PEOPLE: International Journal of Social Sciences
ISSN 2454-5899

Setiawan et al., 2018

Volume 3 Issue 3, pp. 1466-1482

Date of Publication: 7th February, 2018

DOI-https://dx.doi.org/10.20319/pijss.2018.33.14661482

This paper can be cited as: Setiawan, T, Koes H, S., & Wartono (2018). The Exploration of Using E-Scaffolding in Solving Physics Problem. PEOPLE: International Journal of Social Sciences, 3(3), 1466-1482.

THE EXPLORATION OF USING E-SCAFFOLDING IN SOLVING PHYSICS PROBLEM

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Abstract

The ability of problem solving is one of the important ability which is had by student. In physics, problem solving use to solve physics exercise not only low level exercise but also high level exercise. E-Scaffolding is the help which is given to the student as online which is integrated in the website. This research aims to see how far the effectivity E-Scaffolding which is given can help student to solve the physics exercise. The research samples are five students of class X science 3 senior high school 2 Malang 2016/2017. The taken technique is purposive sampling. The data is gotten from the student's exercise recording in the website then it is sent to the researcher's email. Data is analyzed qualitatively. In thus research, E-Scaffolding which is use is procedural scaffolding and strategy scaffolding. Procedural scaffolding and strategy scaffolding use question prompts but in strategy scaffolding adds choice of answer which is

chosen by student. The result of the research shows that E-Scaffolding can help to give the student's indication in solving the physics problem. The student who is correct on procedural scaffolding and strategy scaffolding tends be able to solve physics exercise correctly and otherwise. These both scaffoldings can be the alternative to the teachers in helping students to solve the physics question in medium level and high level.

Keywords

Problem Solving, E-Scaffolding, Procedural Scaffolding, Strategy Scaffolding

1. Introduction

Learning based technology is a *trend* rapidly grows in some developed and developing countries. USA, UK, Singapore, and Australia are examples of countries that use technology in learning. Indonesia uses technology in education is not only in learning but also in final *assessment*, it is often referred to as the national exam (UN). *Assessment* at the UN using the *Computer Based Test* (CBT). CBT has advantages and disadvantages, the following advantages:

- Saving for the cost sides because the government does not have to print out
- It can be used to test the honesty of students because the examination can only be accessed when the test is taking place
- The results of the students' work can be checked by the system in a short time
- It can facilitate the students because they do not need to fill manually in personal data which have a greater potential error.

As for the disadvantages of cbt are:

- The number of computers are inadequate
- Internet networks in indonesia that had not been evenly distributed
- The electricity in village areas which use the system outage have been turned off or no electricity at all
- Students who are unfamiliar with computers will difficult to use it.

However, in this case the ministry of education and culture gives the choices to the school. If the computer does not support, it can be the manual test. The purpose of UN implemented is to measure the students' competence nationally and it is considered as admission to the college level. In addition, the UN also measures the integrity index of students in a school. With the highest index of integrity, the next generation more honest, so that it can impact to the decline the number of corruption which is the biggest problem in Indonesia lately.

At the senior high school consists of several subjects which are tested in a group of natural sciences which consists of mathematics, physics, chemistry and biology, a group of social sciences which consists of a historical, economic, and geographic and language group consists of English and Indonesian language. From the subjects which are tested above, Physics is a difficult subject than the others. It is proven by the average value of Indonesian students in physics final exam in 2016 was still relatively low. There is 67.43 on a maximum score of 100. There are several causes of the low value of the physical examination are: 1) The physics is considered a difficult lesson, 2) physics consisted of difficult formula, 3) learning in school is not contextual, 4) students are not accustomed to assessment by using CBT in learning to make students feel difficulties. This is the focus of this research is to familiarize the student *assessment* through CBT and explore the students' answers on the website after being given E-scaffolding.

