Jurnal Ilmiah Sekolah Dasar
Volume 6, Number 4, 2022 pp. 558-567
P-ISSN: 2579-3276 E-ISSN : 2549-6174
Open Access: https://doi.org/10.23887/jisd.v6i4.47302

Digital E-Assessment Technology in Assessing Students' Tolerance Character

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ARTICLE INFO

Article history:
Received May 24, 2022
Accepted August 30, 2022
Available online November 25, 2022

Kata Kunci:
E-Assessment, Karakter Toleransi, Pendidikan, Teknologi Digital

Keywords:
Digital Technologi, E-Assessment, Education, Tolerance Character

ABSTRAK

Adanya sistem penilaian berbasis digital akan mendukung penilaian karakter siswa dalam proses pembelajaran. Penilaian karakter dengan menggunakan e-assessment akan sangat membantu guru dalam mengatasi pemborosan kertas, mengefisienkan waktu, mengatasi pengeluaran yang besar dan membuat siswa lebih fokus dalam mengisi karakter. Penelitian ini bertujuan untuk menganalisis karakter toleransi pada siswa sekolah dasar dan untuk mengetahui kelayakan dari produk. Penelitian ini merupakan penelitian pengembangan dengan menggunakan design pengembangan 4D. Sampel dari penelitian ini adalah sebanyak 175 siswa. Data kuantitatif dari penelitian ini didapatkan dari validasi ahli media dan hasil penilaian karakter toleransi siswa sedangkan data kualitatif didapatkan dari wawancara. Data kuantitatif pada penelititan ini dianalyisis menggunakan statistik deskriptif dan statistik inferensial sedangkan data kualitatif menggunakan analisis miles & huberman. Hasil analisis deskriptif penilaian karakter toleransi siswa berada pada kategori baik dan terdapat perbedaan dari karakter toleransi siswa di 3 sekolah. Hasil dari pvalidasi ahli media terhadap pengembangan web-based assessment berada pada kategori baik sehingga produk dapat digunakan untuk menilai karakter toleransi siswa. Implikasi dari penelitian ini terletak pada efisiensi waktu dalam pengolahan dan pendistribusian data, hemat biaya pengadaan, dan kemudahan penggunaan dalam menilai karakter siswa menggunakan web-based assessment..

ABSTRACT

The existence of a digital-based assessment system will support the assessment of student character in the learning process. Character assessment using e-assessment will greatly assist teachers in overcoming paper wastage, streamlining time, overcoming large expenditures and making students more focused in filling out characters. This study aims to analyze the character of tolerance in elementary school students and to determine the feasibility of the product. This research is a development research using 4D development design. The sample of this study was 175 students. Quantitative data from this study were obtained from the validation of media experts and the results of the student tolerance character assessment, while qualitative data was obtained from interviews. The quantitative data in this study were analyzed using descriptive statistics and inferential statistics, while the qualitative data used Miles & Huberman analysis. The results of the descriptive analysis of the character assessment of student tolerance are in a good category, and there are differences in the character of student tolerance in the 3 schools. The results of the validation of media experts on the development of web-based assessment are in the good category so that the product can be used to assess the character of student tolerance. The implications of this research lie in time efficiency in processing and distributing data, saving procurement costs, and ease of use in assessing student character using web-based assessment.

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1. INTRODUCTION

The development of digitalization technology at this time has progressed very rapidly which has penetrated all sectors of daily life, including the education sector. The era of revolution faced by Indonesia at this time is the era of the industrial revolution 4.0, where in the era of the industrial revolution 4.0 this is one of the toughest challenges for the education sector in Indonesia. Another term for the era of the industrial revolution 4.0 is the digital revolution (Agustini et al., 2019; Robandi et al., 2019; Sahal et al., 2020). The opportunities and challenges in the digital revolution in the education sector in Indonesia are to be able to start adapting education strategies to the rapid development of existing digital and take advantage of them (M. Astuti et al., 2021; Avando Bastari et al., 2021; Lawrence et al., 2019). The rapid development of digital technology at this time has given a very big influence in the education sector (Gandasari et al., 2020; Mutohhari et al., 2021; Shahroom & Hussin, 2018). Digital technology not only has a positive influence on the millennial generation but also has a negative influence, teachers must be able to assist students in utilizing digital technology (Carayannis et al., 2022; Skobelev & Borovik, 2017; Xu et al., 2018). Digital technology 4.0 not only allows the transfer of knowledge but can also facilitate collaborative learning to create and provide easy understanding between teachers and students (Beer & Mulder, 2020; Dewanti et al., 2021; Koehler et al., 2013). Thus the education sector must be ready to face the era of digitalization which is developing so rapidly. The digital technology that can be used in the education sector is by using E-assessment.

