Virtual simulation instructional training for students' drop out of mathematical science digital entrepreneurs

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Virtual simulation instructional training for students' drop out of mathematical science digital entrepreneurs

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Abstract. This research aims to provide assistance and Virtual Simulation Instructional (VSI) training for drop out as a pilot for digital mathematical entrepreneurship in the industrial revolution 4.0 era so that graduates have ICT skills and are ready to face disruption. The subject of the research was the centre of learning activities of Insan Madani School and Dewi Sartika School in Baros, Serang, Banten, Indonesia. The research method used is a combination of informative methods and interactive demonstrations. The results showed that students' abilities in terms of ICT with an increasing model of understanding in optimal model of 75.56%, non-creative model of 7.78%, theoretical model of 4.44 practical model of 4.44%, memorizing model of 10 %, and no model of 0% and were able to produce VSI with quality that was suitable for sale. The VSI recommendations are a strategic alternative in the development of small digital scale industry businesses and their use for digital mathematics entrepreneurship pilot learning.

1. Introduction

In various regions in our country, the number of labour forces not absorbed in the formal sector is very large. The most are in villages where the employment is very limited. It is difficult to work in the non-formal sector because on average they do not have specific skills. Only from time to time do they get odd jobs, for example as construction workers, most of them are unemployed. Prolonged unemployment will certainly trigger negative excesses, ranging from juvenile delinquency to those leading to criminal acts such as theft, logging, muggings, pickpocketing and other criminal acts that are directed at meeting the needs and lifestyle of teenagers [1].

Facing the 4.0 industrial revolution is certainly not easy. Some things need to be prepared, for example by changing the learning method in the world of education that exists today. One of them is virtual learning by the demands of the 21st century, namely ICT literacy where the empowerment of virtual learning has an impact on the economy, especially the shearing caused by students who drop out.

Community empowerment efforts, especially for the youth have been carried out by the government through relevant agencies through relevant programs, but still, the impact is not too significant in reducing the number of unemployed [2]. Community empowerment efforts are not only the responsibility of the government but are the responsibility of all components of the nation, including the Universitas Sultan Ageng Tirtayasa. We are now living in a digital era that offers various facilities to start building a business because being an entrepreneur is both an opportunity and a challenge. To start a business requires a physical selling place in the form of a shop or shophouse. While now, through digital applications, all can make buy and sell transactions without having to have a physical selling place [3].

The business of buying and selling virtual simulations or animations is a promising business opportunity in the present and future for school drop out, how not currently internet use and e-learning have dominated shopping activities and activities or even taught to teach in the community. Also, the fourth generation industrial revolution is marked by the emergence of supercomputers, smart robots, driverless vehicles, genetic editing and the development of technology that allows humans to virtual activities. Digital skills are also not too complicated and easily transmitted even to young people who did not even get a high school education. To open this business also does not require large capital [4].

Some researchers have published the results of their investigations related to the use of virtual simulations in learning. First, the use of simulation media on climate change material can facilitate the transformation in the construction of conception in the minds of students [5]. Learning with simulation media can reduce the number of students who misconceptions on optical material [6]. Physics learning using electrical magnetic simulation media can change students' unscientific conception towards a scientific conception [7]. The use of light simulation media and colour dispersion is effective in helping students to construct their conceptions so that the ability to understand can be improved [8]. The use of virtual simulation media on the concept of light waves can improve the understanding of wave concepts and the process of conceptual change of students towards a scientific conception [9].

If in the past the lecture learning was excellent, now it has shifted to online or virtual learning. This shift is because virtual simulation has the potential to improve the understanding of concepts and learning experiences more effectively. Students can respond to virtual and will get feedback in the form of programmed instruction [10]. There are several benefits of virtual labs, including: (1) not requiring space, equipment and lab materials, (2) replacing practical equipment that is expensive or not owned, (3) providing reducing learning time, (4) developing the potential of practicum into independent and flexible learning more efficiently and economically, (5) can be accessed anywhere and anytime, (6) interactive, students can do practicum as done on physical with interesting visuals. Also, the use of virtual labs can improve critical thinking, creative and problem-solving skills [11] and can develop ICT literacy without neglecting knowledge of laboratories [12].