1.1 Scaffolding

E-scaffolding is the provision of assistance to students by online. The purpose is the students are able to solve a problem which they cannot accomplish if without the help (Belland, Walker, Kim, & Lefler, 2014). E-Scaffolding is relating to the Zone of Proximal Development (ZPD), a term used by Vygotsky as a zone between the actual development level (to solve the problem independently) and the level of potential development of students (to solve the problem by helping someone who more knowable it). When the problem in the ZPD of students, it means they can solve problem independently (for the actual construction) but it would be better if through the teachers' help or the other friends who understand with this problem (growth potential) (Santrock, 2011). Vice versa, if a problem outside the ZPD of students, scaffolding was given will not be beneficial to the students in solving problems. E-Scaffolding can help students in solving complex problems and stimulate students' thinking skills during the process of resolution of a problem (Belland, Walker, Kim, & Lefler, 2016). The research results in the fields of science, technology, engineering, and mathematics for senior high school students, college students, graduate students and adults show that computer based scaffolding has positive effect to learning outcome with g = 0,53 (Belland, Walker, Kim, & Lefler, 2014) and thinking higher level on problem-based learning (Kim, Belland, & Walker, 2017). Participants were given the scaffolding is better than participants who did not obtain the scaffolding. In addition, from 158 students which are given scaffolding by online from the course instructor is obtained that occurred a positive impact on students' attitudes and well emotional closeness with the course instructor or with the other course participants (Cho & Cho, 2013). Pedagogical scaffolding

facilitates teaching by making greater use of texts to foster cognitive development and encourage free expression and creativity (TAM, 2017).

Scaffolding which can be given to the students consisted of four, namely conceptual scaffolding, metacognitive scaffolding, procedural scaffolding and strategies scaffolding (Hannafin, 1999), (Cagiltay, 2006) and (Yu, Tsai, & Wui, 2013.). From the four scaffoldings above, the students can be given one of the collaboration both scaffoldings or even all of them. In this research the scaffolding which are given as online or it is called E-Scaffolding is taken from two types of scaffolding above namely; procedural scaffolding and strategy scaffolding. Procedural Scaffolding is used to utilize the resources and tools which available and then guide students in conducting experiments in laboratory (Yu, Tsai, & Wui, 2013.). Procedural scaffolding is usually the help related to what steps have to be passed by student and order them in solving problems. On learning of physics, procedural scaffolding is used to design the experiments conducted in the laboratory so that it is easier for students to achieve the concept of physics. In this research, procedural Scaffolding which are given to students as the step to solve the problem by answering prompt question which is provided on the website.

Strategy Scaffolding aims to help students in selection the information which is needed, to evaluate the available resource and to guide students in analyzing the problem (Hannafin, Land, & Oliver, 1999). Strategies Scaffolding consists of prompt questions, feedback, modeling experts, and instruction (Pol, Volman, & Beishuizen, 2010). In this research, E-Scaffolding which is given through the instructions on the prompt question. Students were asked to choose between two alternative answers which are correct. The answer is used to help in solving the problem. Scaffolding strategy can improve the engagement of students when they proceed with online self-learning (Wang & Yu, 2015).

1.2 Problem Solving

Problem solving is an important capability which must be possessed by students in 21 centuries. Problem-solving is used to solve the unusual problems. Problem-solving is as an important role in everyday life, especially on scientists and technicians (Hull, Kuo, Gupta & Elby, 2013). In addition, problem-solving is also an important element in all areas of science (Ibrahim & Rebello, 2012) and (Adeoye, 2010). In studying physics, problem solving is used to solve the problems either of the middle level and high level. Therefore, gives exercise and solves it the central issue of learning physics in the classroom, both high school and college Cleaner (Kim, & Pak, 2001). Problem-solving is one of the main objectives to be achieved in learning

physics in some countries but it is difficult to achieve by the students (Lorenzo, 2005). Physics is one of difficult and abstract learning so that students find it difficult to solve the problems of physics (Ornek, Robinson, & Haugan, 2008). In solving the problem of physics is required at least two aspects: quantitative and qualitative. Qualitative aspects are used to understand the current problems as the quantitative aspects as the solution of this problem (Gok, 2010), (Ibrahim & Rebello, 2012) and (Mason, & Singh, 2010). When completing a physics problem required a thorough understanding of the problem to be solved, while the ability of the students are diverse and so it needs the help of teachers when students are not able to solve problems independently. Such assistance is called *E-scaffolding* in research which is given help by online (E-Scaffolding).

2. Methodology

This research used a qualitative approach. A qualitative approach is an approach which is more focused approach in the ongoing process of research (Creswell, 1994). The kind of this research is the description research. Description research is the research that emphasizes the process, meaning and understanding which are then presented in the form of words and pictures (Creswell, 1994). The purpose of taking description research the researcher want to explore specifically about the students' answer when solving the physics problem.

2.1 Participant

The research samples are five students of class X science 3 senior high school 2 Malang 2016/2017. The taken technique is purposive sampling. The schools already use a computer either in learning or national exam. Besides the question of the word comes from the material that they have learned.

