

Design of Interactive Multimedia Learning Vocabulary for Students Communication Disorder and Deafness During the Covid-19 Pandemic

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Abstract The development of technology is very helpful in teaching and learning in general. However, these developments can also be used for students with disabilities, especially those who have communication disorders and deafness. But in reality, teachers are still limited in managing the development of teaching materials even though school facilities are sufficient to do that. This is very reasonable considering the limitations of educators who must specifically focus on trends in the development of technology-based education. The interactive method is one alternative solution, especially the role of multimedia technology in learning media. At the school for students with disabilities in Denpasar, SLB B Sidakarya for the category of communication disorder and deafness requires the media to follow these developments. In the initial design stage, taking vocabulary content for grade 1 students, by gathering various data needs, especially from the users, namely teachers and students. The data then becomes the basis for designing interactive multimedia vocabulary learning, which is the basic development of several subjects. The media will have a positive impact, especially increasing student interest in school, with files that are relatively lightweight and processed in design research, expected to be easier for students to learn. This media can also be a medium to help when students study at home, especially the Covid-19 pandemic period, certainly helped by collaboration between the school and design practitioners. In addition to vocabulary, it is also expected to be able to motivate development in other media to assist persons with disabilities in learning, especially in pandemic situations.

Keywords: Multimedia, learning, deaf, Covid-19

1. Introduction

The utilization of technology in the field of education is not new at this time and one of them is the use of technology in interactive learning media. Through the use of interactive learning media, especially for the delivery of learning materials, it will become easier and more enjoyable. This will also make the learning process, especially for children, more attractive to students, and not become bored. The existence of media that is considered attractive raises student interest in learning and

will increase the level of concentration of children towards the subject matter, which of course, has an impact on the quality of education.

The development of instructional media tends to be designed for the use of users in normal physical conditions and is still very minimal in development for people with disabilities. This has become a motivation in developing a media that can be utilized for users with disabilities. The use of interactive learning media, as explained, will certainly also benefit children with special needs, especially in children who have limitations or difficulties in the sense of hearing and communication or hearing impairment in speech. So that the use of technology through interactive media as a

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means of educating children, in this case, is students who are deaf and speechless, deemed necessary to be realized, and can help the teaching and learning process. It is also hoped that this interactive media can increase students' acceptance of subject matter at the Sidakarya Public SLB B Disability School in Denpasar, Bali.

The linkage to the subject matter that will be inserted in the interactive media focuses on the introduction of letters, numbers, vocabulary, and sentences in Indonesian for grade 1 elementary school level with the curriculum implemented in SLB B Sidakarya State School. This interactive media can be used by students who are hearing impaired to speak accompanied or mentored by teachers and/or students' parents so that the impact arising from this process is maximized. The design of this interactive learning media is in accordance with its goals and expectations. The hope is that it can facilitate the teaching and learning process for students with disabilities and can help the teaching and learning process according to students with normal physical.

Another consideration is the Covid-19 pandemic situation, which forces students to follow the recommendations to study at home according to the government's proposals. In certain conditions, students in normal circumstances are certainly not constrained, but it will be an obstacle for students with disabilities in attending proper education. Based on a pandemic situation and the need to develop new learning patterns, it makes a motivation to create a design idea that can be utilized and still generate student enthusiasm for learning, especially for students with disabilities.

2. Resource study

2.1 Learning Media

In the learning media discourse it is said to be divided into five categories, namely: 1) the function of the learning media as a learning resource, as a distributor, transmitter and connector, 2) the semantic function, adding to the vocabulary that is truly understood by students, 3) the manipulative function, overcoming boundaries of space and time and overcoming sensory limitations, 4) psychological functions, learning media have

attention functions, affective and cognitive functions, imaginative and motivational, 5) socio-cultural functions, overcome socio-cultural barriers between communication participants (Munadi, 2013). Other discourse about learning media is 1) witnessing objects and living things that existed in the past, difficult to obtain and difficult to observe directly, 2) hearing sounds that are hard to catch with the ear directly, 3) observing events that rarely occur or occur in the past, 4) easily compare things, 5) can see quickly a process that takes place slowly, or vice versa, 6) observe the movements of machines/tools that are difficult to observe directly 7) see the hidden parts of an instrument, 8) can reach a large audience and observe an object simultaneously, 9) can learn according to their abilities, interests, and tempos (Daryanto, 2016). In principle, discourse related to instructional media emphasizes the function between users with the strategy of delivering messages in its communication to a media.

