a more inclusive environment and empower people with disabilities to reach their full potential.

The results of the data analysis showed that only 5.48% of the population with disabilities over the age of 5 were still in school (Vancampfort et al., 2020). This percentage was much lower than the non-disabled population, which was 25.83% (Putri, 2020).This is especially true for blind people, as based on data from the 2010 Population Census, the percentage of the population aged 10 years and over who have visual impairments ranks first, at 3.05%, or around 5,820 children. This is also reinforced by the number of people with disabilities who do not or have never received education of 23.91%, and the number of people who do not attend school of 70.62% (Khotijah et al., 2023). BPS data from 2022 showed that only around 4% of school-age people with disabilities received formal education services (Kaban, 2024). This low participation may attributed to inadequate facilities and unequal distribution of resources.

Based on the observation results and interviews in three Special Needs Schools (SLB) in Malang City, several problems were found, especially in the use of media in the learning process. Students still found it difficult to understand, requiring teachers to repeat explanations. This is because PowerPoint is limited to text and video only and cannot insert sign language to make it easier for students to understand the teacher's explanation. Students in SLB schools are mostly deaf and have difficulty receiving explanations with text only through PowerPoint, so the facilities are limited. As a reinforcement of the need for interactive media, Virtual Reality (VR) can be used to create an immersive learning environment, such as visiting a museum, zoo, or classroom virtually. SLB students require accessible media, such as videos equipped with alternative text for screen reader users.

Evernoted, a popular digital note-taking platform, provides flexibility and ease in managing information. This platform has great potential to be developed into an effective learning tool for students with disabilities. With its various features, Evernoted can be customized to meet various learning needs. Evernoted technology is a multifunctional platform that provides users with information storage, processing, and management services (Fichten et al., 2022). Evernoted allows users to store and organize various types of content, such as text, images, audio, and video, in one structured place (Vendityaningtyas et al., 2020a).

Needs analysis of mildly hearing-impaired students in learning letter recognition at SLB-B YPTB MALANG. This study aimed to determine the specific needs of mildly hearing-impaired students at SLB-B YPTB MALANG in learning letter recognition. Initial observations revealed a requirement for visual-based learning materials, such as images and videos, to facilitate auditory imitation, fine motor skills development for writing, and letter discrimination through audiovisual categorization. The use of creator-based visual media in teaching vowel shapes and sounds proved effective in enhancing focus and engagement among students. The images and objects within these videos encouraged students to name objects beginning with vowels, thereby improving their spoken language skills. Based on these findings, this study sought to design and develop visually-based learning materials, incorporating environmental and historical content, for hearing-impaired students using Evernote. These materials were packaged as a website and an android app to optimize information delivery and feedback.

METHODS

This study was conducted at SLB-B YPTB Malang, located at Jl. Brigjen Slamet Riadi, No. 126, Oro-Oro Dowo, Klojen District, Malang City, East Java Province. The research activities were carried out from November 5th to 8th, 2024. The research subjects were 21 students from SLB-B YPTB Malang, comprising both junior high and senior high school students. This study aimed to enhance new features within the Evernoted platform to support users with disabilities. This study adopted the ADDIE development model with the steps of Analysis, Design, Development, Implementation, and Evaluation (Najuah et al., 2021; Siregar et al., 2021)) . The analysis stage identifies media that need to be developed to meet the needs of students with disabilities through observation and initial interviews at three SLBs in Malang City. Furthermore, the design stage determines the learning media to be created, including materials, videos, and media prototypes.

In the next stage, the process of developing learning innovations or assistive technology for students with special needs (deaf) was carried out, and it was developed in two versions, namely through an Android application and a website. The software used was Unity as an AR development tool. Unity was chosen to develop AR because it can develop interactive AR content, especially in this case, which will be used in animation models and visual effects from the museum. This content is in the form of replicas of historical objects, simulations of historical events, or virtual environments related to the history found in the museum. Unity was then integrated with the ARCore platform (for Android) to display AR content on mobile devices. The media that has been developed was then validated by media experts and material experts to determine the feasibility level of the media developed. At the implementation stage, a trial was conducted on ten representative students from three SLBs in Malang City. The final stage, the evaluation stage, was conducted to analyze the data that had been obtained.