At this time teachers are in an era of digitalization that is so rapidly developing, where all educational activities cannot be separated from the use of digital technology. Assessment is an important factor in the learning process, the assessment system should be digitized to be able to create an accurate assessment system and save time compared to using a conventional assessment system (D. A. Astuti et al., 2018; Riddell, 2015; Rodríguez-Gómez et al., 2014). In the education sector, the use of e-assessment digitalization technology aims to improve the quality of education. This refers to the assessment activity, namely e-assessment. E-assessment is an information technology that refers to an electronic assessment process where technology is a means of learning and assessment activities (Astalini Astalini et al., 2019; Maison et al., 2020; Uhl et al., 2021). With the e-assessment it will be able to facilitate the work of teachers in conducting assessments. E-assessment is very helpful for teachers in the world of education, where this is followed by the rapid development of digital technology (Adesemowo et al., 2016; Rini & Solehah, 2021; Schildkamp et al., 2020). In addition previous study state digital e-assessment technology can provide fast and accurate feedback, so teachers can save time in making corrections and students can also find out their scores in real time (Essel et al., 2019). Therefore, e-assessment can be one of the digital technologies that can be used by teachers in schools. Digital e-assessment technology can provide fast and accurate feedback, so teachers can save time in making corrections and students can also find out their scores in real time (Okoye, 2014; Rini & Solehah, 2021; Yusmaita & Nasra, 2018). Therefore, e-assessment can be one of the digital technologies that can be used by teachers in schools.

In education, the main component that supports the establishment of all parts of the educational process is e-assessment (assessment). E-Assessment provides its own benefits in supporting the learning process (Adesemowo et al., 2016; Paul et al., 2018; Suryaningtyas et al., 2020). The existence of a digital-based assessment system will support the assessment of student character in the learning process. Character assessment using e-assessment will greatly assist teachers in overcoming paper wastage, streamlining time, overcoming large expenditures and making students more focused in filling out characters (Amran et al., 2019; Knauf, 2018; Mazid et al., 2021). One of the advantages of e-assessment is that it can accommodate all assessment information and data (Alruwais et al., 2018; Moria et al., 2017; Zhang, 2020). Then e-assessment can process data and provide real-time feedback so that there is direct interaction between students and teachers (Biasutti et al., 2019; Hoang & Arch-Int, 2013; Kumar et al., 2021). With this, it can be said that the application of e-assessment digitalization technology will minimize the teacher's time in conducting the assessment because it is not done manually (Diartha et al., 2016; Mulalia Maulana & Arruda, 2020; Rudibyani et al., 2020). Furthermore, the data that has been obtained will be stored automatically so that teachers do not have to worry if students' grades will be lost.

The character performed by students is the embodiment of controlled behavior, for that it is necessary to know the competence of the embodiment of the character. One of the characters possessed by students is the character of tolerance (Anggito & Sartono, 2022; Sufanti et al., 2021; Suhirman et al., 2021). Tolerance is a trait in the form of respecting a view, opinion and belief in differences. To determine the competence of the embodiment, character assessment is needed, namely by using e-assessment (Amran et al., 2019; Amri et al., 2020; Hidayat et al., 2019). E-assessment will assist teachers in carrying out competence on the tolerance character of students in schools. By conducting an e-assessment of the tolerance character of students, tolerance will be created between each other in the teaching and learning

process in schools (Chang, F., & Muñoz, 2006; Darmaji et al., 2021; Hung & Chan, 2020). With this, it can be said that e-assessment is needed in the education sector.

The research that has been done previously is related to the research that researcher doing. Research that has been done previously has a study in the form of an e-assessment-based assessment of students in schools to assess student character. The relevant research is the research about measures and finds out the response of users (students) to the application of assessment to assess students' attitudes towards science subjects and character education values (Tanti et al., 2021). The correlation between students' perceptions in the use of web-based assessments with the character of students at SMPN 2 Batanghari (Iqbal et al., 2022). Furthermore, research that relevant with rearcher is about conducted determine student perceptions of the use of web-based character assessments which were analyzed based on gender differences (A. Astalini et al., 2021). Then the research that have related is research about the analyze the relationship between social care characters integrated with electronic modules based on local wisdom of rice cultivation (Asrial et al., 2020). Base on those problems the researcher are interested to conducting a study aims to analyze the character of tolerance in elementary school students and to determine the feasibility of the product.