Learning media with the use of computer technology are said to have several objectives, namely: 1) cognitive goals (knowledge) with computers can teach the concepts of rules, principles, steps, and complex processes and calculations. Computers can also explain these concepts simply, by combining animated visuals and audio so that they are suitable for independent learning activities; 2) psychomotor goals (skills) with learning that are packaged in the form of games and simulations, very well used to create working conditions; 3) affective goals (attitudes) programs that are designed appropriately by giving pieces of sound clips or videos can arouse feelings and learning/teaching (Simamora, 2009). The utilization of technology is felt to help the learning process of students during the pandemic.

2.2 Thematic Learning

Based on the reference curriculum, thematic learning by Jamaris is a learning strategy based on an integrated curriculum approach that aims to create or make the learning process relevant and meaningful for children (Syafaruddin, 2019). While other discourses mention, thematic learning is integrated learning that uses the theme as a unifying material contained in several subjects

and given in one face-to-face. In learning, the theme is given with the intention of uniting curriculum content in a unified whole, enriching the language vocabulary of students and making learning involving several subjects to provide meaningful experiences to students (Kunandar, 2007). Relevance in this design is learning material by taking reference according to the applicable curriculum.

2.3 The child with special needed

Children with special needs are those who need special handling related to their specialty. Children with special needs are now a new term for the people of the city. If we understand more deeply the meaning of "children with special needs," this term is not too foreign. In Indonesia, this term is more popular with the term 'extraordinary child' (Fadhli, 2010). While special needs according to Kauffman and Hallahan in the FIP-UI team (2007) that is: a) mental retardation or child with development impairment, b) learning disabilities or specific learning disability, c) attention deficit disorder with hyperactive, d) emotional or behavioral disorder, e) communication disorder and deafness, f) partially seing and legally blind, g) autistic children, h) physical disability, i) multiple handicapped, j) giftedness and special talents. The implementation of this research will focus on 1st-grade students for communication disorder and deafness at SLB B Sidakarya Denpasar.

3. Design Methods and Systems

Based on the situation, SLB B Negeri Sidakarya has been established since 1970 and currently has a variety of supporting facilities such as sports fields, visual aids for the development of sound and rhythm perception, computer rooms, and other equipment that can be used in the learning process. About the material in the learning media will collaborate with the 1st-grade teaching team as well as the informant to find out the needs of the system to be designed as well as the learning material that will be delivered.

Questionnaires were distributed to all 14 1st-grade students with a range of 6-7 years, 7 boys and 7 girls, with 5 questions referring to

teacher-guided learning as visual reference development data (Table 1).

Table 1. Visual reference questionnaire

N o	Questions	Respondents' answers	Frequency	Perce ntage
1	Have you ever studied using a computer?	Ever	11	78,5%
		Never	3	21,4%
2	Are you happy if you study using a computer?	Happy	13	92,85 %
		Not happy	1	7,1%
3	Choose which picture do you like?	Vector image	10	71,4%
		Bitmap image	4	28,5%
4	Choose a color group that you like.	Primary color and secondary	8	57,1%
		Cool color	3	21,4%
		Hot color	3	21,4%
5	Choose the type of font you like.	Arial Rounded MT Bold	7	50%
		Maiandra GD	2	14,2%
		Kristen ITC	5	35,7%

The design of an interactive multimedia learning media introduction to vocabulary for students, the presentation is adjusted to the design of the implementation of learning in schools. Learning links three themes, and each theme is in four subjects (table 2).