Data analysis was conducted using qualitative and quantitative data. Quantitative data were obtained through a questionnaire using a 4-item Likert scale for validation instruments. Meanwhile, qualitative data were obtained from an open

questionnaire filled out by the validator in providing comments on the media developed.

$$Pi = \frac{\text{assessment result score}}{\text{maximum score}} \times 100\%$$

(1)

The percentage of Pi written in equation (1) can be used in calculating the wighted average in equation (2) below.

$$P = \frac{\sum nipi}{\sum ni} = \frac{\sum nipi}{n}$$

(2)

Description:

P   : weighted average percentage

Pi   : percentage of each aspect

$\sum n$: number of statement items for each aspect

$\sum n.$: number of questions

The percentage can be classified in Table 1.

Table 1. Classification of media feasibility categories

No	Interval Value (%)	Feasibility Classification
1	76-100	Very Feasible
2	51-75	Feasible
3	26-50	Less Feasible
4	0-25	Not Feasible

RESULTS & DISCUSSION

At the analysis stage, the results showed that 66% of 10 representative students from three SLBs Malang City had difficulty learning history material directly in class. This was reinforced by the results of interviews with representatives of three teachers and three principals of SLB, indicating that students still had difficulty receiving information from the learning process in class. Based on the analysis results, students still had great difficulty understanding, and teachers had to repeat the explanation. This is because PowerPoint is limited to text and video only. It cannot insert sign language to make it easier for students to understand the teacher's explanation. Students at SLB schools who are mostly deaf find it difficult to receive explanations with text only via PowerPoint, so this is a limitation of the facilities found in schools.

The results of the data analysis showed that the design stage of the material that will be taught is to discuss the history of museums in Malang City and their heritage. Learning innovation or assistive technology for students with special needs (deaf) is developed in two versions, namely through an Android application and a website. The first development in the form of an android application based on augmented reality (AR) mainly displays additional information about cultural heritage sites, artifacts, and historical relics. The topic selection for video development by selecting museum locations in Malang includes Singasari Museum, Mpu Purwa Museum, Indonesian Music Museum, and Eng Ang Kiong Temple.

The software used was Unity as an AR development tool. Unity was chosen to develop AR because it can develop interactive AR content, especially in this case, which will be utilized in the museum's animation model and visual effects. Unity was then integrated with the ARCore platform (for Android) to display AR content on mobile devices.

The first thing to do for integration with Evernoted is to create a special notebook for each historical topic to be displayed. Then, save the AR content planned in the previous process with Unity's help. Development through an Android application is carried out by integrating the selected AR software SDK into the application. Then, synchronization is carried out with Evernoted to ensure that the application can access data from Evernoted. Further development of the website has been designed to be responsive so that it can be accessed from various devices. The next step after the video and content of the material or theory of history and museums in the Malang area are included in the website, and then an interactive feature as a discussion forum is added.

The media developed is named Evernoted Learning Media Center, and it scans images, objects, and archaeological sites in the museum to see AR objects. In the next display on the Android application, information about the object or site will automatically appear around the scanned object. The development of the initial display of the Evernoted Learning Media Center based on Augmented reality can be seen in Figure 1.
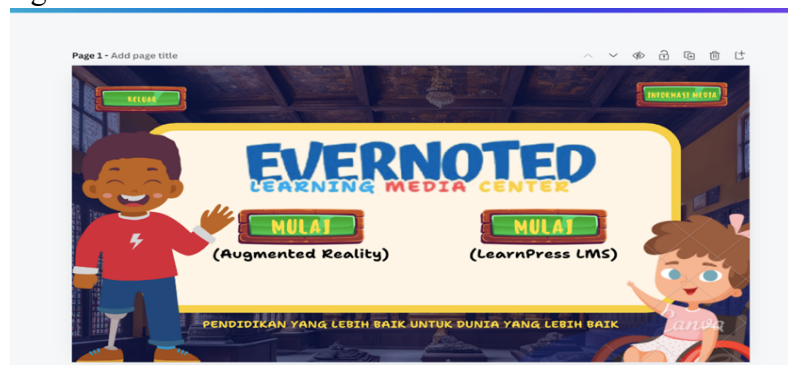