2. METHOD

This research is a development research with the aim of knowing the teacher's response to the e-assessment of students' tolerance character at school. This development research designl used in this research is using the 4D model. The 4D development model is a development model that can make products in the education sector more systematic. The 4D development model consists of 4 main stages, namely: Define, Design, Develop and Disseminate (Agustina et al., 2021; Yundarini et al., 2020). In this 4D development model, researchers will develop the product to the final stage, namely Disseminate (Dissemination) because at this stage the objectives of the new research can be fulfilled.

The population of this study is the primary school located in the city of Muara Bulian with a sampling technique using purposive sampling technique. Purposive sampling technique is a sampling technique based on the criteria set by the researcher. The criteria for the sample are that the SDN must be accredited A so that the samples obtained are SDN 13, SDN 64, and SDN 112 with a total sample of 175 students from 3 schools. The validators in this study were 2 lecturers of physics education at Jambi University. The instrument used in this study aims to determine how the teacher's response to the e-assessment-based character assessment in schools. Meanwhile, to validate the product, a media expert validation questionnaire was used, where the media expert validation questionnaire which contains 35 statements with 5 Likert scales, while the grid from the media expert validation questionnaire can be seenin in Table 1. Furthermore, the adoption tolerance questionnaire as for the grid of the tolerance tolerance questionnaire can be seen in Table 2.

Table 1. Media Expert Grid

Variable	Indicator	Items
Functionality	1. Suitability 2. Accuracy 3. Fulfillment	3, 7, 8, 9; 4, 5, 6; 1, 2
Reliability	4. Maturity 5. Fault tolerance 6. Recovery	15, 16 ;10, 11, 12; 13, 14
Usability	7. ability to understand 8. Ability to learn 9. Operation	18, 19, 20, 23; 26, 27; 17, 21, 22, 24, 25
Efficiency	10. Time 11. Real time 12. Resource	28, 29; 31, 32, 34; 30, 33, 35

Table 2. Tolerance Character Grid

No	Tolerance Aspect	Tolerance Indicator
1	Peacefulness	a. Care b. Fearlessness c. CLove

No	Tolerance Aspect	Tolerance Indicator
2	Respect Differences and Individuals	d. Respect each Other e. respect other people's differences
3	Awareness	f. Self Respect g. Appreciate the kindness of others h. Open i. Resepctif j. Comfort and life k. comfort with others

After the expert validation questionnaire is collected, the results from the validator for media validation will be obtained according to the variables that have been in accordance with the grid. After that, the results were taken from interviews with teachers at school with a total of 4 interview questions. After validation was carried out, further trials were carried out at SDN 13, SDN 64, and SDN 112 where students would fill out a tolerance character questionnaire contained in the web-based assessment so that the results of the tolerance character of students at SDN 13, SDN 64, and SDN 112 would be obtained. Muara Bulian District.

The data in this study are quantitative data and qualitative data where later these two data will be analyzed. Quantitative data derived from the results of expert validation and results of tolerance character will be analyzed using descriptive statistics. Descriptive statistics are statistics that explain data with explanations in the form of mean, mode, median, percentage, and maximum and minimum values. In this study, the results of the validation and results of tolerance character will be in the form of mean and percentage and the results of product trials will be in the form of percentages. The qualitative data in this study comes from interviews, literature studies and comments from expert validation where this qualitative data will be analyzed into several stages, namely the stages of collecting data, reducing data, presenting data, and stages of data verification (Miles et al., 2018).

3. RESULT AND DISCUSSION

Result

The needs analysis in this study is to be able to meet the needs of teachers and students. This analysis was carried out using the interview method with the teacher at the school. The results of this needs analysis are used as a reference in making e-assessments to assist teachers in assessing the character of student tolerance. In the interview, the questions asked were about how the teacher was able to find out the character of tolerance possessed by students in the learning process teaching in schools. This research was conducted to see the results of the assessment of the tolerance character of elementary school students in Muara Bulian, where the assessment was carried out through e-assessment so that it would facilitate the process of assessing the tolerance character of students. The descriptive results of this study can be seen in Table 3.

Table 3. Descriptive Table Of Tolerance Character Assessment

School	Category	Mean	Median	Mode	Min	Max
SDN 13	Very Bad Bad good Very Good	116.30	117	117	98	137
SDN 64	Very Bad Bad good Very Good	121.72	122	110	98	140
SDN 112	Very Bad Bad good Very Good	117.95	119	111	100	140

In Table 3, the results of descriptive analysis are obtained from the assessment of the tolerance character of students in 3 elementary schools in Muara Bulian where at SDN 13 the mean is 116.30 with a

median value of 117, a mode of 117 and a minimum value of 98 and a maximum of 137. The results of descriptive analysis the tolerance character of students at SDN 64 obtained a mean value of 121.71 with a median of 122, a mode of 110 and a minimum value of 98 and a maximum value of 140. The results of the descriptive analysis of the character of tolerance of students at SDN 112 obtained a mean value of 117.95 with a the median is 119, the mode is 111 and the minimum value is 100 and the maximum is 140. After the descriptive analysis is done, the assumption test is carried out as a condition for testing the hypothesis where the assumption test is carried out in the form of normality and homogeneity tests. The results of the normality test can be seen in Table 4.