Table 2. Vocabulary introduction learning material

Theme	Subjects	Subject matter
Personality	Natural Sciences	Know the parts of the body
	Social Sciences	Mention a family member
	Bahasa. Indonesia	Read simple sentences with the right pronunciation
	Mathematics	Count the number of body parts
Environment	Natural Sciences	Mention animals and plants
	Social Sciences	Mention the objects in the house
	Bahasa. Indonesia	Read simple sentences with the right pronunciation
	Mathematics	Differentiating the size of an object
Symptoms & Events	Natural Sciences	Mention natural phenomena
	Social Sciences	Mention everyday events
	Bahasa. Indonesia	Read simple sentences with the right pronunciation
	Mathematics	Determine the time of morning, afternoon and evening

3.1 System Requirements

Media design requires software and hardware components to support the design process, and both must support each other. Graphic applications are indeed a significant component in visual design and with the support of a hardware system to operate the process. In addition to graphics applications, the need for video editing software applications is also essential for the video compositing process. Visual graphics and videos must be integrated as a whole so that the delivery of the contents of learning materials can be done as much as possible and can accommodate all existing themes.

3.2 Media Description

The media will refer back to the discourse and things related to the visual reference he is referring to. Thematic learning is a strategy that interprets the development of

one family or several scientific families (Syafaruddin, 2012). While other discourse states thematic learning is integrated learning that uses the theme as a unifying learning material for each meeting (Kunandar, 2007). The relevance of the discourse to the media, the reference of teaching material refers to the themes and lessons that have been mentioned in tables 1 and 2. However, in its implementation to be interesting requires a visual element through data reference for the development of visual references related to visual elements in the design.

Visual references are elements that considered to have a relationship with the concept to get a rough draft design (Setiawan, 2020). This will relate to the basic design elements in graphics, such as illustrations, typography, colors, and shapes, such as the data presented in table 1. The design guidelines related to rules and norms are Law of the Republic of Indonesia Number 20-2003 Article 1 paragraph (2), which states that national education is education based on the Pancasila and the 1945 Constitution of the Republic of Indonesia which is rooted in the values of religion, the national culture of Indonesia and is responsive to the demands of changing times (Indonesia, 2003). Another rule is the Law of the Republic of Indonesia Number 4-1997 concerning Persons with Disabilities in Chapter III concerning Rights and Obligations, namely in Article 6 the first point that states that every person with disabilities has the right to education at all units, lines, types, and levels of education. And in Chapter IV on Equality and Opportunities in Article 11 which states that every person with disabilities has the same opportunity to get an education at the unit, path, type, and level of education in accordance with the type and degree of disability. (Indonesia, 1997). Based on the issuance of law on education for disabilities, we should be able to think together, and on this basis, this design carried out.

4. Result and Discussion

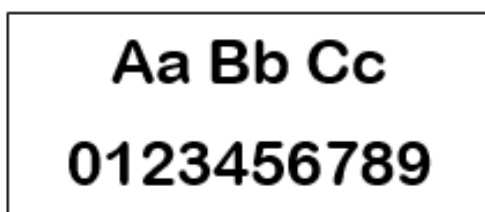
The design concept in the learning media is cheerful or cheerful with the visual strategy of the school atmosphere. The idea is the result of a comparative thought based on the initial

data that has done so that it can be assumed the direction of the visual elements.

4.1 Visual Strategy

Several elements are considered in a visual strategy, including typography, illustrations, colors, animation, video, and sound, can be explained. This process can also be said as a pre-design process that can be described based on the elements, namely:

- a) Typography considers readability and legibility in text presentation. Based on the results of the questionnaire on the respondents as prospective users showed 57.1% chose the font type Arial Rounded MT Bold, which belongs to the Sans Serif family of letters. These letters will be used in the presentation of texts on learning media. This font has the right level of readability and legibility, according to the nature and character of the Sans Serif font group that is simple, easy to read, and friendly, very suitable intended for children.



