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Instrument development to measure the use of hologram-based learning media

Rian Vebrianto [1]*, M. Yusriadi [1], Adisti Yuliastrin[2]
[1] UIN Sultan Syarif Kasim Riau, Indonesia
[2] Universitas Terbuka, Indonesia
* Corresponding Author E-mail: rian.vebrianto@uin-suska.ac.id

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ABSTRACT

Hologram-based learning media is one of the alternative learning media that can be used as educational media, increasing student motivation and interest in learning and optimizing the division of work in groups. This media was developed to avoid abstract thinking, a negative impression that has been allowed to occur since they were young, which, in the end, until adulthood, the negative image is dull and makes students uninterested in things. This research was included as developmental research or RnD. Studies related to developing instruments to measure the use of hologram-based learning media as educational media in elementary schools still need to be completed. The research model used in this study was 4D. The data was collected with an offline questionnaire, and then it was analyzed using quantitative data analysis using the SPSS version 23 for Windows program. The results of this study have proven that: (1) The evaluation instruments construction and development for the use of hologram-based learning media for students in this study were carried out using a theoretical development model to test seven research constructs, namely (a) didactic components, (b) construction of hologram-based learning media, (c) technical hologram-based learning media, (d) ease of use, (e) efficiency of hologram-based learning media, (f) benefits, and (g) interest; (2) The results of construct validity and reliability testing show that the validity of the evaluation instrument has met the valid criteria because the value of r-count > r-table (r-count > 0.254); and (3) The reliability of the evaluation instrument which has been compiled and developed in this study has also met the high category as indicated by the magnitude of the Cronbach alpha reliability coefficient of 0.980. This indicates that the instrument developed meets the requirements for measuring the use of hologram-based learning media for students.

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INTRODUCTION

Learning is a process that occurs in every person from the time he is born until the end of his life. The learning process can happen anytime and anywhere. This can be proven by changes in a

person's behavior at the knowledge, skill, or attitude level. The learning process so far takes place in schools, especially elementary schools, which is more often carried out passively, meaning that the teacher explains the material. The students listen even though the active learning approach was seriously pioneered by the Ministry of National Education Research and Development Agency in 1979 with a project known as the Supervision Project and ASLM (Active et al. Method) (Suhartoyo et al., 2020).

In improving students' knowledge and skills, it requires to have a creative teacher (Kuswanto & Radiansah, 2018). There are various ways to be a creative teacher in the learning process, one of which is by utilizing learning media in the learning process. Learning media is inseparable and integrates the learning methods (Kuswanto & Radiansah, 2018).

Apart from being factored in by the teacher's weaknesses, the low ability of students is also influenced by the teaching materials used, such as books that are not colored and give rise to abstract values (Nengsi et al., 2021). Besides not maximizing learning media, as stated by Fadillah & Ninawati (2020), teachers can also involve the surrounding environment in the teaching and learning process. They are monotonous (Agnesti & Amelia, 2020). Moreover, teachers do not involve students' experiences with the material presented (Andriana et al., 2020). The problems above are contemporary and must be addressed, and solutions must be sought immediately.

Research conducted by Taufiq (2020) found that the low understanding of science, especially the solar system, is due to the teaching system being carried out monotonously, disinterested, and unmotivated because the material is passive and does not pay attention to student modalities. As a result of students' low understanding of the solar system, the scores obtained also decreased (Taufiq, 2020). One of the reasons is that teachers are considered to be lacking in variations in learning methods (Indragani et al., 2021). Also, there is a lack of student independence in finding reading material in their learning process (Hidayati & Listyani, 2010).

One of the learning media that teachers can use is alternative learning media in the form of holograms. Hologram technology, also known as holography, is the refraction of light reflected on the screen to form a recording object that is the same as the recorded object. The hologram is operated by making images or visuals in the form of a background and can be seen from various sides of dimensional objects, such as 2D or 3D views. The holographic display is monotonous, like images in general, and can be communicative according to the audio-visual recordings.