Figure 1. Evernoted Android Home Screen

The augmented reality-based Evernoted Learning Media Center application on Android functions to display additional information on scanned objects, artifacts, and cultural heritage relics. The augmented reality-based Evernoted Learning Media Center application offers a hi-tech tour experience around the museum using AR (augmented reality) (López-Belmonte et al., 2023). The AR display of the augmented reality-based Evernoted Learning media center application can be seen in Figure 2 below.

Students can then scan images or objects in museums/cultural heritage sites to display AR objects (information related to the object or site will appear around the scanned object). The development of the Evernoted Learning Media Center application media based on augmented reality on Android has several properties that make it easier for students with special needs who are deaf. First, the media of this application is real-time interaction, so it allows students with special

needs who are deaf to interact directly with digital objects displayed in the real world.

Figure 2. Application Usage View

Second, this application utilizes a camera to capture the surrounding environment and display digital objects. Third, this application provides an immersive experience, and AR applications provide a more in-depth and interactive experience than regular applications. Users feel as if digital objects exist in the real world. The image of the object scan display can be seen in Figure 3.

Figure 3. Application Usage View

The second development is the Evernoted Learning Media Center, which is a website. This platform is specifically designed for users of special needs deaf students as an online learning media to meet the needs of independent learning. The development of this platform utilizes several features in Evernoted, such as the ability to organize information and share it with others. However, the development of this platform has been adjusted and enriched with additional features that support the learning process for deaf people. One of the advantages of the development of this platform is that it displays a virtual tour with several important elements such as video tutorials, animated images, text transcripts, image descriptions, use of high color contrast, easy-to-read fonts, simple navigation, and simple and easy-to-understand sign language for deaf students.

The first virtual tour, developed using video tutorials, is designed for a short duration to show how to use Evernoted features step by step. The videos shown are equipped with text and sign language as captions. This video will display several museum objects in Malang, including the Singasari Museum, the Mpu Purwa Museum, the Indonesian Music Museum, and the Eng Ang Kiong Temple,

to make it easier for deaf students to visually see the original condition of the museum without having to visit the location. This video is equipped with sign language to make it easier for students to understand the meaning of the explanation given in the video.

Video in virtual tours is equipped with text and sign language transcripts. All videos and audio must be equipped with accurate text transcripts to make it easier for students with special needs who are deaf to understand the meaning of the explanation in the video displayed. In addition, each image displayed on the website is accompanied by an image description and detailed text description to help students understand its contents (Araiza-Alba et al., 2021). In this section, the use of language in the video and its sign language translation are designed to be easily understood by deaf students. Furthermore, the features found on the Evernoted Learning Media Center website are supported by the selection of high color contrast in writing video descriptions. The use of contrasting colors facilitates the reading of the text. In addition, the selection of fonts is also determined to be clear and easy for deaf students to read. The appearance of the website that will be used in developing the Evernoted Learning Media Center can be seen in Figure 4.
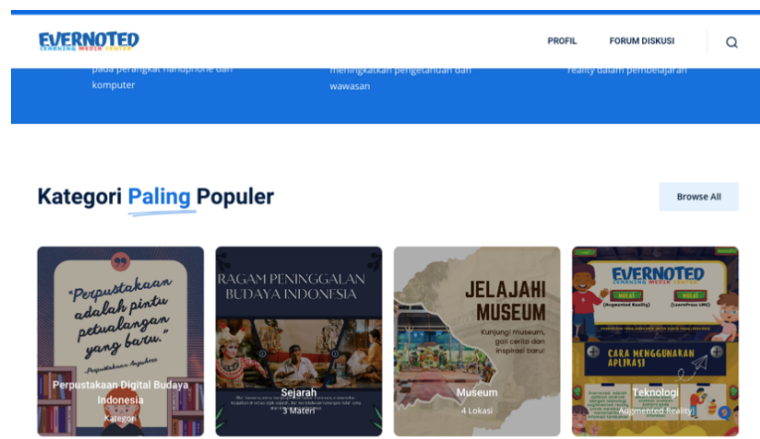

