PE - 12

STUDENT'S SELF-CONFIDENCE TO UNDERSTANDING THE PHYSICS CONCEPTS THROUGH COMPUTER SIMULATION ANIMATION

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Abstract

The use of computer simulated animation as learning media in Physics has gained popularity. This research aims to test the student's self-confidence to understanding and the student's belief in the concepts of Physics presented by computer simulated animation. The study was conducted by means of in-depth interviews to one student on the physics concepts that were being studied through a computer simulated animation. The interview results show that the student does not believe in the accuracy of concepts presented by the animation. The student still doubt the accuracy of the physic concepts that have already understood and the concepts presented thorugh the animation after answering series of questions testing the accuracy of ith concepts. This research recommendation is that there should be teachers' guidance to help students learning through computer simulated animation to understand physic concepts.

***Keywords**: self-confidence, belief, accuracy, understanding, learning media, physics animation*

Introduction

Computer simulated animations have been very popular in applied physics learning in the classroom. A variety of parallel seminars held at the national conferences, for example, shows that computer simulated animation is a popular research. Some schools also allocate some money to buy a package of computer simulated animation as their learning media.

Indeed, computer simulated animation have many advantages in overcoming the flaw in the concept presentation or subject learning, especially for physics. For example, the study of microscopic and macroscopic, study of rapid and slow movements, and study of the dangerous processes. The cases can be well presented by computer simulated animation.

Although computer simulated animation have many advantages as learning media, especially in physics subject, there should be a caution in its use. Man-made computer simulated animation are created by varying true or false techniques and formulas. Kristiyanto (2008) has found that some computer simulated animations, both commercial and non commercial ones, present some inaccurate physics concepts. If those animations, which are used in teaching and learning process, present wrong physics concepts, what will happen to the students (the users)? Will students believe the accuracy of the concepts presented through the computer simulated animation?

Research Objectives

This research aims to test the student's self-confidence to understanding and the student's belief in the concepts of Physics presented by computer simulated animation.

Theory

Animation is the result of the processing of moving images. The use of computer assisted animations in teaching learning process make students feel more interested and happy (Hardiati et al, 2004). This is because complex physical events which are not represented by analogies can be explained more easily through computer simulated animation (Kristiyanto, 2004).

According to Paul Suparno (2007), learning through animation media can provide an opportunity for students to collect and analyze data as well draw conclusions. "This kind of learning process shows that computer simulation based learning is a constructivist learning as students build their knowledge by themselves."

One advantage of learning using computer simulated animation is that the learning can be done by students at any time and a specific part can be repeated to be studied (Suparno, 2007). Therefore, students may repeat the part themselves so that they will learn and master the material more quickly. This enables them to quickly understand the concepts being learned.

Ed van den Berg (1991) states that, "the key to the concept improvement is INTERACTION with students. Without interaction, the teacher will not know the student's misconceptions." Interaction is one of the keys of communication. This is supported by Mulyani Sumantri and Johar Permana (2001) which states that:

> The process of learning is basically a communication process. In the process, messages are not always successfully conveyed due to limitations in the communication. Because learning is a communication process, the contents and methods used in this communication should be clear and meaningful as to avoid any miscommunication. To reduce, minimize, or eliminate those limitations, an intermediary called learning media can be used.

Using animations as learning media is one strategy in implanting concepts to students. Good animated instructional media, according to Kristiyanto (2008), should not have contents which deviate from the concepts' truth. "To get physics animation that does not deviate from correct physic concept, the animation should be made based on correct physic concepts."

Method

This is a qualitative study employing in-depth interviews with one student about the physics concepts that are being studied through a computer simulated animation. The results of the interview were then examined for their understanding based on the answers and questions related to the topic of research subjects being discussed.

Results and Discussion

The topic of the lessons learned by the research subject is the oscillation concept of a pendulum motion. The subject was asked to learn the topic through an animated show

independently. Before the subject started playing or using animation, the subject answered some questions and did some tasks about motion and graphs that describe the motion of a pendulum attached to a string after being distorted.

Here are the excerpts of questions and answers between the subject and the researcher which demonstrated the stability or instability in the subject's belief in the concept accuracy presented by the animation. The interview recorded between the researcher and the subject on this topic started after the subject played the animation, starting from P018 (the 18th sentence of the researcher) and S020 (the 20th sentence of the research subject):

Subject clicks the arrow key to push the pendulum ... and the animation starts.
P018: Was the track the same as the one you described?
S020: Yes sir
P019: The graph, was the position to the time the same as the one you described? (pointing to the graph on the subject's worksheet)
S021: Yes sir, the same
P020: Are you sure? (pointing to the graph on the subject's worksheet)
S022: Yes (nodding his head)
P021: So, is that correct? (pointing to the graph on the monitor showing the animation)
S023: Yes
P022: Are you sure that one is correct?
S024: Sure, Sir (while nodding of head)
P023: What's your reason?
S025: because for each time it is ... that's made its equilibrium point ... (pointing to the pendulum positions)

The boldfaced recording transcript line on the graph of position versus time of pendulum oscillation movement has already shown that the subject believed that what the animation displayed was the same as the graphs the subject drew.