Information in the form of a hologram with visuals as if 3D is supposed to help construct information so that it is efficient and interactive in processing information, which will later be realized and developed (Saada et al., 2020). This hologram-based learning media can make the learning process more interactive and keep students interested in participating in both offline and online learning (Hazin, 2021). It is assumed that the presentation of technology-based learning media (in digital form) significantly influences students' attractiveness to learn the material being taught (Lukman et al., 2020). Through online learning, students can determine their study time freely and can study anywhere (Afandi et al., 2021).

This study attempted to develop hologram-based learning media validation instruments. This is due to the limited instruments used to validate the media. The research instrument is a tool used to measure observed natural and social phenomena. Specifically, all of these phenomena are called research variables (Sugiyono, 2017). Research instruments are used to measure variables in the natural sciences that are widely available and have been tested for their validity and reliability. The urgency of developing instruments for assessing learning media, as expressed by Ruskala (2021), is to evaluate how effective the new learning media is in the learning process.

Recognizing the developments and benefits of this hologram-based learning media, an assessment instrument is needed to see the feasibility of hologram learning media in education. However, very few publications address the issue of developing holographic media assessment instruments. Therefore, researchers intend to create an instrument useful for assessing whether hologram-based learning media is appropriate for the learning process to increase students' interest and motivation in learning, optimize the distribution of work in groups, and avoid abstract thinking. This study is contributed to answer questions about the references used to assess the feasibility of hologram-based learning media.

METHOD

The Research and Development (R&D) research design was used for this particular study. R&D stands for "research and development," which represents a research method used to produce certain items and test the efficacy of those products (Brigenta et al., 2017). Development research in the media and technology sub-domain aimed to improve the instructional design, development, and evaluation process based on specific problem-solving situations and generalized inquiry procedures (Silalahi, 2018). The research model used in this study was 4D. The development of the four D models includes four stages of development, namely define, design, develop, and disseminate.

However, this study only performed three stages of development, namely define, design, and develop—the intended development aimed at developing media validation instruments. The designed validation instrument was developed in the form of a questionnaire. The main objectives of the questionnaire are: (1) represent information that is relevant to the survey objectives, (2) provide a logical sequence of questions that are directed to the subject matter to respondents, (3) provide a standard format for recording facts, opinions, and attitudes, and (4) facilitate data processing (Arikunto, 2013).

Then, the instrument was assessed using a Likert scale. The Likert scale is commonly used as a standard psychometric scale for measuring response. This measurement scale has procedures that facilitate survey construction and administration, as well as data coding and analysis (Li, 2013). Each aspect was translated into an indicator, which will be used as a construction starting point for the instrument. Commonly, the Likert scale has a size expressed in the form of words, such as Very less, less, enough, reasonable, and very good (Sugiyono, 2013).

For quantitative analysis, the answers were given a number or value. The explanation is as follows: less = 1, enough = 2, good = 3, and very good = 4 and would be processed using the SPSS application version 26. Using this SPSS application would make it easier to process data obtained in the field (Kusumah, 2018).

RESULTS AND DISCUSSION

Result

Define

Learning media in the learning process has an important role. The learning process will feel more fun and make it easier for the teacher to convey learning material to students. Recognizing this importance requires an effective and efficient learning media in this learning process. A learning media can be considered effective and efficient if an assessment and measurement of the learning media has been carried out. For this reason, an assessment instrument is needed to assess whether this media is suitable for use or not.

Moreover, learning media that are still new to hearing, such as hologram-based learning media, require instrument construction to assess the validity of this media. To the researchers' knowledge, no one has researched the development of assessment instruments, specifically in examining the validity of hologram-based learning media. Departing from this needs analysis, this study is needed to develop the hologram-based learning media assessment instrument.