2.2 Data Collection

The data is derived from the students' recording in the website. That recording is sent to the researcher's email then. From that the researcher will see the ways of their work. There are some students who can answer with one step but there are also some students who have to pass the scaffolding first so that they can answer the questions correctly, there are the other students who have passed the scaffolding but they are still wrong to answer the questions. That students' recording is being qualitative date by the researcher.

2.3 Data Analysis

The date is analyzed then and seen how far the scaffolding which is given, procedural scaffolding and strategy scaffolding can help the students to solve the physic questions.

3. Discussion

3.1 The students' steps in solving kinematics in one-dimension problem

There are some steps which must be passed by student when they solve the straight motion kinematics problem in the website, they are:

3.1.1 One step with the assumption that the student is correct

The first step must be passed by student is login by the input of the name and number of student or class. After that it will appear the first question which must be finished by the students. The students will finish that question on the paper which has been prepared by the researcher. The result is input on the website. If it is wrong, the student may try it again. It is prepared three chances to repeat the input of the result. If on that three attempts the student is correct in the first attempt, the second attempt or the three attempts, the student may finish the next question. The student of this type doesn't need scaffolding to finish the problem. The step of solving for the next question is same as the first question.

3.1.2 Three steps with the assumption that the first scaffolding (procedural scaffolding) can help the students

The student of this type is passed three steps in solving the problem. The first step is login in the website by entering name and number or class. The first question will appear then the student solves it on paper which is prepared by the researcher. After that the student inputs the result on the column which is in the website complete with unit in physics. From the three chances which are given this student is wrong to input the result so that it must be passed the first scaffolding. The second step is to click the first help (first scaffolding) the type of the first scaffolding is procedural scaffolding, where the student is given direction on the way of solving problem. There are three columns which is filled by the students. The three columns have question which is known, what is asked, and how to solve it. The student of this type is assumed of correct so that they can directly to the next step. The third step is the students respell the question by keeping attention of the scaffolding which has been passed. On this step the student is attempted of correct when they input the answer so that the step which is passed is finished.

3.1.3 Four steps with assumption the student is helped on the second scaffolding (strategy scaffolding)

The student of this type is passed four steps to solve physics problem, the first step is the student login by input name and number or class, after that it will appear the question which must be finished by the students. That question which is finished on the paper which has been

given by the researcher then the student input the result in column. There are three chances to input the result if the student gave the wrong answer. The three chances are all wrong, the result by number, unit until the unsuitable unit between the question and the answer which is given. For example, the question is about the distance but the student input the answer by the unit of velocity. The second step is the student click the first help (procedural scaffolding). In this part the students keep input name and number or class. After that it will appear the first help with three columns which lead the students to solve the problem. The questions are what is known from the question, what is asked, and how to solve it. The student of this type answers with the wrong answer, one of them or all of them. So that the student is not helped yet by the first scaffolding. The next step is to click the second help (strategy scaffolding). After the students click it, they must login by entering name and number or class. The aims of login so that the activity of the student run well the step that they pass and how long the students pass that step. Strategy scaffolding is also three columns which include the questions which is known, what is asked, and how to solve it. Except question, the researcher prepares two answers of that question. That answer will be chosen by the students. The student of this type is assumed to choose the correct answer from the three questions. The fourth step the students finish the question which is answered wrong before. From the first scaffolding and the second scaffolding the student is helped to answer the questions so that the answer which input in the website finally to be correct.

3.2 Difficulty grade one student of Sciences 3 senior high school 2 Malang in solving the problem of straight motion kinematics

Straight motion kinematics problem which is given to the students consist of 3 chapter subs, they are uniform motion with 4 questions, non-uniform motion 2 questions and free fall motion with 2 questions. The student is asked to finish the question on paper then input the result in the website. Every student's answer will be sent to the researcher's email. So that it seems the student's score, the wrong and the duration of the giving the answers. There are the discussions of the student's difficulties according to the material chapter subs.