Table 4. Normality Test Result

	Kolmogorov-Smirnova		
	Statistics	**df**	**Sig.**
SDN13	0.118	55	0.14
SDN 64	0.128	55	0.076
SDN 112	0.147	55	0.092

Table 4 shows the results of the normality test at 3 public elementary schools in Muara Bulian. In conducting the normality test, the data will be normal when the significance value is greater than 0.05. The significance value for the normality test at SDN 13 is 0.14, at SDN 64 a significance value is 0.076 and for students at SDN 112 a significance value is 0.092, which means that the results in the three schools are normal. Based on data analysis, shows the results of the homogeneity test, where the homogeneity test is carried out to determine the variety of data in the study and to find out whether the data is homogeneous or not, it can be seen through the results of the significance which must be greater than 0.05. In this study, a significance value of 0.841 was obtained, which means that the data is homogeneous. After the assumption test is fulfilled, the ANOVA assumption test can be carried out to see a comparison of the assessment results of the three classes which can be seen in Table 5.

Table 5. Anova Test Results

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	879,057	2	439.529	3.546	0.031
Within Groups	21196.184	171	123.954		
Total	22075.241	173			

Table 5 shows the results of the ANOVA test carried out to find out whether there are differences between the three classes which can be seen through the significance value which must be less than 0.05. From the analysis results, the significance value of the ANOVA test is 0.031, which means that the three classes have different tolerance character results. To see which schools have more good tolerance characters, it can be seen through the PSOT hoc further test which can be seen in Table 6.

Table 6. Post Hoc Test Results

(i)	**(J)**	**Mean Difference (IJ)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
SDN 13	SDN 64	-5.41505	2.09544	0.028	-10.3693	-.4608
	SDN 112	-1.64173	2.07021	0.708	-6.5363	3.2529
SDN 64	SDN 13	5.41505	2.09544	0.028	.4608	10.3693
	SDN 112	3.77332	2.04186	0.157	-1.0542	8.6009
SDN 112	SDN 13	1.64173	2.07021	0.708	-3.2529	6.5363
	SDN 64	-3.77332	2.04186	0.157	-8.6009	1.0542

Base on Table 7 is the result of the post hoc test to see which school has the better tolerance character. From the table, it can be seen that SDN 64 has a better character than SDN 13 which can be seen through the significant difference in the mean of 5.41 debfab, the magnitude of the significance is 0.028, which means that SDN 64 and SDN 14 have very significant differences. From the post hoc test results, it is also known that SDN 112 has a better tolerance character than SDN 13 which can be seen through the difference in the mean of 1.64 and not significantly different with a value of 0.708. And from the results it can be seen that SDN 64 has a better tolerance character than SDN 112 where there is a mean difference of 3. 77 and the difference is not too significant which can be seen through the results of the significance value

of 0.157. Furthermore, to determine the feasibility of the e-assessment media used to assess the tolerance character of students in 3 elementary schools in Muara Bulian, a feasibility test was carried out where the results of the feasibility test of the e-assessment used can be seen in Table 7.

Table 7. Product Validation Test

No	Assessment Aspect	Validator 1			Validator 2		
		mean	Percent-tags (%)	Category	mean	Percent-tags (%)	Category
1	Functionality	3.64	72.8%	good	3.80	76%	good
2	Reliability	3.70	74%	good	3.94	78.8%	good
3	Usability	3.73	74.6%	good	3.75	75%	good
4	Efficiency	3.93	78.6%	good	3.71	77.2%	good
Overall Average		**3.75**	**75%**	**good**	**3.8**	**76%**	**good**

Base on Table 7, the media expert validation test, the assessment aspect of the results of validator 1 and validator 2. Where the values obtained in the aspect of functionality assessment with the mean value are validator (1) 3.64 and validator (2) 3.80, for the percentage, namely validator (1) 72 .8% and validator (2) 76%, with the results obtained, the aspect of functionality assessment can be categorized as good in its use. Then the value on the aspect of reliability assessment with the average value of validator (1) 3.70 and validator (2) 3.94, for the percentage, namely validator (1) 74% and Validator (2) 78.8%, on the aspect of reliability assessment can be categorized good to use. Furthermore, in the Usability assessment aspect, the average value is validator (1) 3.73 and validator (2) 3.75 with the percentage value of validator (1) 74, 6% and Validator (2) 75%.