Design

The construction and method of developing evaluation instruments for hologram-based learning media in this study were carried out using a theoretical development model. This study began with a theoretical study to formulate an evaluation construct for hologram-based learning media. Based on a study of various theories regarding the evaluation of the use of hologram-based learning media, seven constructs were developed to evaluate the use of hologram-based learning media for students, namely: (a) didactic component, (b) construction of hologram-based learning media, (c) technical hologram-based learning media, (d) ease of use, (e) efficiency of hologram-

based learning media, (f) benefits, and (g) interest. Table 1 is a grid of instruments evaluating students' use of hologram-based learning media.

Table 1. Grid of Training Evaluation Instruments for Teachers

No.	Construct	Item Number
1	Didactic Component	1, 2, 3, 4, 5
2	Construction of hologram-based learning media	6, 7, 8, 9, 10
3	Technical hologram-based learning media	11, 12, 13, 14, 15
4	Ease of use	16, 17, 18, 19, 20
5	Efficiency of hologram-based learning media	21, 22, 23, 24, 25
6	Benefits	26, 27, 28, 29, 30
7	Interest	31, 32, 33, 34

Table 1 shows that the number of statement items is 34, spread into seven constructs after the researchers arranged the instrument grids for each construct.

Develop

Validation of non-test instruments and developed questionnaires

In the next stage, the researcher compiled the statement items using a Likert scale. After the instrument was compiled, a process called expert judgment was carried out, which was consulted by an evaluation expert. The expert judgment resulted in the improvement of several inaccurate statement items with the construct. After correcting the statements, the researchers conducted trials on 60 students at SD Muhammadiyah Penyasawan. Based on the test results data, the next step was to analyze to determine the validity and reliability of the training evaluation instruments for teachers that have been developed.

Construct validity is a measuring tool that shows results by the theory (Ihsan, 2015). Emory stated that construct validity is one of the methods that can be used in making measurements, namely considering the correlation between research data and existing measurement methods, convergent discriminant techniques, factor analysis, and multi-method analysis (Fahruna & Fahmi, 2017). Question items in an instrument are considered to be valid if the calculated person coefficient value (r-count) is greater than the Pearson table coefficient value (r-table) (Triana & Oktavianto, 2013). From the analysis carried out, the results of the instrument validity test from the research data are shown in Table 2.

Table 2. Instrument Validity Using Item Correlation Values with Corrected Item-Total Correlation for Each Study Construct

Construct	Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Didactic Component	1	.698	.981
	2	.664	.981
	3	.676	.981
	4	.719	.981
	5	.709	.981
Construction of hologram-based learning media	6	.697	.981
	7	.759	.981
	8	.834	.980
	9	.810	.980
	10	.864	.980
Technical hologram-based learning media	11	.788	.980
	12	.795	.980
	13	.869	.980
	14	.817	.980
	15	.729	.981
Ease of use	16	.736	.981

Construct	Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
	17	.808	.980
	18	.790	.980
	19	.828	.980
	20	.767	.981
Efficiency of hologram-	21	.704	.981
based learning media	22	.721	.981
	23	.756	.981
	24	.791	.980
	25	.743	.981
Benefits	26	.787	.980
	27	.830	.980
	28	.843	.980
	29	.859	.980
	30	.842	.980
Interest	31	.823	.980
	32	.780	.980
	33	.679	.981
	34	.694	.981

Based on Table 2, it can be seen that the r-table value is 0.254, which is obtained from a table with a degree of freedom (df) of 58 of the 34 questionnaires distributed as a trial. From the calculation, all items are declared valid because the value of r-count> r-table so that all question items can be used to evaluate the use of hologram-based learning media for students.

Reliability of Non-Test Instruments and Developed Questionnaires

Each item was assessed for internal consistency in developing an evaluation instrument for using hologram-based learning media for students. It measures the degree to which an item on a scale measures the same construct as other items on the same scale. Table 3 describes the reliability scale using Cronbach's alpha coefficient for a set of questionnaires based on the evaluation instrument for using hologram-based learning media for students.