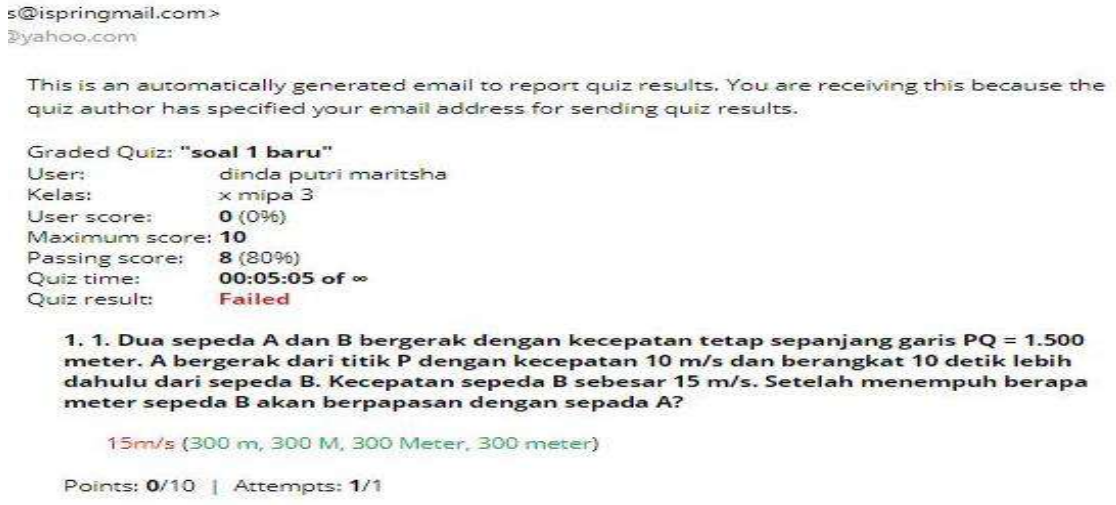
3.2.2 Uniform motion

On this chapter sub consists 4 questions which are given to the student but the researcher will discuss only two questions because two other questions have the same concept so that the student's difficulties tend the similar.

3.2.2.2 The question number 1:

Two bikes A and B are moving with constant velocity along the line PQ = 1.500 meters. Bike A move from point P with velocity is 10 meters/second and goes for 10 seconds ahead than bike B. Attended how bike meter B will pass a bicycle?

There are some students' difficulties in answering the question above, those are: the first difficulties are write the time component in the form of mathematic because the time of start of two bikes are different. Except that the time of starting of two bikes are unknown specifically as the physics question commonly. Many of the students which write the time which is needed bike A and bike B are 10 seconds because only those times are on the questions. Whereas those times are only to know the difference of the time starting between both of them, not the time of starting bike A or bike B. Except that there are students who write 10 second as the time of running bike B and confused to decide the time of running bike A because it is not mentioned on the question. The next difficulties are the students don't understand the concept of met between both of bikes. There are many students think that met is time of running which they need similar, in actually the same distances. Met is both of bikes will meet in the specific period after running in some meter distances. Another mistake is the students don't write unit in physics. The system says wrong to the students who don't input without unit. Because unit is very important in physics and gives physical meaning from physical quantity. Except that there are students who use unit of velocity for distance. Every student has the different of the time in finishing the question, there is student who answer fast but it's wrong, the student like that usually only predict the answer. and also the student who answer for a long time but it's also wrong, usually the student like that the understanding of their concept is wrong so that it needs time to understand which is asked to the question. Next the example of the students' answers which is sent to the researcher's email.



s@ispringmail.com>
@yahoo.com

This is an automatically generated email to report quiz results. You are receiving this because the quiz author has specified your email address for sending quiz results.

Graded Quiz: **"soal 1 baru"**
User: dinda putri maritsha
Kelas: x mipa 3
User score: **0** (0%)
Maximum score: **10**
Passing score: **8** (80%)
Quiz time: **00:05:05 of ∞**
Quiz result: **Failed**

1. 1. Dua sepeda A dan B bergerak dengan kecepatan tetap sepanjang garis PQ = 1.500 meter. A bergerak dari titik P dengan kecepatan 10 m/s dan berangkat 10 detik lebih dahulu dari sepeda B. Kecepatan sepeda B sebesar 15 m/s. Setelah menempuh berapa meter sepeda B akan berpapasan dengan sepada A?

15m/s (300 m, 300 M, 300 Meter, 300 meter)

Points: **0**/10 | Attempts: **1**/1

Figure 1: *The students are wrong to answer the question and use unit of velocity for distances*