The job opportunity and business opportunity that is quite hopeful, if school drop out has digital skills to make simulations or animations for education. Every day in a community environment there will be only those who need simulation services, and it is possible to support entrepreneurs in the digital field. If the virtual simulation produced is effective in its use at a relatively low price, it will be a special attraction for the community. People will tend to prefer to use simulation creation services from out of school youths rather than buying simulations for learning that costs more.

However, to have the skills to develop Virtual Simulation for learning (instructional), of course, school dropout must be carefully trained. Skills training can be carried out by those who have prior knowledge and skills. It is believed that the transmission of Virtual Simulation skills to out of school youth in addition to overcoming the problem of the amount of unemployment and its excesses, will also be able to overcome the problem of the need for cheap but high-quality Virtual Simulation for the community.

2. Virtual Simulation Instructional (VSI)

Computer simulation is a computer program that contains a particular system model and that can be executed, after the execution of the output can be analysed [13]. Computer simulations usually model abstract concepts and involve mathematical models. Computer simulations have become an important part of mathematical modelling and natural systems, social systems, and technological systems. Simulation modelling is usually done with the aim of modelling visuals that become more real and realistic. The benefits of simulation are to make the abstract system into a concrete system, or a graphical representation of an abstract system.

Virtual simulations are also used in the aviation world to test a pilot before flying a plane, or the driver to get a driving licence must be tested using a simulation. Because the simulation has a broad meaning, so the virtual simulation area in this study is modelling of an abstract object that becomes more real. The microscopic properties are defined as properties that are not observed by the eye (abstract) and occur in very small (micro) material. Microscopic phenomena are events of an unobserved existence by the eye (abstract) and occur in very small (micro) material. A microscopic example in

physics is the size of particles that make up water on a micro scale and the movement of water particles that cannot be observed by the sense of sight [10, 12].

The development of simulation in learning must be done carefully so that the media produced is by the needs in learning. The three are some basic steps in creating simulation media, namely:
(1) Determine the system and describe theories that determine changes in the system.
(2) Determine the free (independent) parameters that will be changed by the user.
(3) Determine the dependent variables be presented to the user in response to the parameters entered.
(4) Develop mathematical approaches and algorithms to evaluate and present change.
(5) Determine the method in the interface if you want to exit the simulation or continue the simulation.
(5) Test, get feedback, and improve.

3. Digital Entrepreneurs

The unique context in which entrepreneurs accrue and activate social capital in transaction networks has not been considered in either entrepreneurship literature. However, what is known is that the online context is quite distinct from the offline context; these differences persist even if individuals participate in both online and offline networks [14]. How people build, maintain, and use social networks online is substantively different than with face-to-face interactions: when using time and space are compressed, interaction speed is accelerated, and people are increasingly accessible [15]. Also, online relationships are thought to be distinct from offline relationships because of the unique relational affordances SNSs offer [16]. CMC literature suggests that the online context represents an omnibus social context change, where the online context is so different that offline research findings may not apply.

Digital entrepreneur is expanded to support corporate services and consumer involvement. The key to successful digital marketing: (1) must pay attention to terms in AIDA (Awareness, Interest, Desire, and Action). (2) A market is a place of two-way communication. To obtain this communication, the brand must do positioning first, can be through various media (forums, blogs, etc.), and the most effective is through social networks. Rules in digital marketing: (1) Target one segment and create a virtual community. (2) Extending the role of brands in portfolios globally. (3) Use creative prices. (4) Prioritizing design for consumers. (5) Use adaptive experimentation. (6) Rediscover marketing research and modelling as knowledge creation. Electronic commerce: electronic commerce or e-commerce is the distribution, purchase, sale, marketing of goods and services through electronic systems such as the internet or television, www, or other computer networks. E-commerce can involve electronic fund transfers, electronic data exchanges, automated inventory management systems, and automated data collection systems. The information technology industry sees e-commerce activities as applications and applications of e-business (e-business) related to commercial transactions, such as: electronic transfer of funds, SCM (supply chain management), electronic marketing (e-marketing), or online marketing (online marketing), online transaction processing, electronic data interchange / EDI, etc. E-commerce is part of e-business, where the scope of e-business is broader, not just commerce but also includes collaborating business partners, customer service, job openings. [14].