Picture 1. Arial Rounded MT Bold font display

- b) Color is one of the most important elements in visuals and the questionnaire shows that 57.1% of color choices refer to primary to secondary colors. While the color reference also considers the visual format in the RGB screen presentation and the value of each color in the format.

	R:72 G:106 B:73		R:165 G:42 B:61
	R:96 G:182 B:51		R:218 G:37 B:29
	R:0 G:90 B:159		R:208 G:153 B:111
	R:166 G:216 B:246		R:255 G:249 B:116

Picture 2. Color levels in RGB format

- c) The illustration refers to the response questionnaire showing 71.4% chose the use of vector-based images. Identical vector images related to cartoon images, which expected to increase students' interest in

visual viewing. Vector images can also support the process of inserting motion in an image in the animation process because of its scalable nature and easily modified shape.



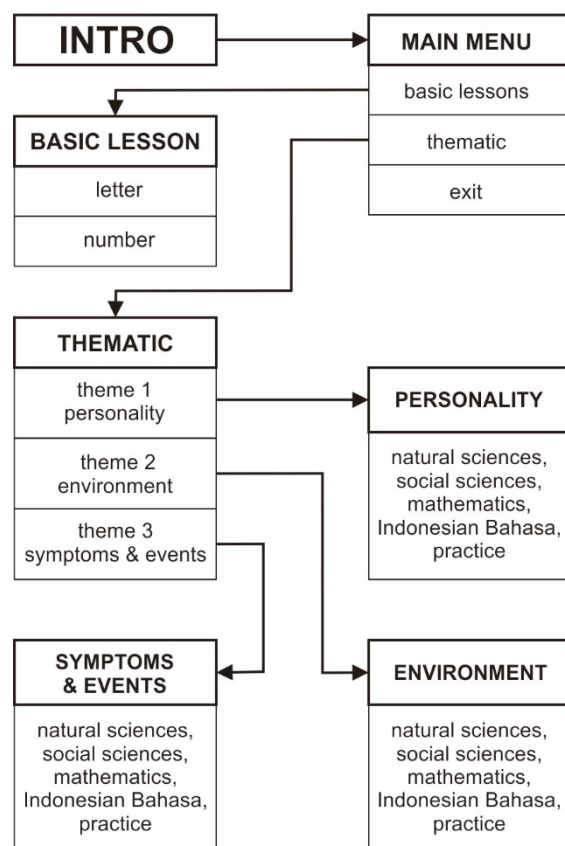
Picture 3. Examples of visual references for figures. Sumber: xanciell101.student.umm.ac.id (left), tesa.student.umm.ac.id (right)

- d) Animation in media design is a supporting element of learning content so that it can raise on the interactive side of the media. Content with animation will be inserted in the learning material, including intro opening and character movements with tweening animation techniques.
- e) Videos also used to support content to complement the animated presentation. However, the video format used to present sign language offerings as communication between content and its users with the compositing process in a professional video editing application.
- e) Audio is still needed in media design, although the target is students with disabilities. This takes into consideration some cases obtained in the supervisor's interview that generally, communication disorder and deafness do not entirely lose hearing. They can still hear even though it is not normal and with different hearing limits. For this reason, the audio element remains a supporting part of the media to designed.

