


E-Assessment on Student's Self-Concept for Physics Learning

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ARTICLE INFO	ABSTRACT
Article history <i>Received July 7, 2019</i> <i>Revised August 11, 2019</i> <i>Accepted November 16, 2019</i>	This study aims to apply students' self-concept E-assessment to SESKA-based physics. Student self-concept E-assessment in this study aims to see students' self-concept of physics and how the teacher responds to the development of students' self-concept E-assessment with SESKA systems. The method implemented in this research has three stages, namely: (1) Development, (2) Implementation, & (Evaluation). This research was carried out on 450 students and 15 teachers in the Jambi Province of Indonesia. The results of this study indicate students' self-concept of physics is classified as good 47.1% (212 students), and the teacher's response is classified as positive, with 66.7% (10 teachers). Therefore, SESKA-based E-Assessments receives a good response and needs to be developed on a large scale.
Keywords <i>ICT</i> <i>SESKA</i> <i>Self-Concept</i> <i>Physics</i>	<p>Penelitian ini bertujuan untuk menerapkan konsep diri E-assessment siswa untuk fisika berbasis SESKA. Konsep diri E-assessment siswa dalam penelitian ini untuk melihat konsep diri siswa fisika dan bagaimana guru menanggapi pengembangan konsep diri siswa E-assessment dengan sistem SESKA. Metode penelitian ini menggunakan 3 tahap, yaitu: (1) Pengembangan, (2) Implementasi, & (Evaluasi) dan dilakukan pada responden: 450 siswa dan 15 guru di Provinsi Jambi Indonesia. Hasil penelitian ini menunjukkan konsep diri fisika siswa tergolong baik 47,1% (212 siswa) dan respons guru diklasifikasikan positif dengan 66,7% (10 guru). Jadi disimpulkan bahwa E-Assesment berbasis SESKA menerima respon yang baik dan perlu dikembangkan dalam skala besar.</p> <p>This is an open access article under the CC-BY license.</p> 

I. Introduction

Education is the most important aspect for everyone in a country. Through education, it is expected that educators can prepare students' abilities to play an active role in becoming qualified human resources in the era of globalization. Therefore, every quality of education that exists in a country affects the progress of that country. The realm of education contributes to the development of the civilization of the nation's life (Karyadi et al., 2018). Assessment in education is necessary to know the level of success and efficiency of the learning process in facing the challenges of education. With an objective assessment, it will be known what to look for in a particular case.

Assessments can be carried out for a variety of reasons and intentions that give the practice

a certain perspective (Fuller, 2013). Assessment from an educational perspective is one of the important things to do. The assessment has a crucial role in education (Heitink et al., 2016). Assessment in education is defined as an evaluation to find out how education works effectively for each student. Assessment in education is not only limited to assessing the cognitive level and intelligence of students but also in assessing the affective domain of students or characters. Character good objectivity that shows human quality, whether known to humans or not and goodness, is affirmed by society and religion. Today's character becomes one of the main concentrations developed in each student because the character is related to students' attitudes in controlling their behavior. The concern for knowledge in education is included in the aspects of values, attitudes, man-

ners, and other good characters (M. N. Abdullah & Kadhim, 2016).

Students' character ratings are crucial, as they can find out the relatively stable individual's behaviors or attitudes. Attitude is often regarded as the personal trust of each individual that is stable and difficult to change (van Aalderen-Smeets et al., 2017). One character that can be developed for students is self-concept. The concept of self is said to be an assumption to someone who feels comfortable with themselves and their own abilities (Lawrence & Vimala, 2013). In relation to self-concept, learning needs to be developed in a positive direction to form good self-confidence. Self-concept consists of two aspects, namely physical self-concept, which is reflected in its appearance, and psychological self-concept that is detailed on academic self-concept and social self-concept (Dwija, 2008). The importance of increasing positive self-concept will have a good impact on the behavior and attitudes that a person has in learning.