Figure 4. Virtual Tour Web View

The first virtual tour, developed using video tutorials, is designed for a short duration to show how to use Evernoted features step by step. The videos shown are equipped with text and sign language as captions. This video will display several museum objects in Malang, including the Singasari Museum, Mpu Purwa Museum, Indonesian Music Museum, and Eng Ang Kiong Temple, to make it easier for students with special needs to see the original condition of the museum visually without having to visit the location. This video is equipped with sign language to make it easier for students to understand the meaning of the explanation given in the video.

After the media was developed with the team, a validation test was conducted on media expert lecturers and material experts. Several aspects are assessed: ease of use of the media, interactive, and usefulness, and then, the material expert on the material, language, presentation, visuals, and usefulness. An example of the video display can be seen in Figure 5.

Figure 5. Example of Video Display

The analysis of the assessment data by media experts showed that the media developed was very feasible to be tested, with a feasibility level of 81.75%. The detailed explanation can be seen in Table 2.

Table 2. Results of data analysis by media experts

Aspect	Total Score	Maximum Total Score	Feasibility Percentage
Visual	35	40	87.5
Ease of Use	80	88	90.9
Interactive	32	40	80
Usefulness	11	16	68.75
Average Feasibility Percentage			81.75

Furthermore, the analysis of assessment data by material experts showed that the material was very feasible to be tested, with a feasibility level of 84.31%. Table 3 below presents the validation results from material experts.

Table 3. Results of data analysis by material experts

Aspect	Total Score	Maximum Total Score	Feasibility Percentage
Material	55	64	85. 90
Language	62	72	86.11
Presentation	40	48	83.33
Visual	34	40	85
Usefulness	13	16	81.25
Average Feasibility Percentage			84.31

After obtaining two feasibility values between media and materials, the overall feasibility of the media was calculated using equation (2) with 83.17%, categorized as the very feasible category. Furthermore, Table 4 below presents qualitative data in the form of suggestions or comments from expert lecturers, along with input provided as a follow-up

Table 4. Expert Advice

Suggestion	Follow-up
The media developed needs to pay attention to the visual needs of students	The media in the Android version is good and easy for students to use. The media

with special needs, especially in color selection	developed in the form of a web should pay attention to the colors, not be too flashy, and the use of sign language should be displayed more clearly.
The media that has been developed has not been optimally used as interactive multimedia media.	The media has been developed with animation and explanatory videos, especially on the web, but it needs to be added for discussion forums so that learning occurs in 2 directions.

Based on the results of quantitative and qualitative validation tests, this media has advantages, especially in terms of visual aspects and ease of access for users. This media was developed by considering the needs of students with disabilities and is easy to use. The development of this media is equipped with sign language to explain the meaning of the video made in a virtual tour on the website. This sign language makes it easier for deaf students to understand the meaning of the video in detail and clearly.

Several stages were involved in the product trial process with students at SLB YPTB Malang. The initial stage comprised students scanning a barcode to access a website containing historical content. In this phase, students were initially guided on how to scan the barcode to enter the website and view the historical content presented there. The website address is accessible through the following link: https://ever-noted.com/ . The accompanying image illustrates this activity.