4.2 Media Design

In design entering the process of structuring the realization of ideas, there is a stage that has previously been pre-designed and now begins the plan in action. The design of this interactive media, if arranged in the form of a chart, then the composition is included in the menu structure serving on the media. Each item is a button for its integration in the following

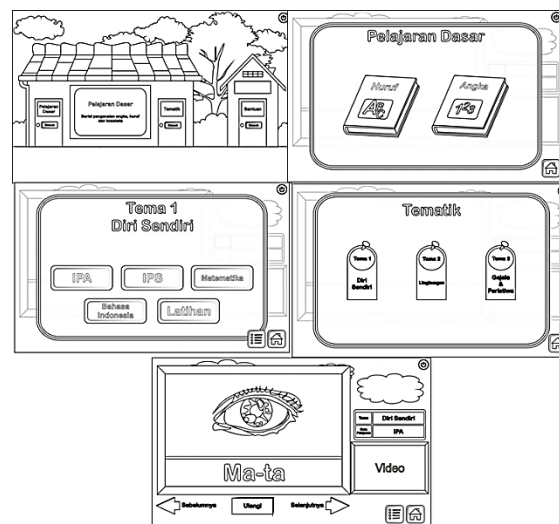
content that referenced, and each content contains material that has explained in the previous sub.



Picture 4. Interactive media structure menu

4.3 User Interface

At this stage, the strategy is to bring together a system designed with the target of users, namely to find out the responses that exist in the media from the activities or input from users. This strategy presents visuals with a combination of systems that work on interactive media so that the media can consider to work and have aesthetic added value visually. However, the consideration remains on who the user is, and specifically on the subject is class 1. Some examples of visualization of menus on the media can be seen in picture 5.



Picture 5. User interface design

4.4 Character Design

In character design, the process begins with the construction of character illustrations in vector-based graphics applications. The vector image is an image that utilizes lines and shapes to make objects, and images produced will not be constrained by resolution. However, the complexity of forming objects is somewhat different from bitmap-based pictures due to differences in image element factors. Vectors are also accessible when managed in a 2-dimensional based animation process.

In character design, it is also necessary to consider the emphasis of reality, for example, student uniforms, cheerful facial expressions, color approaches, and other data that refer to the initial reference. The character also needs to consider the technical process, especially in the preparation of animation and joint points in the animation motion.



Picture 6. Character Design

4.5 Interface Design

The interface design phase emphasizes the value of media interaction, its relation to the background, menu responses, and each sub-menu, patterning the system navigation space, and the response of each menu component to the other menus. The interface will be related to the supporting design aspects and still with the reference data that has obtained. The planned menu structure is then proportioned according to the composition of each theme in the menu structure so that compositing between image and animation can process according to plan.

Interface design also includes the process of designing learning content because this element will later be processed again in a different application with animation techniques. Each component looks integrated, but technically the details are separate; this system called a layering image system so that the export process to the animation application is not constrained. The advantage of a vector base will also give the process advantages that the file format is lightweight and does not aggravate the performance of the hardware while in the editing process.

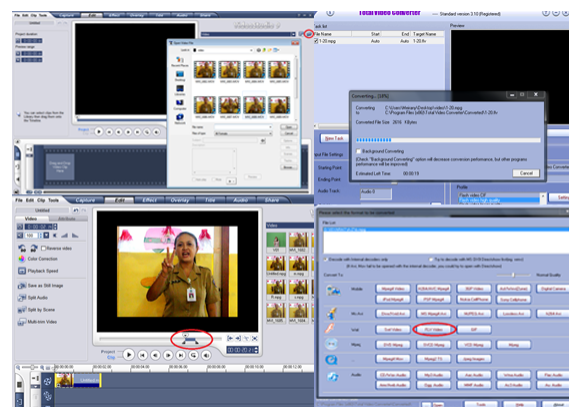
The method of exporting illustration components by moving each layer from the graphic app to the animation design app. Aside from being a graphical application as a tool for

designing interfaces, it is also a visible test tool to map proportions by harmonizing the display resolution of both apps, including the texture and detail of each object.