The self-concept character assessment, in this case, focuses on the object of physics. Because physics not only teaches about the concepts of nature and technology but also teaches character. Science or science learning, in essence, has dimensions of thinking abilities, dimensions of products, and dimensions of development of attitude or character (Pratiwi & Fasha, 2015). Physics learning is essential for every student. Science has been introduced since basic education; science is a continuous process of learning (Narmadha & Chamundeswari, 2013). Physics generally contains material about nature, environment, and technological development. Science education researchers have the concept of science (Topcu & Şahin-Pekmez, 2009). The self-concept character assessment of physics has a definition of the assessment of student attitudes and student behavior, which tends to be consistently carried out continuously in physics lessons at school.

Character evaluation is generally done conventionally and traditionally. Generally, the researcher conduct research related to the character of students in school using a questionnaire instrument. (Cohen et al., 2013) state that researchers must judge the correct questionnaire used for data collection, and, if so, what kind of questionnaire it will be. Commonly, the questionnaire used to evaluate students' character employs a Likert scale. (Joshi et al., 2015) mention that the Likert scale is one of the most

fundamental and frequently used psychometric tools in educational and social sciences research. The Likert scale describes the level of agreement or disagreement of the research subject. This research used a paper-based questionnaire. Because this questionnaire was paper based, the research evaluating the character of students' self-concept towards physics was carried out by directly distributing the questionnaire to each student.

The evaluation of the character of self-concept towards physics with a paper-based questionnaire has a weakness, namely the excessive disposal of paper and the effect on the quantity of waste and less effective and efficient. (Birenbaum et al., 2006) state, in general, current assessment systems tend to be uneconomical, time-consuming, not cost-effective, and demotivating both for learners and teachers. That problem can be answered by technology and computers that can change the system to be computerized in the form of an E-assessment (Sahidu et al., 2017). With the development trend of the industrial revolution 4.0, the implementation of the educational process should follow the 4.0 industrial revolution. 4.0 industrial revolution-based learning has the characteristic always to use internet networks and technology. One of them is the development of E-learning. E-learning is the most recent way to carry out distance education by distributing learning materials and processes over the Internet (Ardito et al., 2006). In line with the development of E-Learning, the development of E-assessment to assess students' self-concept of physics should also be started

Therefore, by following the development of industry 4.0 in the world of education, the researchers developed E-assessment by developing a SESKA system program for concept characters self. This E-assessment of students' self-concept in physics will be more effectively and efficiently developed in character research because it can be used remotely without face-to-face research with respondents and is interactive. This SESKA System development for E-assessment on students' self-concept character is not only beneficial for researchers but also for teachers. Besides, being educators, teachers also have the role of being evaluators.

As an evaluator, the teacher must be able to carry out assessments on learning outcomes and evaluate, as well as controlling student learning activities (Ismail, 2010). As an evaluator, the teacher can utilize the self-concept E-assessment of the physics with the SESKA sys-

tem to find out how the character of students' self-concept towards physics, which is useful

for learning effectiveness. The homepage of the SESKA system is presented in Fig. 1.



Fig. 1. SESKA Website Homepage (Welcome to the SESKA Website/Welcome On Website SESKA)

SESKA system is for E-Assessment. Therefore, education systems recognize the key role of information communication technology in transforming education to meet the needs of the 21st-century (Marwan & Sweeney, 2019). From the explanation above, the focus of the research in this study is outlined in the research question below:

How does the assessment of self-concept of self towards physics use e-assessment by using a SESKA system program?

What is the teacher's response to the development of self-concept character assessment of physics using the SESKA system?

