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Developing instrument to measure the use of online comic as educational media

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ABSTRACT

Studies related to the development of instruments to measure the use of online comics as an educational media in tertiary institutions are still limited. A survey study was carried out on 60 students from various study programs at open university. The data collection was done using an online questionnaire. The data were analyzed using quantitative data analysis assisted by SPSS version 23.00 for Windows. The results of this study showed that: 1) the preparation and development of an evaluation instrument for the use of online comics for students was carried out using a theoretical development model to test seven research constructs; 2) the results of the construct validity and reliability testing indicated that the validity of the evaluation instrument for the use of online comics for students met the valid criteria because the value of r-count >r-table (r-count >0.254); and 3) the reliability of the online comic use evaluation instrument for students that had been compiled and developed in this study also fulfilled the high category as indicated by the alpha Cronbach reliability coefficient of 0.980. This indicates that the instrument developed meets the requirements to be used in measuring the use of online comics for students.

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1. INTRODUCTION

Considering that students today are generally very interested in technology, the world of digital technology can be used as an alternative educational media for students. The use of gadgets for students has advantages and disadvantages. Therefore, teachers need to find the right strategy to minimize these limitations. The use of gadget technology in students was suggested by several experts who stated that children naturally learn about their environment through observation, which in this case technology offers easily accessible facilities to expand the area and reach of exploration [1]. Furthermore, applying technology in education can develop higher order thinking skills (HOTS) and students can creatively develop new insights that will begin to emerge more and more steadily [2]. In addition, building an information technology competency framework in online teaching has many meanings in the mentoring process that contributes to increasing student learning capacity [3]. The results of these previous studies suggest that

instructional technology should be used in education wherever possible, to facilitate resource utilization, support cognitive and meta-cognitive development processes.

Research on the importance of technology for students has been carried out in several developed countries. A research conducted in America provides policy recommendations encouraging parents to use media technology for their children. The research was done using a nationally representative sample of 2,326 parents of children age eight years and under. This study examined the factors associated with parent-child relationships across six types of media: book, television (TV), computer, video game, tablet, and smartphone. The implication of the results of this study was that parental intervention is more focused on encouraging the sharing of media technology [4]. Other researchers conducted studies related to joint reading activities between parents and children using electronic books, where there was good interaction between children and teachers or parents [5]. Programs carried out include reading electronic books together, where adults as teachers can develop children' insights in various fields of science such as the concept of marine conservation and support children's language and literacy development. At this point, digital educational comics that are based on the blending of text and image, can be used as a powerful teaching tool and at the same time prepare children for a digital future come to the fore [6].

The use of electronic comic book media that uses images and text can facilitate children to get to know various ideas. According to McVicker [7], comics are available for children as a literacy media that allows teachers to design and create comics themselves and link them to learning themes. Chen and his friends conducted a study on 89 children in an elementary school, early grade, in Taoyuan City, Taiwan. These experts researched a situational learning system using digital comic games designed to help students learn through script writing in groups. The results of the study showed that students from the experimental group had significantly higher learning motivation compared to the control group who were taught using traditional teaching methods [8]. Based on various literatures and reports, it is stated that there are 80% of comic readers worldwide [9]. In addition, the use of comics in learning makes students more motivated [10, 11], students describe comics as fun [9, 12], improves students' understanding and memory [13-15], and the use of comic media is very attractive to students [16-19]. The integration of comics with teaching activities will open a new window to students' imagination and thus contribute to their creative thinking processes [20]. Thus, there is an emerging need to develop instruments using comics. Based on the importance of using online comics as an educational media, an appropriate assessment instrument is needed in order to evaluate and provide improvements to increase the use of online comics. Therefore, the objectives of this study were 1) to develop a non-test instrument or questionnaire to measure the evaluation of the use of online comics among students at Open University, Pekanbaru, Indonesia and 2) to obtain the validity and reliability of the instrument.