Table 3. Cronbach Alpha Reliability Index for Each Study Construct

Construct (N = 60)	Overall Cronbach's Alpha Score
Didactic Component	0.981
Construction of hologram-based learning media	0.980
Technical hologram-based learning media	0.980
Ease of use	0.980
Efficiency of hologram-based learning media	0.981
Benefits	0.980
Interest	0.980

Based on Table 3, the Cronbach Alpha Reliability Index values were obtained for each study construct and the overall alpha values obtained: (a) inactive components, (b) construction of hologram-based learning media, (c) technical-based learning media holograms, (d) ease of use, (e) efficiency of hologram-based learning media, (f) benefits, and (g) interest respectively were 0.981; 0.980; 0.980; 0.980; 0.981; 0.980; and 0.980. This showed that the reliability value (α) is more significant than 0.60 for each construct studied. This result is reinforced by the opinion of Basuki and Hariyanto (2014) that instruments that have a high or reliable correlation are in the range of 0.6 < X < 1 (Arifin, 2017). Thus, the seven research constructs have fulfilled the reliable requirements to be used for further research needs.

Discussion

Based on the results of the validity and reliability test of the evaluation questionnaire on the use of hologram-based learning media, a valid and reliable instrument was obtained. These results confirm the findings of a previous study, which stated that an assessment instrument that can be used is an instrument that meets valid criteria (Nurfillaili et al., 2016). Apart from meeting valid criteria, the instrument must also fulfill highly valid criteria (Efendi & Widodo, 2019; Wales et al., 2017).

Furthermore, the findings explained that the instrument is considered suitable for use in research if it meets the four test requirements: validity, reliability, item difficulty level, and discriminatory power (Aji & Winarno, 2016; Adams & Wieman, 2011). Ihsan (2015) also reported that validity is defined as the ability of the instrument to measure the attributes of the construct under study. These opinions strengthen the results of this study so that the assessment instrument evaluating the use of hologram-based learning media for students is declared valid and suitable for further research needs on the same topic.

According to the analysis, the questionnaire developed concerning the evaluation instrument for using hologram-based learning media for students has good construct validity and high reliability, so it can be used in research, particularly in hologram-based learning media development. Thus, the research instrument that measures the evaluation of the use of hologram-based learning media for students who have been tested is considered feasible and trusted to be used in similar studies. This is reinforced by research, which states that to ensure the quality of research results, the instruments used should be derived from a selection of valid and reliable tools (Souza et al., 2017; Suratno, 2016).

Furthermore, the use of evaluation instruments must meet valid and appropriate criteria for use (Pinilih et al., 2013). Assessment instruments related to hologram-based learning media for students can prevent speculative actions from students in making assessments, especially in determining the final grade after researching evaluation achievement, the topic mentioned earlier. Even so, this instrument did not involve enough respondents from students of SD Muhammadiyah Penyasawan. Of course, it was not necessarily suitable for use as a research instrument in other schools.

The researchers expect that further research can be carried out to determine the validity and reliability of respondents on other campuses and with a larger sample of respondents. This is intended to make this research instrument better and the validity and reliability values higher to be used as a better tool for obtaining research data.

CONCLUSION

From the study that has been undertaken, it is possible to conclude that: (1) An evaluation instrument construction and development for the use of hologram-based learning media for students in this study was carried out using a 4D development model to test seven research constructs, namely (a) deductive component, (b) construction of learning-based media holograms, (c) technical hologram-based learning media, (d) ease of use, (e) efficiency of hologram-based learning media, (f) benefits, and (g) interests; (2) The results of testing the construct validity and reliability show that the validity of the evaluation instrument for the use of hologram-based learning media for students has met the valid criteria because the value of r-count> r-table (rcount> 0.254); and (3) The reliability of the evaluation instrument that has been compiled and developed in this study also meets the high category as indicated by the magnitude of the Cronbach alpha reliability coefficient of 0.980.

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