II. Method

This research uses three stages research method, namely: 1. Development, 2. Implementation, 3. Evaluation. In detail, the research phase is explained as follows:

In the development stage, Self-concept questionnaire E-assessment physics was developed. This stage includes limiting the measurement indicators of self-concept in physics learning. There are eight indicators that measure students' self-concept in physics, namely: (1) Self-esteem, (2) the perpetrator himself, (3) The judge himself, (4) The Physical Self, (5) The ethical self-immoral, (6) Personal self, (7) The Family Self, (8) the social self. The measurement indicators of students' self-concept towards physics aim to prepare relevant statements related to students' self-concept in physics. Each of these indicators was compiled into

statements relating to the character of students' self-concept towards physics. From these statements, the students' self-concept of physics questionnaire was developed. Students' self-concept of physics in the questionnaire became the basis of developing an E-assessment with the SESKA system. In addition, the development and manufacture of E-assessment were based on the flowchart and storyboard of analysis of hardware (software) and software requirements analysis. The final stage was the conceptual E-assessment of character input on physics in the SESKA system. This SESKA used MySQL. The development and data collection employed open-source software. Recorded data from sensors in the MySQL database were hosted on a web-based dashboard GUI using the PHP scripting language (Thapliyal & Kumar, 2016).

The implementation phase began with the steps to simulate and apply the student's self-concept E-assessment on physics to the students and teachers. The initial step was an E-assessment simulation to a small group. Then a small group trial was conducted to find out how students assess the students' self-concept E-Assessment. The result of that small group trial shows that the E-assessment self-concept of physics is feasible to be used. In this stage, the self-concept E-assessment was carried out to 450 high school students and 30 teachers. This stage was a large group trial. Trials were conducted along with the software development stage. This implementation involved prospective users, educators, and students (Retnawati et al., 2017).

In the Evaluation Phase, a comprehensive evaluation of the E-assessment of the concept of self-concept towards Physics using the SESKA system was carried out. The evaluation process aims to improve its weakness, so it is appropriate to be used to connect the designers and users directly to assess the physical concept of students through the website system of SESKA. The evaluation phase is the last stage before the E-assessment is determined to be feasible for wide-scale usage with a large sample of various respondents in the area. This step intends to open chances for all stakeholders to use the students' self-concept E-assessment of physics with the SESKA system.

This research was conducted with a sample of 450 students and 15 teachers as respondents. The student samples came from 2 schools, Public High School 8, State High School 6, in Batanghari Regency, Jambi Province, Indonesia. And for teachers, they are physics teachers in Jambi Province, Indonesia. The sampling technique used was the purposive sampling technique. This sample was taken based on predetermined criteria, namely nationally accredited schools.

III. Results and Discussions

The results of the study were attained from data of self-concept character E-assessment via the "SESKA" program which had been filled by students and teachers as respondents. This data was input automatically on the "SESKA" database. The obtained data was in the form of quantitative data. To see the self-concept of physics in detail, it was analyzed using descriptive statistics. This statistic is used along with IBM SPSS Statistics software.

Character and computation-based evaluation of networks should be the most important part of education. This arises because character assessment can assess students in learning. Assessment for attitude appears to be a more complex activity in the learning context (Yan, 2018). Database system E-assessment students' self-concept of physics with a "SESKA" system using a Mysql database. MySQL server is a program that stores large amounts of information in an organized format and easily accessible through programming languages like PHP (Yank, 2004). Therefore, with the MySQL database on SESKA, the E-assessment character of students' self-concept of physics makes was easily conducted, even with amount of information inputted by students. The complete research data is presented in the Table 1.

Table 1. E-assessment of Self-Concept toward Physics

Category			Median	Mode	Min's	Max	%
Interval	Attitude	Total					
44.0 - 79.2	Very bad	12	165	156	117	193	2.7
79.2 - 114.4	Not good	28					6.3
114.4 - 149.6	Fair	60					13.3
149.6 - 184.8	Good	212					47.1
184.8 - 220	Very good	138					30.6
TOTAL							100%

A. Character E-assessment students' self

E-assessment of students' self-concept character towards physics in this study used a system was developed as "SESKA". This E-assessment was conducted at 450 high school students in Jambi Province, Indonesia. The results of the E-assessment results in students' self-concept of physics (Table 1).