2. RESEARCH METHOD

The research used a theoretical model, which is a model that describes a thinking framework based on relevant theories and is supported by empirical data [21]. The research steps carried out include eight stages, namely: 1) conducting theoretical studies in formulating constructs and evaluation indicators for the use of online comics, 2) compiling instrument grids, 3) compiling instrument items, 4)) conducting expert judgment, 5) conducting trials, 6) conducting analysis, 7) revising, and 8) formulating the final instrument of research results [22, 23]. This research was conducted at Open University, Pekanbaru, Indonesia in the even semester of the 2019/2020 academic year and involving sixty students from various study programs. In accordance with the characteristics of the response type, the format of the measuring instrument used was the Likert scale, where each statement had 4 alternative answers, namely strongly agree (SA) with a score of 4, agree (A) with a score of 4, disagree (D) with a score of 3, and strongly disagree (SD) with a score of 1. Development of a questionnaire instrument with a scale of 4 [24] which will assess the level of validity and reliability so that it can produce quality instruments and to know what should be measured. After the data was collected from the distribution of questionnaire instruments using online comics among Open University students, the data was then analyzed using the statistical package for social sciences (SPSS) [25-27] to determine the quality of the instruments that had been developed. The researcher determined the validity of this instrument by comparing the significance level obtained with the specified significance level of 0.05. The reliability index was also obtained using the Cronbach Alpha. The validity of an instrument must have a minimum value of 0.3 [28] and the instrument reliability value must be in the range of $0.6<X<1$ [29]. A good and quality instruments will be produced by fulfilling these two requirements.

3. RESULTS AND DISCUSSION

3.1. Validity of non-test instruments, and the developed questionnaire

The formulation and method of developing an evaluation instrument for the use of online comics in this study was carried out using a theoretical development model. This research began with conducting a theoretical study to formulate an evaluation construct for the use of online comics. Based on a study of various theories on evaluating the use of online comics, seven constructs for evaluating the use of online comics for students were compiled, namely: deductive components; online comic construction; online comic technicality; ease of use; online comics' efficiency; benefits; and interest. The following is a grid for evaluating the use of online comics for students.

Based on Table 1, it showed that the number of statement items is 34 items which are scattered into seven constructs. After the researcher arranged the instrument for each construct, the researcher then compiled the statement items using a Likert scale. After the instrument was composed, expert judgment was carried out which is consulted with the evaluation expert. The result of the expert judgment was the correction of several statement items. After the corrections were made, the researchers conducted a trial on 60 students of Open University at Pekanbaru. Based on the test results data, the next step was to conduct an analysis to determine the validity and reliability of the training evaluation instruments for teachers. Construct validity is a measuring tool that shows results in accordance with theory [30]. Emory stated that construct validity is one of the methods that can be used in measuring, namely considering the correlation between research data and existing measurement methods, convergent discriminant techniques, factor analysis, and multi-method analysis [31]. The question item in an instrument is said to be valid if the calculated Pearson coefficient (r-count) is greater than the Pearson table coefficient (r-table) [32]. Nunnally [28] also said that the correlation between items with a total score that exceeded 0.25 is considered a high score. The results of the instrument validity test of the research data are as shown in Table 2.

Table 1. Training evaluation instrument for teachers

No	Construct	Item number
1	Deductive component	1, 2, 3, 4, 5
2	Online comic construction	6, 7, 8, 9, 10
3	Online comic technicality	11, 12, 13, 14, 15
4	Ease of use	16, 17, 18, 19, 20
5	Online comics efficiency	21, 22, 23, 24, 25
6	Benefits	26, 27, 28, 29, 30
7	Interest	31, 32, 33, 34

Based on Table 2, the r-table value is 0.254 obtained from the table with a degree of freedom (df) of 58 from 34 questionnaires distributed as trials. From the overall calculation, all items are declared valid because the value of r-count >r-table so that all question items can be used to measure the evaluation of the use of online comics for learning.

Table 2. The validity of the instrument using item correlation value with the corrected item-total correlation for each study construct

Construct	Item	Corrected item-total correlation	Cronbach's alpha if item deleted
Deductive Components	1	.698	.981
	2	.664	.981
	3	.676	.981
	4	.719	.981
	5	.709	.981
	6	.697	.981
	7	.759	.981
Online Comics Construction	8	.834	.980
	9	.810	.980
	10	.864	.980
	11	.788	.980
	12	.795	.980
Online Comics Technicality	13	.869	.980
	14	.817	.980
	15	.729	.981
	16	.736	.981
	17	.808	.980
Ease of Use	18	.790	.980
	19	.828	.980
	20	.767	.981
	21	.704	.981
	22	.721	.981
Online Comics Efficiency	23	.756	.981
	24	.791	.980
	25	.743	.981
	26	.787	.980
	27	.830	.980
Benefits	28	.843	.980
	29	.859	.980
	30	.842	.980
	31	.823	.980
Interests	32	.780	.980
	33	.679	.981
	34	.694	.981

3.2. Reliability of non-test instruments, and developed questionnaires

Each item was assessed for internal consistency in developing an evaluation instrument for the use of online comics for students. It is a measure of the extent to which items on the scale measure the same construct as other items on the same scale. Table 3 illustrates the reliability scale using Cronbach's alpha coefficient for a set of questionnaires based on an evaluation instrument for the use of online comics for students.