Figure 6. Students Practice Scanning Barcodes to Websites

In the second phase, students experienced 360-degree videos using Virtual Reality (VR) headsets. Upon accessing the website, students were presented with a collection of videos. Other research has highlighted the need to clarify the scope and nature of studies on 360° educational videos, as well as the advantages and limitations of this learning modality. Results indicate the diverse applications of 360° videos across nine content areas to foster deep learning through virtual reality. Learners expressed positive experiences with 360° VR learning, although the impact on learning outcomes varied (Snelson & Hsu, 2020). They were able to embark on a virtual tour using VR technology, exploring historical sites within several Malang museums, including the Singasari Museum, the Brawijaya Museum, and the Music Museum. A visual representation of the 360-degree video

interface on the website can be accessed through the following link: https://evernoted.com/category/sejarah-budaya/. A sample 360-degree video display on the website is shown below.
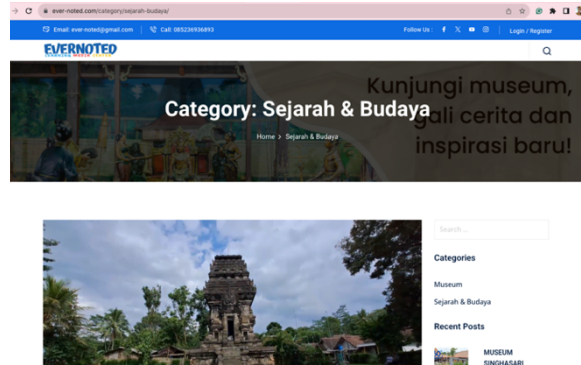

Figure 7. 360 Video Website Viewing

A visual representation of the VR trial process is presented in the figure below.

Figure 8. Students Practice Using VR

The subsequent stage involved accessing the Android application by installing the "evernoted learning media center" Android application. Students, in collaboration with their team, collectively practiced using the "evernoted learning media center" application using their respective devices. Initially, students installed the "Evernoted AR.apk" application. Following installation, students proceeded to navigate the application's menu options. The open-source nature of the Android OS enables manufacturers to ship customized OS versions pre-installed with a suite of applications, often for product differentiation. Recently, some device vendors have come under scrutiny for potentially invasive data collection practices and other harmful or undesirable behaviors exhibited by pre-installed applications on their devices (Gamba et al., 2020). The following documentation illustrates the students' application installation process.

The subsequent stage involved peer-to-peer or peer-tutor discussions to clarify perceptions. These peer-tutor discussions aimed to assess student comprehension of the explanations presented on the "evernoted learning media center" platform. Students then provided each other with feedback in a cyclical manner. Students who grasped the material explained the concepts to their peers in front of the class.

Figure 9. Students practice installing the Evernoted AR.apk application from their respective gadgets

As previously reviewed, peer tutoring holds significant potential to facilitate the development of skills in deaf students, particularly in comprehending delivered messages (Foulkes & Naylor, 2022). A visual representation of the peer-tutor discussion activity is presented in the following image.

Figure 10. Students Do Peer Tutor Discussion Activities

In the final stage, students completed a questionnaire assessing their perceptions of the use of the Evernoted Learning Media Center assistive technology. This questionnaire served as a benchmark for evaluating the success of the assistive technology development for individuals with disabilities. The distributed questionnaire consisted of eight indicators to gauge student perceptions of media development. The questionnaire provided four response options: a) SS (Strongly Agree); b) S (Agree); c) KS (Disagree); and d) TS (Strongly Disagree). The questionnaire was administered to 21 students, and by repeatedly reviewing the percentage results for each indicator question on the questionnaire, the following conclusions can be drawn , a pilot study conducted on 21 informants revealed that 75% (16 students) strongly agreed they found it easier to understand history lessons using the Evernoted Learning Media Center website. Twenty percent (4 students) agreed that they found it easier to understand history lessons using the website. The remaining 5% (1 student) expressed partial agreement with the statement. Overall, the results suggest that a majority of the informants found it easier to understand history lessons using the Evernoted Learning Media Center website.

To assess the level of enjoyment among informants using VR, 65% (14 students) strongly agreed that they enjoyed the virtual tour. Thirty percent (6 students) agreed that they enjoyed the virtual tour. The remaining 5% (1 student) partially agreed with the statement. Overall, the results suggest that a majority of the informants enjoyed the virtual tour. These findings align with previous research conducted by Nakes, which highlighted the need for history teachers to develop pedagogical approaches that extend beyond traditional methods such as lectures and textbook readings. Prior research indicated that conventional history instruction is not engaging for students, necessitating a shift towards content-based narrative approaches in history learning to foster skill development (Nokes, 2022).