Based on the Table 1, the mode value was 156, the median value was 165, the minimum value and maximum were 117 & 193, respectively. While based on the self-concept character category students had different self-character / attitude concepts. They were divided

into 5 student characters namely very bad self-attitude attitude character = 2.7% (12 students), bad character = 6.7% (28 students), quite good characters 13.3% (60 students), good characters = 47.1% (212) and very good characters = 30.6% (138 students). So, it can be concluded that the character of students' self-concept towards physics in high school students in the Jambi province of Indonesia by using the SESKA E-assessment system shows that good characters have the most dominant value in this study with a percentage (47.1%). Thus, this good character can help in improving the quality of learning, especially with teacher responses to the E-assessment concept devoted to physics.

The teachers at junior high school in Jambi Province of Indonesia responses towards the

development of E-assessment with a “SESKA” system are presented in Table 2.

Table 2. Teacher's Response to E-assessment System

Category			Mean	Mode	Min	Max	%
<i>Interval</i>	<i>Attitude</i>	<i>Total</i>					
48 - 50	Very bad	0	4.2	4	3	5	0
50,1 - 72	Bad	0					0
72,1 - 94	Fair	3					20,0
94,1 - 116	Good	10					66,7
116,1 - 140	Very Good	2					13,3
TOTAL							100

Based on the Table 2, the descriptive value for the teacher's response to the E-assessment of self-concept towards Physics shows the mean value of 4. 2, the mode value of 4, the minimum value of 3 and maximum of 5. On the other hand, based on the category of teacher response to the E-Assessment, the character of students' self-concept of physics concludes three different responses. The results of teacher responses concluded from the table show that none of the teacher respondents chose the bad and very bad category. While the other responses for the remaining 3 categories were, fair category got 20% (3 teachers), good category got 66.7% (10 teachers), and very good category got 13.3% (1 teacher). So, it can be concluded that the physics teacher's response to the development of students' self-concept E-Assessment of physics in Jambi province, Indonesia showed positive results. This is indicated by the dominant percentage in the good category, with a percentage of 66.7%. Therefore, the needs of students' self-concept assessment of physics must be applied to school students. Thus, the development of the E-assessment of students' self-concept of physics is in line with one of the teacher's tasks as an evaluator.

B. Character Concept Self-E-assessment of "SESKA-based" Physics

The SESKA system uses program language created on Macromedia Dreamweaver MX 2004 applications in the form of PHP. It uses PHP as a scripting language that embeds HTML from web pages. At SESKA, it uses MySQL as one of the database input servers that aims to store E-assessment information. (Chen & Hsu, 2014) state that a data-continuous Structured Query Language (SQL) process is an automated enterprise in

formation process that processes continuous incoming data streams. MySQL in the SESKA E-assessment program make the data filled in by respondents directly enter the information database continuously. Thus, it facilitates the assessment process. When the evaluator wants to return to the destination, the webserver executes the PHP script and replaces the results to the page.

Meanwhile, in general, assessment has often been used by education staff to measure the cognitive and learning conditions of students. (Nikou & Economides, 2018) state that assessment is a critical process in education that features both measuring and supporting student learning. The assessment is not too focused on the assessment of student character. This E-assessment emerged as a more effective and efficient character assessment solution and followed the development of industry 4.0. E-assessment appears to look at the behavior and character of students, primarily the students' self-concept characters in physics. It is important because the behavior is related to students themselves. Self-concept is assumed to be very important and influential factors related to a person's behavior and emotions, as well as cognitive outcomes, such as student academic achievement (Chao et al., 2019).

E-assessment on students' self-concept of physics using a web & online SESKA system can support the performance of teachers or other stakeholders with more authority in the world of education. The web-based assessments (e-assessment) help the lecturer or teacher to quickly and objectively assess students (Hardianti et al., 2017). The development process of the concept character E-assessment designed for physics can be seen in the Fig. 2.