Picture 7. Designing the learning content interface

4.6 Video Editing Process

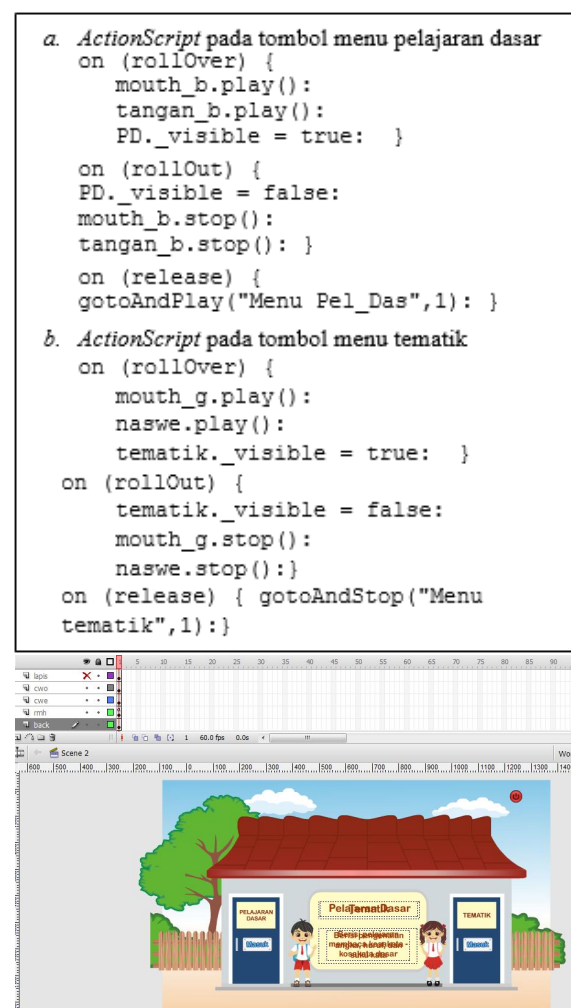


Picture 8. Video editing process

At the editing stage with the video format, there are several elements that must be considered, namely video, format, composition, and audio. The video element is recording in frequency transmission or in the form of video recording (Setiawan, 2018). Video recording is carried out by a model that is the teacher's student teacher who will appear along with the content as a translator. Composition, which refers to video framing on viewing each

content, has a smaller scale but still clearly visible to be listened to. Format refers to the synchronization of the video frame image resolution and the integration of video elements on interactive media with animated elements. Especially for the format, also adjust the screen viewing on a desktop computer in general so that pixel damage does not occur in video images when displayed in interactive media or rendering that burdens hardware performance when uniting all elements.

4.7 Animation and Coding Process



Picture 9. Example of coding actionscript in animation

The animation process uses an animation application with assets that have prepared previously, namely material text assets, including subjects, illustrations, and videos. All assets are combined into one and sorted by action categories in animation, which summarized into interactive media. Each asset,

as well as navigation buttons, character moves, and transitions of each menu, are represented in animated frames and connected to the content of learning material. Combining all this requires a particular language in the design system that gives commands to the existing animation assets to display each menu following the design in the menu structure.

Animation in the application uses the Actionscript coding command 2.0 with properties size 1280 x 768 pixels wide view and a frame rate of 40 frames per second for smooth motion animation. The use of a frame rate of 40 fps to slow down the video presentation (30 fps) to be in harmony with the motion of animation on the media.

4.7 Learning Materials on Interactive Media



Picture 10. Examples of some final display menus on learning media

There are two learning materials, namely 1) basic learning materials, and 2) thematic learning materials. The basic learning material is divided into the introduction of numbers presented by displaying the names and symbols of numbers that are mentioned based on fragments per syllable. While the introduction of letters in the form of the alphabet by the same presentation as the number presentation. Next is a thematic menu

consisting of content about personality, environment, and family in the same way as the basic learning material. Additional menus are training menus on each element according to the learning referred to based on the menu structure in the media design chapter. The following will present in picture 10 examples of the display of necessary numbers and letters, thematic learning materials, vocabulary learning materials, and subject exercises for students.