3.2.2.3 The question number 2:

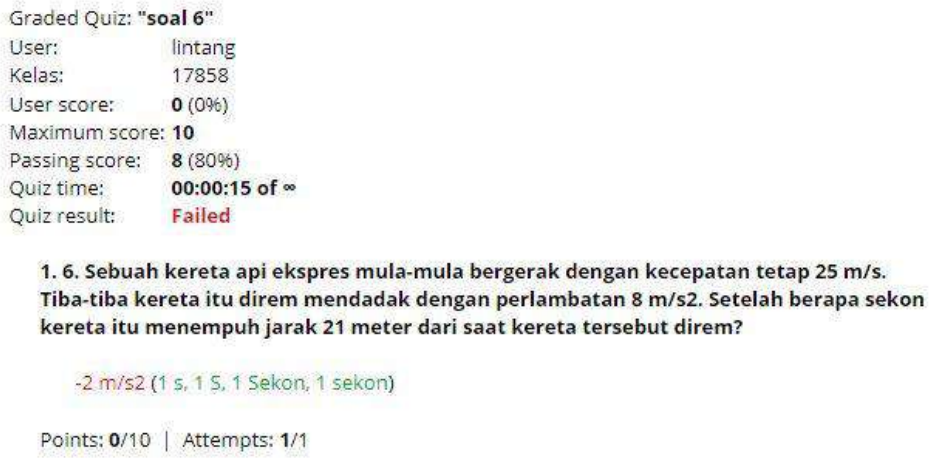
Two bikes A and B are moving with constant velocity along the line PQ = 1.500 meters. move from point P with velocity of 10 meters/second and leave for 10 seconds ahead of bike B. the velocity of bike B is 15 meters/second. After arrive in point Q, bike B running back to point P with constant acceleration. How many meters the distance bike B from point P while cross paths with A after returning from Q?

The first difficulties which is found to the student when answering the question number two is the difficulties of writing variable which is known especially the variable of time. actually in the question is unknown specifically the variable time to the both of the bikes, but it's given explanation that bike A leaves 10 seconds first. that information should be able to help write the time variable by separating distances time bike B is 't' so that the time of running bike A to be t+10. It can be contrary for example the time of running bike A is t so that the time of running bike B is t+10. The second difficulties is the student is difficult to make different between distances and movement. They think the distance on the question as the all distances which is run by bike B whereas that distance is the position both of them is meeting. after bike B running back from Q. the third difficulties is the student feel difficult to find when the bike B exactly arrives to the position of Q and the same time where is the position of bike A. therefore they don't know how far bike A and bike B separate when bike B running back from Q position.

3.2.3 Non-uniform motion

This chapter sub consists of three questions but the concept is similar so that the researcher discusses only one question. It is non-uniform motion question which is given to the student:

An express train firstly moves with the constant velocity 25 m/s. Suddenly that train was in sudden brakes with the $8m/s^2$ deceleration. how many seconds after that train across the distance 21 meters from the crossroads when the train brakes? From the question above there are some difficulties which is faced by students. The first difficulties are the student is error in operating mathematic equation. There are two correct answers 1 second and 5,25 second. From the correct answers which are given by student tend to input 1 second. The second difficulties is the student cannot decide first period because be fooled on the questions which say the train firstly moves with the speed 90 km/h so that it doesn't mention the first point of the train. The


Graded Quiz: **"soal 6"**
User: lintang
Kelas: 17858
User score: **0** (0%)
Maximum score: **10**
Passing score: **8** (80%)
Quiz time: **00:00:15 of ∞**
Quiz result: **Failed**

1. 6. Sebuah kereta api ekspres mula-mula bergerak dengan kecepatan tetap 25 m/s. Tiba-tiba kereta itu direm mendadak dengan perlambatan 8 m/s2. Setelah berapa sekon kereta itu menempuh jarak 21 meter dari saat kereta tersebut direm?

-2 m/s2 (1 s, 1 S, 1 Sekon, 1 sekon)

Points: **0**/10 | Attempts: **1**/1

fourth difficulties is the student error to input the unit of time. The unit of time which should be second is changed by deceleration unit (m/s^2). Next the result of the students, answer:

Figure 2: *The students are wrong to answer the question and use unit of deceleration for time*

3.2.3 Free fall motion

This chapter sub consists of two questions, the researcher will discuss both of them. next the first question: two balls is thrown at the same time. ball A is thrown upward with the velocity 20 m/s. Ball B is released from the top of 80 m vertical down with the first velocity which is similar. Which point both of balls meet?