Fig. 2. Home Page E-Assessment discipline toward science on SESKA "

In Fig. 2 a web view of self-concept character E-Assessment is shown. Students took physics subjects with a "SESKA" system. That homepage is shown for every respondent who will use SESKA as a character E-Assessment. On the SESKA home page, the picture above shows 2 class groups who are the respondents of the character's self-assessment E-Assessment of physics. From the results of observations conducted during the implementation of self-concept research E-Assessment, students provided good and positive responses to E-Assessment. Students felt happy and interested in new ways developed through the SESKA system. This is because there is still very rare internet-based assessment and communication. The students' interest indicates the need for E-Assessment to be developed and improved. Because with the use of E-Assessment, researchers or teachers can easily see the current conditions of students related to the concept of

the students analyzed efficiently and effectively.

As for the homepage, when the respondent opens SESKA, you see the phrase "Welcome Visitors". That phrase indicates that they have successfully accessed the SESKA System on their communication device (android or computer). In the home page menu, there are several sub-menus that can be accessed by users (Respondents).

C. E-Assessment: Self - Concept toward Physics

E-assessment was developed from the questionnaire instrument. The questionnaire instrument with the code developed by the SESKA system aims to create a character self-assessment E-assessment instrument for physics. Fig. 3 & 4 shows the form of concept questionnaire E-assessment page written at SESKA.

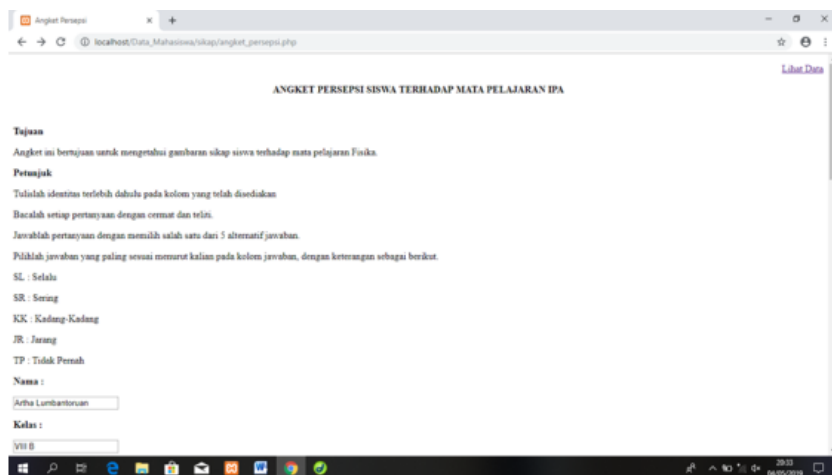


Fig. 3. Self - Concept Toward Physics E-Assessment

No	Pernyataan	Jawaban				
		SL	SR	KK	JR	TP
A. Penguasaan						
1	Guru IPA tepat waktu saat masuk kelas	○	○	○	○	○
2	Saya menerima materi yang diberikan dengan baik dan cepat.	○	○	○	○	○
3	Saya mengamati alat peraga yang dipergunakan oleh guru dengan jelas.	○	○	○	○	○
4	Alat-alat praktikum yang ada di labor IPA lengkap dan memadai.	○	○	○	○	○
5	Penampilan guru ketika masuk kelas tidak rapi.	○	○	○	○	○
6	Guru IPA ketika mengajar tidak bervariasi.	○	○	○	○	○
7	Saya tidak ingin menjadi seorang ilmuwan fisika setelah saya lulus sekolah.	○	○	○	○	○
8	Slide yang ditayangkan guru tidak bisa saya amati dengan jelas.	○	○	○	○	○
9	Buku-buku IPA penunjang dipersiapkan tidak lengkap.	○	○	○	○	○