Table 3. Cronbach's alpha reliability index for each study constructs

Construct (n=60)	Overall Cronbach alpha value
Deductive Components	0.981
Online Comic Construction	0.980
Online Comics Technicality	0.980
Ease of Use	0.980
Online Comics Efficiency	0.981
Benefits	0.980
Interests	0.980

Based on Table 3, the Cronbach's alpha Reliability Index value for each study construct in this study was obtained and the overall alpha value obtained was indicated by the overall alpha value obtained for 1) deductive components, 2) online comic construction, 3) online comic technicality, 4) ease of use, 5) online comics efficiency, 6) benefits, and 7) interests respectively 0.981; 0.980; 0.980; 0.980; 0.981; 0.980; and .980. This indicated that the reliability value (α) is greater than 0.60 for each construct under study. This result is reinforced by the opinion of Basuki and Haryanto that instruments that have a high or reliable correlation are in the range $0.6<X<1$ [29, 33]. Therefore, the seven research constructs have met the requirements for being reliable and valid so it can be used for further research needs.

Based on the validity and reliability test results of the online comic use evaluation questionnaire, a valid and reliable instrument is obtained. The results of this study are reinforced by previous research which states that an assessment instrument that can be used is an instrument that has met the valid criteria [34, 35]. In addition to meeting valid criteria, the instrument must also meet high valid criteria [36, 37]. Furthermore, the findings of Inteni, *et al*. which states that the instrument is suitable for use in research if it meets the four test requirements, namely validity, reliability, difficulty level of questions, and differentiation [38, 39]. Holli, *et al*. also said that validity is efficient as the ability of the instrument to measure the attributes of the construct under study [40]. These opinions strengthen the results of this study so that the evaluation instrument for the use of online comics for students is declared valid and worthy of use for further research needs related to the use of online comics.

In addition to the instrument having met the valid criteria, this study also produced a reliable research instrument with a Cronbach's alpha value of 0.980. This results are reinforced by the opinion that an instrument is reliable if it has an Cronbach's alpha value greater than 0.6 [41]. Furthermore, the instrument is said to be reliable if the Cronbach's alpha reliability coefficient is between 0.70-0.90 [42]. The results of this study are also reinforced by the opinion of Tang Keow Ngang, Subadrah Nair, Bouphan Prachak that the scale and criteria used to measure the test instrument must meet very reliable criteria [43]. The instrument with a greater Cronbach's alpha should be used for all types of research because it has smaller measurement errors and has greater statistical power for any research setting [44]. However, when item in parallel targets a uni-dimensional constructs, the Cronbach's alpha of an instrument should be increased by developing a set of highly correlated items, but not by increasing the number of items with insufficient correlation between items.

Based on the analysis conducted, the questionnaire developed based on the evaluation instrument for the use of online comics for students has good construct validity and high reliability so that it can be used in research in the development of online comics. Therefore, the research instrument that measures the evaluation of the use of online comics for students that has been tested is deemed worthy of use and is believed to be used in research that measures evaluation of the use of online comics for students. This is reinforced by research which states that to ensure the quality of research results, the instruments used are derived from the selection of valid and reliable tools [45, 46]. Furthermore, the use of evaluation instruments must meet valid criteria and is suitable for use [47]. With an evaluation instrument for evaluating the use of online comics for students, it can prevent speculation from students in conducting assessments, especially in determining the final score after carrying out research on the achievement of evaluating the use of online comics for students. However, this instrument did not involve sufficiently many respondents from students of Open University at Pekanbaru and thus it is not necessarily suitable to be used as a research instrument in other universities. Further research is expected to be carried out to see the validity and reliability of respondents in other universities and with a larger sample of respondents. It is intended that this research instrument will be better and the level of validity and reliability values is higher so that this instrument can be used as a better research tool in obtaining research data.

4. CONCLUSION

This research produces several conclusions, namely: the preparation and development of an evaluation instrument for the use of online comics for students in this study was done using a theoretical development model to test seven research constructs, namely: deductive components, online comic construction, online comic technicality, ease of use, online comics efficiency, benefits, and interest; the results of the construct validity and reliability testing indicated that the validity of the evaluation instrument using online comics for students met the valid criteria because the value of r-count >r-table (r-count>0.254); and the reliability of online comic use evaluation instrument for students that had been compiled and developed in this study also met the high category as indicated by the Cronbach's alpha reliability coefficient of 0.980.

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