Need Analysis of Interactive Multimedia Development for Virtual Learning in Pandemic

J F Lempas¹, S Soenarto² and A D Barahama³

¹,²Instructional Technology Post-Graduate Program, Universitas Negeri Yogyakarta Jalan Colombo 01, Daerah Istimewa Yogyakarta 55281, Indonesia.
³Department of Electronics and Informatics Engineering Education, Post-Graduate Program, Universitas Negeri Yogyakarta Jalan Colombo 01, Daerah Istimewa Yogyakarta 55281, Indonesia.

Email: josianefianny.2017@student.uny.ac.id

Abstract. The pandemic that has not ended has an impact on changing the educational paradigm. Existing conditions demand to continue to use virtual learning. During the epidemic, this study will examine students' demand for interactive multimedia in virtual learning. The interviews reveal that the media that teachers provide in virtual learning during this pandemic has limits. Data was gathered through interviews and questionnaires given to teachers and students. The student requirements questionnaire reveals that interactive multimedia is the most effective instructional medium for pupils. This study is part of a larger investigation of the evolution of multimedia learning during a pandemic.

1. Introduction

Pandemic Covid-19, which wreaked havoc on Indonesia and the rest of the world, altered almost every element of life, including schooling. The government has implemented a number of strategies to break the cycle of the Covid-19 virus's transmission, one of which involves learning from one's own home. It has previously altered the way people learn. Many schools and institutions have been forced to close temporarily due of the Covid-19 pandemic. According to the researchers' judgment, it is improbable to revert to past learning in the near future. The application of social distancing at this stage will harm learning opportunities. Given this situation, it requires teachers to overcome this urgent situation[1].

Online learning is an educational model that is suitable for this pandemic period. Combining face-to-face learning with technology produces blended learning to increase students' learning potential[2]. Educators can now use digital media in their classrooms because to technological advancements. Therefore, teachers are selective in choosing learning media that students can understand concepts well without causing misconceptions.

The major outbreak of Corona Virus sickness may provide another another case for virtual learning. Unfortunately, necessary preparation and infrastructure, such as a decent internet connection, a laptop or iPad as a learning aid, teachers who have completed the training period, and pupils who have been trained to learn independently, were not provided. There are numerous advantages to studying online. In other words, virtual learning can be a lifesaver in a crisis. They contend that it is critical to evaluate software as it is being produced, by testing it on learners and making changes as needed [3]. The use of technology has recently increased rapidly, especially in the world of education. The state of this pandemic era requires learning to continue virtually.
Virtual Learning Environments are currently commonly used by many educational institutions to enhance the learning experience by combining several multimedia technologies. Virtual learning is regarded as a form of learning via technological mediation that fills the gap formed when teachers and students are isolated in location and time [4]. In addition, it allows real-time learning to take place between students and educators in two separate ways. In this example, the computer has a strong influence on the learning setting. The role of teachers and students changed because of the influence of media and technology. Teachers and books are no longer the only sources of information for students, but rather serve as a guide to the methods of knowledge.

Unfortunately, in fact, teachers’ online learning processes still employ the lecture style. In lectures, the teacher is the only source of student learning, so students are not creative and are not allowed to learn more about the subjects they are studying. Supposedly, students are more active in developing lessons [5]. The teacher is only a companion in charge of planning and creating more learning resources to create a conductive learning environment.

The researchers are interested in conducting a need analysis study connected to interactive multimedia based on the analysis of numerous studies mentioned above. Developers construct learning based on the goals to be attained by educators and learners, depending on the results of the requirements analysis [6]. The goal of this research is to present something different from earlier research. As a result, having another alternate media that can be utilized as a tool to aid students in achieving their specific needs and requirements is critical. High school students were used as research subjects, and the descriptive qualitative approach was applied.

Based on the analysis of the problem it was found that the learning process that took place during the Covid-19 pandemic was not yet efficient because learning was still in a conventional form, even though the current situation required the learning process to take place online, and was more effective. As a result, interactive learning tools are required to increase student interest in learning. It can be supported by the use of interactive learning media as a learning aid, thus the first step is to assess the learning media requirements during the pandemic, which piques researchers’ interest in doing this study.