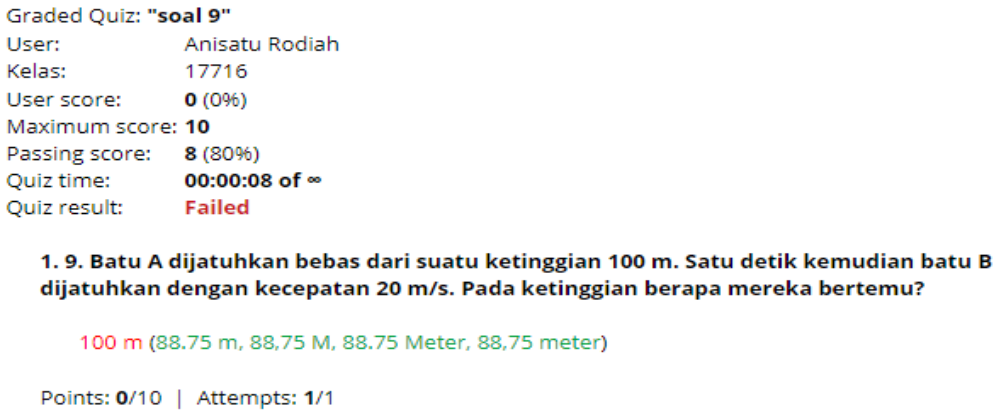
From the question above is found the difficulties which are faced by student. The first difficulties are the student writes ball speed A and ball speed B are had the same positive score whereas one of them has to have negative score. The second difficulties is the process of finishing the question is not correct where the student counts the high of each ball whereas the time doesn't know yet. It should be the student looks for the time of meeting both of the balls by writing height equation ball A same as height ball B when both of the balls meet. Then height when meeting can be looked for.

Next the second question on the free fall motion chapter sub:

Stone A is dropped from a height of 100 meters. One second later the stone B is dropped with acceleration of 20 m/s. Calculate where they met!

The difficulties which is faced by student in answering the question above: the first difficulties are the student can't make difference vertical motion with free fall motion. This question is the combination of these two moves. Free fall motion has first acceleration, but free fall motion doesn't have initial velocity. The student is confused why ball A doesn't have velocity whereas

it's the concept of free fall. The second difficulties the student can't write the time of variable because it's unknown specifically. The time is only known the differences of starting between both of the balls. Next the result of the students, answer:


Graded Quiz: **"soal 9"**
User: Anisatu Rodiah
Kelas: 17716
User score: **0** (0%)
Maximum score: **10**
Passing score: **8** (80%)
Quiz time: **00:00:08 of ∞**
Quiz result: **Failed**

1. 9. Batu A dijatuhkan bebas dari suatu ketinggian 100 m. Satu detik kemudian batu B dijatuhkan dengan kecepatan 20 m/s. Pada ketinggian berapa mereka bertemu?

100 m (88.75 m, 88,75 M, 88.75 Meter, 88,75 meter)

Points: **0**/10 | Attempts: **1**/1

Figure 3: *The students are wrong to answer the question*

4. E-Scaffolding is given

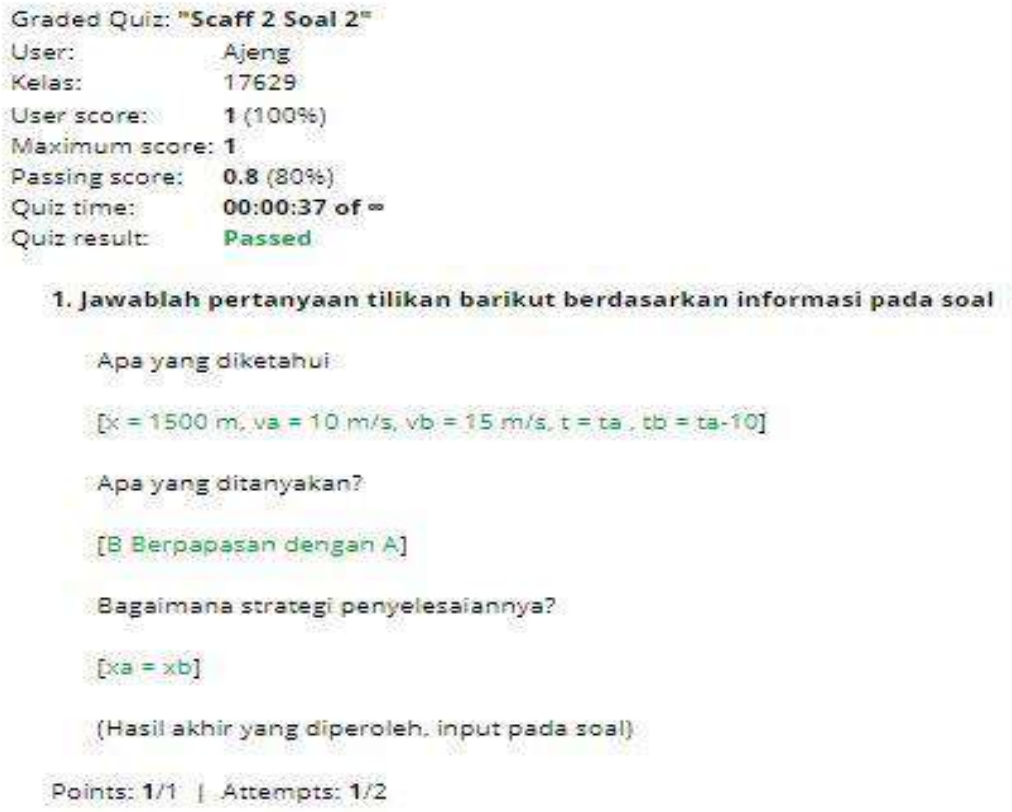
E-Scaffolding is the try to give help to the student so that it' easy in finishing the problem. The kind of help which is given is procedural scaffolding and strategy scaffolding. Next the discussion detail e-scaffolding which is given to the student according to the chapter sub:

4.1 E-Scaffolding on Uniform Motion

On the first scaffolding the student is asked to answer the question prompts. The question is what is known, what is asked, and how to solve it. The purpose of this scaffolding is to lead the student to solve the physics problem. The result is truly many of the students face difficulties to answer that question prompts. Almost the students give the wrong answer on column what is known and how to solve it. On the column of the student which is known is only answer commonly. The student is only write which is known it is variable distance and velocity without writing value of distance and velocity, but the time variable the student doesn't write at all, the researcher assume that the student complicates in outlines the time variable which is unknown specifically on the straight move question.

The second scaffolding the student is asked to answer the question prompts which is added with the answer choice. There are two answer choices which is one answer choice is correct and another answer choice is wrong. On this scaffolding 2 the student begins to be helped

because the almost students give the correct answer on the column which is known but there are student gives the wrong answer to the finishing strategy column. The student still has the wrong concept on the question where both bikes meet? They think that bikes meet so the time of distance is similar, whereas the distance is truly the same. Both bike start with the different time where bike A leave 10 seconds first from bike B. the student like that will be difficult in finishing physics because the concept is already wrong first but in this research is only a few students still wrong on column 3 scaffolding 2. Next the student's answer which is sent by students to the researcher's email:



Graded Quiz: **"Scaff 2 Soal 2"**
User: Ajeng
Kelas: 17629
User score: **1** (100%)
Maximum score: **1**
Passing score: **0.8** (80%)
Quiz time: **00:00:37 of ∞**
Quiz result: **Passed**

1. Jawablah pertanyaan tilikan barikut berdasarkan informasi pada soal

Apa yang diketahui

[x = 1500 m, va = 10 m/s, vb = 15 m/s, t = ta , tb = ta-10]

Apa yang ditanyakan?

[B Berpapasan dengan A]

Bagaimana strategi penyelesaiannya?

[xa = xb]

(Hasil akhir yang diperoleh, input pada soal)

Points: **1**/1 | Attempts: **1**/2

Figure 4: *The students are right in scaffolding 2*

4.2.2 E-Scaffolding on Non-Uniform Motion

On the first scaffolding, the student is wrong to input the first score of train speed (V_0). The students still use unit km/h whereas from the beginning the researcher reminds to input which is the similar unit and it's internationally of m/s. the researcher suppose the student still use unit km/h for the speed till the step of the counting so that the student will be difficult to find

the suitable answer. Except that the students are difficult to find the trains reference of point and the total distance which is passed. Whereas the reference of point of train is the moment of the train happen slowly. It's also the total distance, the student think the total distance of the train is 21 m it's added the passing distance before the train is broken. So that in first scaffolding mostly the students are wrong to fill the first column which contain the question of what is known. But in second column and the third column the students have already answered correctly.

In the second scaffolding the students begin understand that unit which is used for the speed must be changed first in the form of m/s so that all variables which is known have unit which is the similar. The other hand in the first column the students begin understand how to find reference of point and distance of that train. So that most of the students choose the correct answer in the first column of the second scaffolding. But in the second scaffolding the students are actually already correct from the first scaffolding so that the second scaffolding is also choose the correct answer.