Below are some further questions:

P024: ok ... now the graph v(t)?
S026: different
P025: if they are different ... which one is incorrect?
S027: e ... this ... e ... v(t) is same ? (looking confused)
P026: v(t) this is the incorrect one? (pointing to graph on the subject's worksheet) or this one? (pointing to the graph on the monitor) or both are incorrect?
S028: (thinking for a moment while playing a pen in his mouth) ... it's correct that (pointing to the graph on the monitor)
P027: why?
S029: it gradually increases its speed ... (being silent again and looks confused)

The excerpts above discuss the graph of velocity toward time of the motion of the pendulum oscillation. The results of interview show the research subject's graph is not the same as the graph shown by the animated show. This makes the subject confused to choose which one is right. It appears that after watching the animation (although different from the answer), the subject is not immediately sure that the animated show is correct. The subject is still hesitant and confused (shown by the boldfaced lines) while deciding the accuracy of the animation

show.

Below are some further questions:

P028: Here (pointing to the moving pendulum) ... what do you think ... Is the speed constant in every movement?
S030: No
P029: If not, Where is the greatest speed?
S031: when it starts to go down ...
P030: Which one? ... mark there (pointing to the animation)
S032: here (pointing and marking the position of the pendulum in the largest deviation/ turning point on the right)
P031: the greatest speed?
S033: here (pointing to the same spot)
P032: the greatest? here? At a turning point? (pointing to the spot marked earlier)
S034: yes ... at the turning point
P033: at the turning point (while pointing, the pendulum follows the movement) ... if this thing goes up ... this object gradually gets faster or slower?
S035: slower
P034: see the animation ... if it goes up, does it get faster or slower?
S036: slower
P035: yes ... means more quickly . . . . Is it possible at this turning point it has a maximum speed?
S037: No
P036: So which part has the maximum speed?
S038: Here, sir (pointing to and marking the position of the pendulum at equilibrium)
P037: If the animation looks like that... the fastest?
S039: Yes sir ...
P038: ok ... the point here . . . . what is the deviation? (pointing to the mark at the equilibrium point)
S040: deviation ...
P039: Maximum or minimum deviation?
S041: Maximum deviation?
P040: This one.. (pointing to the mark at the equilibrium point)
S042: at the midpoint?
P041: yes ... it's not yet distorted, right?
S043: yes ... means zero ... the maximum deviation is here (pointing to the mark on the maximum deviation)
P042: then these points ... what do they mean? (pointing to point (0,0) in the graph s(t) on the monitor)
S044: They indicate the location of the pendulum ... here (pointing to the pendulum at the equilibrium point)
P043: What is the speed at zero deviation?
S045: the highest
P044: well ... then is this picture correct or incorret? (pointing to the graph of s(t) and v(t) on the monitor) ... in this picture, the velocity is the highest.
S046: true
P045: About your picture? At the equilibrium point, it has zero velocity instead (pointing to the graph of s(t) and v(t) on the worksheet)
S047: yes

P046: so, which one is correct?
S048: this is correct (pointing to the monitor)

From the question and answer above, it appears that after repeatedly learning that the animation show is correct and reasonable, the subject is finally sure (in boldfaced text) that the animated show is true.

From the results of the interview, there are interesting findings to be discussed about the subject's disbelief in the accuracy of the animated show used in learning, which makes the subject unsure in understanding the concepts. According to Paul Suparno (2007), "... learning with computer simulations is a constructivist learning because students build their knowledge by themselves" very closely with these findings. The subject of this study built his knowledge from the information presented by the animated show which is input transmitted as neurvous perception serving to match the information with the one stored in his memory. The perceptions become meaningful information by getting rid of the less important or considered wrong information and focusing on materials that are considered important or true (Schunk, 2012). From these findings, there are still some reasonable doubts within the subject in choosing and eliminating both correct and incorrect information. Animation show does not automatically make the subject directly believe that the information is correct.

The other findings are closely related to Ed van den Berg's statement (1991) which states that, "the key to the improvement conception is the interaction with students. Without interaction the teacher will not know the students misconceptions." Interaction is one of the communication keys. The interview results show that after the interaction and communication of questions and answers between the researcher (teacher) and the subject (student) was establihshed, the subject was able to consciously determine which information is correct and which one is not. With these interactions, the subject began to believe that the animaton show is correct and needs to be learned.

Conclusions and Recommendations

From the results of this study, it can be concluded that that the computer simulated animation do not convince students in the accuracy of the physic concepts. Students still doubt the physics concepts that they have understood and the concepts presented through animation impressions after answering questions testing the accuracy of both concepts.

This research recommendation is that there should be teachers' guidance to help students learning through computer simulated animation to understand physic concepts.

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