2. Methods
This research is qualitative descriptive study conducted by senior high school students that used a survey method. There are 18 teachers and 90 students who participated in this study. The following describes the steps carried out in this study;

2.1. Data collection
In this study, to find out and measure what the needs of students are, data collection techniques are carried out in the form of interviews and questionnaires. To collect additional data sources, the researcher conducted interviews with a number of teachers.

2.1.1 Need analysis
It is vital to examine the media needs in order to determine what is required to support the learning process. This analysis includes an analysis of student needs and what media are used in learning.
1. Questionnaire.
Furthermore, data collection was carried out using a questionnaire. Questionnaires are disseminated online using a google-form comprising questions in order to gather information regarding the demands of learning material during online learning during the pandemic.
2. Interviews
To obtain information related to the needs analysis carried out, the researcher conducted interviews with several teachers regarding the media used in the learning process.
2.2. Data processing
Data processing is carried out to produce information from raw data into information that can be understood in this study using descriptive-qualitative analysis. In processing this data, the data that has been collected is processed from quantitative data into qualitative data.

The score is not transformed into interval data. On a five-point score, the quantitative data is converted to qualitative data. The qualitative data will be transformed according to the conversion table following the processes done after getting quantitative data from the student.

| Interval of Data | Qualitative Information |
|------------------|-------------------------|
| 5                | Very Needed             |
| 4                | Needed                  |
| 3                | Enough                  |
| 2                | Less Needed             |
| 1                | Very Little Needed      |

Table 1. Conversion of quantitative data

After the data has been converted, it is processed by calculating the mean using the formula:

\[
\bar{X} = \frac{\sum x}{N}
\]

Information:

- \(\bar{X}\): Each component’s average score
- \(\sum x\): Score in total
- \(N\): The number of indicators that have been evaluated is large

3. Result and discussion

3.1. Data collecting
In this study, descriptive quantitative approaches were used to analyze the needs of students of multimedia in virtual learning through a questionnaire. The questionnaire is based on numerous factors, including needs and attractiveness, that are adapt to the characteristics of students. Aspects of needs refer to the students' background in using multimedia. The attractiveness aspect refers to multimedia criteria which are important to the students in terms of appearance and content.

3.1.1 Needs analysis
1. Questionnaire.

Students with a score of 1 strongly disagree, disagree with a score of 2, agree with a score of 3, and strongly agree with a score of 4 with the statements provided are given four response columns. The table is an illustration of how a questionnaire was used in this study: students were provided a few statements as be asked to respond by putting a checkmark in the space provided.
Table 2. Need analysis of student [7]

| No. | Aspect of need | Statement | SD | D | A | SA |
|-----|----------------|-----------|----|---|---|----|
| 1.  | Learning to use books is a lot more fun. |          |    |   |   |    |
| 2.  | Aside from books, I need a new sort of learning media. |          |    |   |   |    |
| 3.  | When there are only texts in the learning media, I am content. |          |    |   |   |    |
| 4.  | When there is audio in the learning media, I am happy. |          |    |   |   |    |
| 5.  | When there are videos in learning medium, I am happy. |          |    |   |   |    |
| 6.  | When there are visuals in the learning material, I am happy. |          |    |   |   |    |
| 7.  | When there is animation in studying medium, it makes me happy. |          |    |   |   |    |
| 8.  | When learning medium includes text, audio, and video, I am happy. |          |    |   |   |    |
| 9.  | When learning media includes text, graphics, and animations, I am happy. |          |    |   |   |    |
| 10. | When learning media includes text, movies, and animations, I am happy. |          |    |   |   |    |

2. Interviews

The data obtained from interviews with teachers show in table 2. Results are shown in table of a student questionnaire using learning media during the pandemic. The findings of the questionnaire in relation to the planned media needs are shown in Table 3.

Table 3. The result of the interviews.

| No. | The result of the interviews |
|-----|------------------------------|
| 1.  | Educators deliver glued material from textbooks provided by the government. |
| 2.  | The method most often used when learning online is just lectures. |
| 3.  | The limitations of educators are using learning media in the form of links to access videos from YouTube and files sent via WhatsApp groups. |
| 4.  | Some students have difficulty understanding the content of the material. |
| 5.  | Teachers deliver structured assignments through WhatsApp groups, Google Classroom, and Zoom meetings. |
| 6.  | Teachers have difficulty accessing learning media. |

Based on the results, the teacher is still obsessed on the concept of textbook material. In essence, the textbook suffices as a guide, and the remainder can be developed based on teacher creativity.