A pilot study involving 21 participants revealed that 75% (16 individuals) strongly agreed that they felt more motivated to learn using the Evernoted Learning Media Center website. Twenty-five percent (5 participants) agreed that they felt more motivated when using the website. Overall, the results suggest that a majority of the participants felt more motivated to learn using the Evernoted Learning Media Center website. This finding is consistent with previous research suggesting that 360-degree videos offer significant potential in providing engaging experiential media solutions, particularly in cultural heritage education. The use of 360-degree videos with virtual tours has proven to enhance students' experiences and imagination (Argyriou et al., 2020; Kumar et al., 2022; Pirker & Dengel, 2021).

A pilot study involving 21 participants revealed that 85% (18 individuals) strongly agreed that they felt more assisted in learning history, particularly in understanding museum artifacts, through video presentations on the website. Fifteen percent (3 participants) agreed that they felt more assisted in learning history, particularly in understanding museum artifacts, through video presentations on the website. Overall, the results suggest that a majority of the participants felt more assisted in learning history, particularly in understanding museum artifacts, through video presentations on the website. These findings are consistent with previous research indicating that web-based learning can enhance students' motivation. Prior studies have also shown that both teachers and students, or respondents, expressed interest in using the website due to its user-friendliness and effectiveness (Halim et al., 2022; Reisman & Beckwith, 2023).

A pilot study involving 21 participants revealed that 85% (18 individuals) strongly agreed that the Evernoted Learning Media Center website was visually appealing in terms of color, video presentation, content, and images, thereby increasing attention in history learning. Fifteen percent (15%) of the participants, or 3 individuals, agreed that the Evernoted Learning Media Center website was visually appealing in terms of color, video presentation, content, and images, thereby increasing attention in history learning. Overall, the results suggest that a majority of the participants found the Evernoted Learning Media Center website to be visually appealing in terms of color, video presentation, content, and images, thereby increasing attention in history learning. These findings are consistent with previous research indicating that the integration of digital platforms, particularly websites, in history education has significant potential to enhance learning outcomes. This study further demonstrates that the use of websites can be an effective tool in facilitating the history learning process at the High School Level (Ilmiyah et al., 2024). These findings are consistent with previous research

suggesting that tools like Evernote facilitate information storage and organization. However, the utilization of such tools requires a stable internet connection, necessitating adequate provisions from institutions or schools (Vendityaningtyas et al., 2020b).

Seventy-five percent (75%) of the participants, or 16 students, agreed that the displayed videos were easy to understand, the video playback speed was appropriate, and the videos were easy to view from various perspectives. It can be concluded that, in general, the majority of the informants agreed that the displayed videos were easy to understand and that the video playback speed was appropriate. A pilot study involving 21 participants found that 15% (3 individuals) strongly agreed and 85% (18 individuals) agreed that the Evernoted Learning Media Center facilitated discussions with teachers and peers to review presented material (Anwar et al., 2020; Kalkofen et al., 2020).

CONCLUSION

Based on the results of the validation test by media and material experts, the Evernoted Learning Media Center media developed was very feasible to be tested on students with special needs at SLB in Malang City. The results of the feasibility presentation were 83.17%, which means it is included in the very feasible category. The expert advised that this media needs to be further developed by considering the needs of students with special needs, especially in the visual aspects and color selection. The results of this research indicate that the innovation of assistive technology development based on Evernote in the form of a website and Android application is generally accepted and utilized by deaf students at SLB YPTB Kota Malang. 80% of deaf students felt significantly assisted by the Evernoted Learning Media Center website in facilitating history learning through virtual tours. Based on the initial needs analysis conducted, this assistive technology development has been able to address the needs of 85% of students, particularly in understanding historical artifacts in museums through video presentations on the website. The development of the Evernoted Learning Media Center is visually appealing in terms of color, video presentation, content, and images, thus increasing the attention of deaf students in learning history.

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