Fig. 4. Assessment Self - Concept toward Physics

Fig. 3 & 4 shows the questionnaire display of students' self-concept e-assessment of physics at SESKA. This questionnaire was previously shaped like in general paper-based questionnaire. With the development of E-Assessment, the character of the student's self-concept questionnaire towards physics "Paper" was transformed into E-Assessment with a programming language (coding). That is due to the existing questionnaires still use conventional and manual methods, generally. There are many weaknesses in the paper-based assess-

ment. In addition, manual assessment requires direct questionnaire distribution that require a long time. Besides, the process of inputting the data into a computer also requires more time and effort. The manual systems are slow, take a long time, boring, and troublesome for every individual (M. N. Abdullah & Kadhim, 2016). Therefore, an assessment based on information systems and technology is needed to overcome this problem. This E-assessment appears to facilitate manual assessment by stakeholders of students.

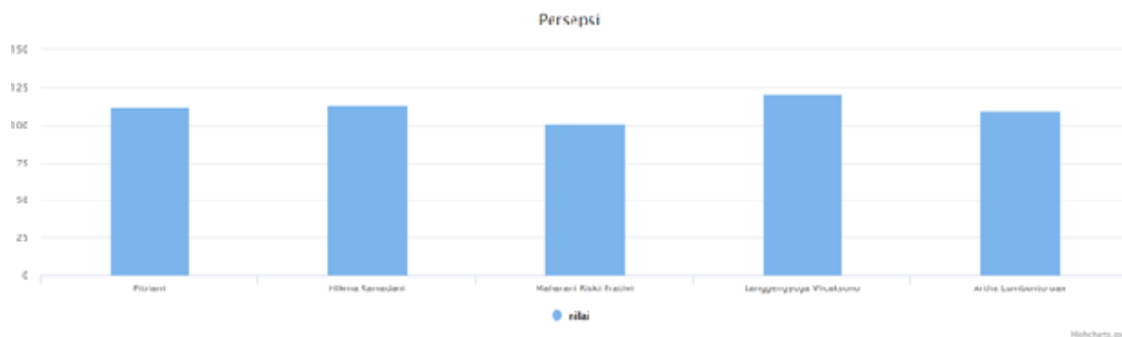


Fig. 5. Graph of Data E-Assessment Results

Fig. 5 shows the results of E-assessment students' self-concept in physics. The bar diagram is an implication of the self-concept of students who have followed the flow of students' self-concept E-assessment. The results of the data were stored in the SESKA database. The database was MySQL. (Welling et al., 2004) state that MySQL is a great tool for learning about databases in general due to the ease of installation and use, as well as the small hard drive and memory footprint. Data put into the concept of self E-Assessment characters were stored in the database. Thus, the respondent using a communication device can connect via the Internet with PHP and MySQL as the

server-side responsible for the user's request, processing, and storage or accessing the database (A. Abdullah, 2016). So, it can be concluded that the data we have input entered the SESKA system E-Assessment, displayed as in the picture above.

IV. Conclusion

Based on the description above, the application of developed SESKA for E-Assessment of students' self-concept towards physics was successful. E-The research on E-assessment of students' self-concept towards physics has been carried out to 450 high school students and 15

teachers. The results of the description of the SESKA system on self-concept e-assessment of physics for student respondents showed that the dominant character was a good self-concept character with a percentage of 47.1% (212 students). The responses from teachers who used the E-Assessment physics were analyzed and classified as a good response with a percentage of 66.7% (10 teachers from 15 teachers). This means that the teacher's response to E-Assessment of the student self-concept with the SESKA system is very good. Thus, the e-assessment is important to be used because it can ease the assessment process for teachers or students because it is in line with the industrial revolution 4.0.

Based on the results of this study, the application of SESKA system development for E-Assessment students' self-concept of physics subjects is recommended. Besides, it is also suggested that material development always be developed in accordance with changes in curriculum or technology. In addition, computer hardware and internet interconnection can be provided optimally so that it does not affect students psychologically in using this system.

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