This element can be demonstrated by the media that teachers use to engage pupils in learning, such as PowerPoint presentations, YouTube videos, and television broadcasts about learning themes. Many of them struggle to comprehend the learning materials.

According to the findings of interviews with numerous educators, throughout the pandemic, most teachers just applied WhatsApp to deliver structured projects, while others used Google Classroom and Zoom Meeting to aid them in teaching. This data demonstrates that online learning at home is confined to completing prescribed homework from teachers. Because of rapid advancement of internet technology, educators now have the opportunity to use it as an innovative online learning medium. Certainly, if learning is not diverse, students will become bored and burdened.

This condition can be caused by a variety of issues, including teachers’ limits in establishing communicative instructional tools for students and a lack of effort in developing interactive learning,
which makes learning a chore for students. Many of them have difficulties comprehending the material. As a result, the learning that is done has no meaning. It is not optional for student learning outcomes to use the online learning paradigm that is being used. As a result, the learning that is done has no meaning.

| No. | Media                                      | Amount % |
|-----|--------------------------------------------|----------|
| 1.  | Textbooks for lesson.                      | 35.8 %   |
| 2.  | Ms. Office: Word & Power Point             | 29.4 %   |
| 3.  | Link YouTube for video learning            | 24.2 %   |
| 4.  | Television                                 | 10.6 %   |

Table 4. Data relate to learning media was given during the pandemic.

Textbooks, Ms. Office, and YouTube video links are among the learning resources supplied during the pandemic, according to interview data. The importance of requirements analysis in the development of content and the creation of tools to aid instructors in generating material that fits the needs of target learners and learning needs is crucial [9]. In this case, the table shows is in the highest score (35.8%), than followed by Ms. Office (29.4%), link YouTube (24.2%), and television (10.6%). The results, that most of teachers delivered students literature in the form of presentation slides. Conventional learning does not allow for the presentation of interactive multimedia content. One way to connect the teacher as a source of student learning is through learning media. Video displays, animations, and simulations are some examples of interactive multimedia presentations [10]. Media is an educational instrument that may be utilized to help students learn more effectively and efficiently by acting as an intermediate in the learning process.

3.2. Data processing

The processes performed to acquire data for this survey by reviewing data from previous surveys. Establishing criteria for characteristics of necessity as well as aspects of learning media's attractiveness then, based on quantitative data gleaned from student evaluation results, criteria for components of need and factors of learning media appeal were developed.

After finding the average score for each component, the data is translated to qualitative data using Widoyoko's conversion.

Table 5. A slightly more complex table with a narrow caption
Description:

\[ X \]: mean score  
\[ \bar{X} i \]: ideal mean  
\[ sbi \]: standard deviation

The conversion method is then applied using a five-point scale, with a high score of 4 and a lowest score of 1. The result of converting to a 5-point scale is as follows.

**Table 6. Scale 1-5 conversion calculation**

| Scale | Calculation |
|-------|-------------|
| 5     | \[ X > \bar{X} i + 1.8 \text{ sbi} \]  
\[ = X > 2.5+(1.8 \times 0.5) \]  
\[ = X > 3.4 \] |
| 4     | \[ \bar{X} i + 0.6 \text{ sbi} < X \leq \bar{X} i + 1.8 \text{ sbi} \]  
\[ = 2.5+(0.6 \times 0.5) < X \leq 2.5+(1.8 \times 0.5) \]  
\[ = 2.8 < X \leq 3.4 \] |
| 3     | \[ \bar{X} i - 0.6 \text{ sbi} < X \leq \bar{X} i + 0.6 \text{ sbi} \]  
\[ = 2.5-0.3 < X \leq 2.8 \]  
\[ = 2.2 < X \leq 2.8 \]  
\[ = 2.5-0.3 < X \leq 2.8 \]  
\[ = 2.2 < X \leq 2.8 \]  
\[ = 2.5-0.9 < X \leq 2.2 \]  
\[ = 1.6 < X \leq 2.2 \]  
\[ = \bar{X} i - 1.8 \text{ sbi} < X \leq \bar{X} i + 0.6 \text{ sbi} \]  
\[ = 2.5 - (1.8 \times 0.5) < X \leq 2.2 \]  
\[ = 1.6 < X \leq 2.2 \] |
| 2     | \[ X \leq \bar{X} i - 1.8 \text{ sbi} \]  
\[ = X \leq 2.5-0.9 \]  
\[ = X \leq 1.6 \] |

The 1-5 range conversion can be used to draw the following conclusions about student needs.