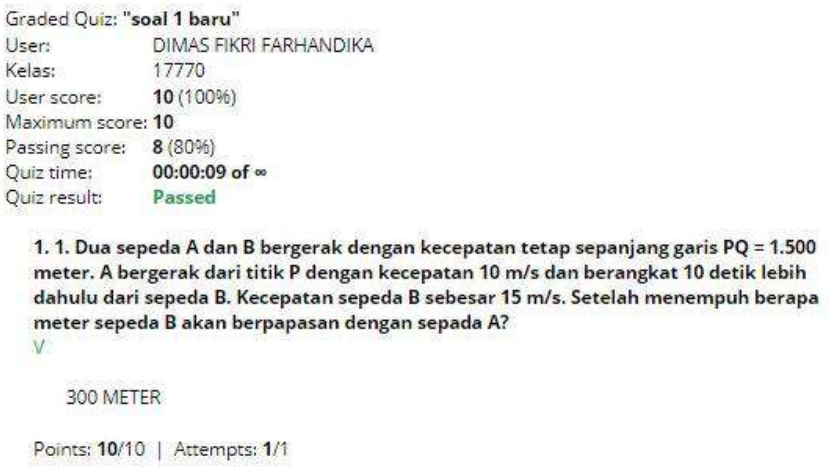
4.2.3 E-Scaffolding in the free fall motion

Even in the first exercise and the second in the main sub of free fall motion, the students do not pass the scaffolding 1. It shows that the student has already understood the concept and they do not need scaffolding anymore. It's very good for students when the students begin understand so the scaffolding which is given can be decrease. But in the second scaffolding there are students still wrong in the first column of the second scaffolding. The students is still difficult to outline the variable of time which is unknown specifically. The word of one second earlier is mostly interpreted by students as the time of falling stone subtract one second whereas it should be adding. It will be effect on the way of the next solving. But it's only a few students which is classified to this type. Most of the students is already helped in the second scaffolding.

5. The Result of the E-Scaffolding

From the students' work shows the students can solve the physics problem after passing the step of scaffolding 1 and scaffolding 2. The time of solving is not so long if we compare with the first step before they pass scaffolding process. But this thing doesn't happen to the all students, there are students which give the wrong answer. These students who are wrong usually in the step of scaffolding 1 or scaffolding 2 are still wrong so that the scaffolding which is given can't help them to solve the physics problem. But almost the students are helped by this scaffolding. The first help can lead the student to solve the physics problem by asking the

students to answer the question prompts. After passing the scaffolding, one student already has description how to solve the question. But students' concept is wrong, so the scaffolding 1 can't lead it so that it needs help more. If the student's concept is already correct so the first scaffolding is already enough. Almost the students who are researched can't pass only one scaffolding but both of them and there are students who are not helped even a few students. The second scaffolding is two option choices in every column. One of them is the correct answer. Almost the student is fooled on the questions which are not mentioned the specific time variable so that almost wrong in the first column that answer the question which is known. But not many students like those. Almost the students answer correctly on those three columns. The students like those answer correctly the questions which are given after remedial. The question prompts help student in drawing a conclusion from a experiment because with understanding the question prompts, student will be directed at the important things related to problem solving (Ge, Planas, & Er, 2010). Other studies revealed that procedural scaffolding may improve the ability of student in answering in quick succession scaffolding may improve the ability of student in answering in quick succession. Research conducted on 78 elementary school


Graded Quiz: **"soal 1 baru"**
User: DIMAS FIKRI FARHANDIKA
Kelas: 17770
User score: **10** (100%)
Maximum score: **10**
Passing score: **8** (80%)
Quiz time: **00:00:09 of ∞**
Quiz result: **Passed**

1. 1. Dua sepeda A dan B bergerak dengan kecepatan tetap sepanjang garis PQ = 1.500 meter. A bergerak dari titik P dengan kecepatan 10 m/s dan berangkat 10 detik lebih dahulu dari sepeda B. Kecepatan sepeda B sebesar 15 m/s. Setelah menempuh berapa meter sepeda B akan berpapasan dengan sepada A?
V

300 METER

Points: **10**/10 | Attempts: **1**/1

students in Taiwan (Yu, Tsai, & Wui, 2013). Next the result of the students' work after passing the first scaffolding and the second scaffolding:

Figure 5: *The students are right to answer the question*

6. Conclusion

From the discussion above, it can be concluded that the first and the second scaffolding can help the students in solving the physics problem. Scaffolding 1 gives the students' direction

to solve the problem but scaffolding 2 gives the alternative way in solving it which can be chosen by themselves. These both scaffoldings can be the alternative to the teachers in helping the students to solve the physic questions in medium level and high level. But these both scaffoldings still have weakness in implementation; it takes much time because every scaffolding must input the student's name, the process of solving the problems can't be known by the researcher because the students are only input the ending result of their work.

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