Discussion

Existence of digital e-assessment technology in the education sector, this indirectly becomes an alternative for problem solving in knowing how the character of tolerance possessed by students isat school. This e-assessment-based tolerance character assessment is an appropriate assessment technique to find out how the student's tolerance character is in the learning process at school. The things that support the process of developing digital e-assessment technology are conducting needs analysis by conducting interviews with teachers at school (Kundu & Bej, 2021; Suryaningtyas et al., 2020). Interviews were conducted to find out the character problems that students have at school and provide solutions for teachers in forming the character of student tolerance. Before this e-assessment is used, this e-assessment is first tested for feasibility to be used in knowing how the character of students' tolerance during the learning process at school to find out how the character of tolerance possessed by students at school (Sekeh, W et al., 2019; Sufanti et al., 2021; Suhirman et al., 2021). After the descriptive analysis is carried out, then the assumption test is carried out where the assumption test must be carried out to meet the requirements so that hypothesis testing can be carried out. The normality test was conducted to determine whether the data were normally distributed or not. From the results of the normality test, it can be seen that the significance value of the normality test at SDN 13 is 0.14, for SDN 64 it is known that the significance value is 0.076 and at SDN 112 the significance value of the normality test is 0.092. From the results, it is concluded that the data is normally distributed so that further homogeneity tests can be carried out to find out the variety of data. From the results, it can be seen that a significance value of 0.841 is obtained which can be concluded that the data is homogeneous so that the conditions for testing the hypothesis can be fulfilled.

After fulfilling the prerequisite test, the researcher can test the hypothesis. The ANOVA test from this study found that there were significant differences between the three schools. This is known through the significance value obtained through the ANOVA test where from this study a significance value of 0.031 was obtained. After it was known that the tolerance character of students in the three elementary schools was different, then further tests were carried out in the form of a post hoc test to find out in detail which elementary school had a better tolerance character. From the data, it can be seen that the tolerance character of students at SDN 64 has a significant character with other Elementary Schools, especially with SD 13 which is very significant, this is indicated by the very large difference in the mean of 5.41 while with SDN 112 it is only 3.77. There are several previous studies related to the research that the researcher did, including the research that explained about that elementary school students from an early age really need to strengthen character education because character will determine the nation's future (Dekawati, 2020; Singh, 2019; Suminto & Mbato, 2020). Previous studies found that teachers are currently very difficult to measure the character of students, especially elementary school students where to take measurements an instrument is made so that it can measure the character of students, especially elementary school students

(Annisa et al., 2020; Rantesalu, 2020; Rudyanto, 2016). Currently one of the characters that really needs to be assessed is the character of tolerance so that an instrument is made that is able to measure the tolerance level of elementary school students (Amran et al., 2019; Maryono et al., 2018; Widodo, 2019). This is supported by research conducted that character assessment in high school can be done using electronic media so that it will be easierteachers in conducting assessments which for now are only devoted to high school (Amran et al., 2019).

The implication of this research is that there is a great need for this e-assessment because it will greatly assist teachers with all the facilities provided. The use of e-assessment to measure the character of tolerance is also very important to support digitalization in the world of education so that this development is very important for teachers, especially elementary school teachers who really need character assessment because from an early age students must have character assessments. The limitation of this research is that currently the developed e-assessment is only able to assess the tolerance character of students where according to the Minister of National Education there are 18 character values that must be followed by students. Another limitation of this study is that only a trial was conducted on 3 elementary schools in Muara Bulian, so a larger sample is still needed to compare the results of student character assessments where students must measure characters other than tolerance characters. There commendation for this research is that it is very necessary to develop an e-assessment that is able to assess all student characters in one place so that the teacher will be greatly helped. Another thing that can help is by making standard instruments so that future developers will be able to make e-assessments that can be used in a wider environment.

4. CONCLUSION

The use of e-assessment in the education sector, students as respondents show good results in the application of e-assessments as a medium for assessing the character of student tolerance in schools. From the interviews, it is known that students show a fairly interactive response in the application of e-assessment as a medium for assessing the character of student tolerance because with the e-assessment it can show results directly and can be evaluated on students and make students not feel bored quickly in The process of assessing the tolerance character of students at school is due to the assistance of an assessment in the form of digital e-assessment technology, so students only press buttons without having to use stationery.

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