**Table 7. The result of integrating quantitative and qualitative information**

| Quantitative Data | Range | Qualitative Data |
|-------------------|-------|------------------|
| 5                 | \( X > 3.4 \) | Very Needed       |
| 4                 | \( 2.8 < X \leq 3.4 \) | Needed           |
| 3                 | \( 2.2 < X \leq 2.8 \) | Enough           |
| 2                 | \( 1.6 < X \leq 2.2 \) | Less Needed      |
| 1                 | \( X \leq 1.6 \) | Very Little Needed |
In one multimedia, text, graphics, audio, video, animation, and interaction are all mixed to make learning more enjoyable than previously. All learning types, including auditory, kinesthetic, and visual, can benefit from multimedia. Researchers discovered numerous constraints in the continuing learning process analysis of interactive learning multimedia needs was "required" to promote learning based on the findings of their research.

4. Conclusion
The absence of interactive media that can give understanding and are engaging in presenting content while learning is one of the barriers to online learning, according to research on this topic. This study serves as a foundation for future research to produce appropriate media to be offered to students during the epidemic such that the subsequent learning is enjoyable and of high quality.

The researcher thinks that the findings of this study can help and serve as a reference for teachers as they try to innovate in generating media that can boost student knowledge, so that it can be utilized as a reference and input for future scientific growth.

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References
[1] S. Dhawan, “Online Learning: A Panacea in the Time of COVID-19 Crisis,” J. Educ. Technol. Syst., vol. 49, no. 1, pp. 5–22, 2020.
[2] M. H. Bahiraey, “Quality of Collaborative and Individual Learning in Virtual,” Proc. Second Int. Conf. E-Learning E-Teaching (ICELET 2010), no. Icelet, pp. 33–39, 2010.
[3] S. Tzur, A. Katz, and N. Davidovich, “Learning Supported by Technology: Effectiveness with Educational Software,” Eur. J. Educ. Res., vol. 10, no. 3, pp. 1137–1156, 2021.
[4] P. W. Stonebraker and J. E. Hazeltine, “Virtual learning effectiveness: An examination of the process,” Learn. Organ., vol. 11, no. 3, pp. 209–225, 2004.
[5] A.-N. Septiani, T. Rejekiningsih, Triyanto, and Rusnaini, “Development of Interactive Multimedia Learning Courseware to Strengthen Students’ Character,” Eur. J. Educ. Res., vol. 9, no. 3, pp. 1267–1279, 2018.
[6] F. N. Biduri and Y. Rasyid, “THE ANALYSIS OF NEEDS ON LEARNING MATERIALS IN CONTEXT- BASED READING MANDARIN LANGUAGES AND CULTURE,” J. Educ. Teach. Learn., vol. 3, no. 1, pp. 9–16, 2018.
[7] J. F. Lempas and S. Soenarto, “Analysis of learning multimedia development needs for network infrastructure architecture,” IOP Conf. Ser. Mater. Sci. Eng., vol. 1098, no. 5, p. 052090, 2021.
[8] M. A. Gilbert, Strengthening Your Social Media Marketing with Live Streaming Video. 2019.
[9] S. Menggo, I. M. Suastra, M. Budiarsa, and N. N. Padmadewi, “Needs analysis of academic-English speaking material in promoting 21st century skills,” Int. J. Instr., vol. 12, no. 2, pp. 739–754, 2019.
[10] S. W. Widyaningsih, I. Yusuf, Z. K. Prasetyo, and E. Istiyono, “Online Interactive Multimedia Oriented to HOTS through E-Learning on Physics Material about Electrical Circuit,” vol. 9, no. 1, pp. 1–14, 2020.
[11] E. P. Widoyoko, Evaluasi Program Pembelajaran. Yogyakarta: Pustaka Pelajar, 2009.
[12] E. Anismanova, “Digital Literacy of Future Preschool Teachers Ellina Sergeevna Anismanova 1,” J. Soc. Stud. Educ. Res., vol. 11, no. 1, pp. 230–253, 2020.