4.8 User Testing

After the final stage went well, the next tested by the user, that is, in 1st-grade students SLB B Sidakarya with a category of seven women and seven men with a total of 14 students. Testing is done by giving five statements that refer to the level of user comfort on the designed interactive multimedia results.

Table 3. Question list

No	Pernyataan
1	Tampilan media pembelajaran interaktif pengenalan kosakata ini menarik
2	Saya menyukai tampilan media ini
3	Saya senang belajar dengan menggunakan media ini
4	Saya mau belajar menggunakan media pembelajaran untuk selanjutnya
5	Media pembelajaran ini mudah digunakan

Table 4. Statment Values

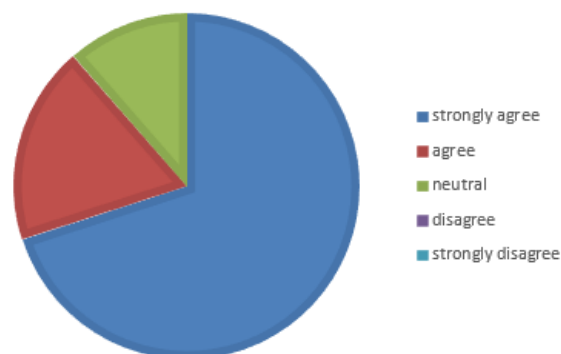
State ment Num ber & Valu e	Strong ly Agree (%)	Agree (%)	Neutra l (%)	Disagree (%)	Strong ly Disagr ee (%)
1	71,42	21,42	7,14	0	0
2	57,14	28,57	14,28	0	0
3	64,28	21,42	14,28	0	0
4	85,71	0	14,28	0	0
5	71,42	21,42	7,14	0	0
Aver age	69,99%	18,57%	11,42%	0,00%	0,00%

note: f= number of answers, N= total users

$$P = \frac{f \times 100\%}{N} \quad (\text{pers.1})$$

Based on testing and the average quantity of the statement value to the user that is students, it can conclude that students like the interactive multimedia display that has designed. During the test, students also expressed their interest because it was easy to use and willing to use the learning media in the future.

AVERAGE VALUES



Picture 11. Diagram rata rata berdasarkan nilai pernyataan

4.9 Data Transfer During Pandemic Covid-19

The purpose of the data transfer is flexibility in the use of data or, in this case, the learning media designed. Interactive learning media designed as a digital format, and the media has the opportunity to be moved or reproduced. Data transfer can be done easily, for example, through intermediaries such as flash disk devices, hard drives, or DVDs. The other most accessible media is through a network or data transfer with internet network intermediaries, for example, via email or even chat rooms on social media. After the data transfer process carried out, it can then installed on a computer device on each student assisted by a teacher or parent.

It was also a solution during the Covid-19 pandemic when students forced to study at home to anticipate the broader spread of the epidemic. Learning media in the form of digital data can open anywhere as long as the device used according to media specifications. Surely they will also embrace social distancing programs and reduce student boredom by learning from conventional methods.

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5. Conclutions

Based on the discussion on the topic of design of interactive multimedia learning vocabulary for students communication disorder and deafness during the Covid-19 pandemic, it can conclude that several important points are:

- a) Learning media in increasing student attention can be developed by utilizing technology, one of them with interactive multimedia learning.
- b) The design of instructional media must be aligned with the applicable curriculum and the planning process in the design under consideration, so that it can answer the problems encountered.
- c) Learning media about vocabulary in the review, combining various elements including animation, video, visual graphics, audio, and other support systems in the design of media.
- d) The flexibility of learning media can facilitate the transfer of data by utilizing supporting devices or the internet network.
- e) The existence of media flexibility in the design of instructional media is a solution for students and teachers during the Covid-19 pandemic, so the teaching and learning process can still be done even at home.

As for the development advice on the designed media is the limited use of media that can only operate on desktop computers with recommended support software. This can still be very developed again on the operating system Android or Macintosh so that the media can be disseminated more broadly through e-commerce markets in a global network.

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