4. Method

The method used for the introduction of work principles and important parts of virtual simulations for learning is a blend of informative and interactive demonstrations. The informative method is used to provide a brief description of the working principle of virtual simulations and their main parts. The demonstration method is used to demonstrate modelling how virtual simulations can be applied to learning [17]. For this activity, participants will be invited from youth representatives from each village covered in the Taktakan District of Serang City and Baros District, Serang City. The objectives of the problems faced by partners are:

(1) Get training to develop skills to create virtual simulations for learning so that the Centre of learning graduates have 21st-century skills and are ready to face the industrial revolution era 4.0.
(2) Get training and assistance in the production of virtual simulation products for learning
(3) Able to design and procure a virtual simulation system for learning
(4) Get training and assistance in production management, marketing strategies and economic analysis
(5) Get training on virtual simulation industry.

Table 1. Solving problems, processes, methods and results

Problems	Processes and Methods	Results
1. The applied learning is less optimal 2. Graduates from the Centre of learning are still found by graduates with low quality 3. Diversification of Centre of learning graduates' limited skills and not yet ready to enter the digital era 4. Limited student skills are only basic concepts 5. Centre of learning management has not been implemented as a good person and graduates are just looking for a diploma correctly.	1. Mixing training because it is not equipped with computer skills and simulation making 2. Training for e-learning or virtual production assistance 3. An instructional virtual simulation design (VSI) 4. Management training and mentoring 5. Training on VSI-based digital industries	1. Centre of learning Insan Madani in Taktakan District Serang City and Learning Centre Dewi Sartika in Baros, Serang City gets an ICT skills formula 2. Able to produce VSI with high quality and selling 3. Graduates have digital skills 4. Well-managed production management

Other things that can be done to get an understanding of the business, as well as increase the capabilities they already have through (1) training designs virtual simulations for learning in other forms (2) mentoring as a virtual simulation industry for independent learning Work procedures to support the realization of the methods offered are:

(1) Conducted a meeting with the centre of learning Insan Madani partners in Taktakan District Serang City and Learning Centre Dewi Sartika in Baros, Serang City.
(2) Explain the purpose and objectives of the meeting
(3) Explain opportunities that are economically valuable with the results of production using virtual simulation
(4) Experiment with the appropriate system
(5) Conduct virtual simulation production training
(6) Conduct mentoring virtual simulation production
(7) Designing with various shape
(8) Conduct training on small-scale digital industry

5. Results and Discussion

5.1. Results need analysis phase

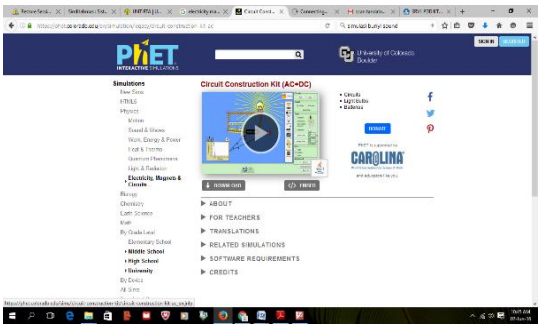
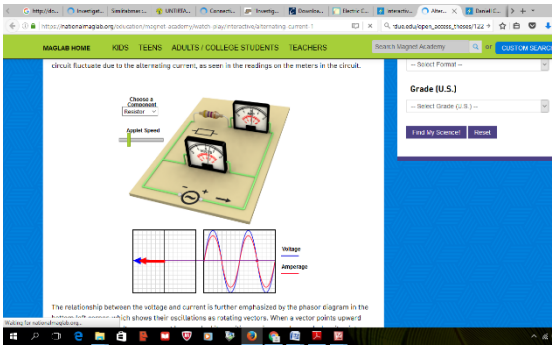
The preparation phase is carried out by analysing the simulation needs a study that will be developed. The results of this need study are an in-depth exploration phase of the issues being studied. This activity aims to get an overview of the problems and reliable solutions to overcome these problems. The needs study phase consists of literature studies and analysis of the availability of virtual simulations of microscopic phenomena on electrical material. Literature study was conducted to determine the problem to be studied, researchers conducted a study of literature studies on research reports relating to the understanding of concepts experienced by students on electrical material, concept construction learning models, virtual simulations, and electrical material characteristics.

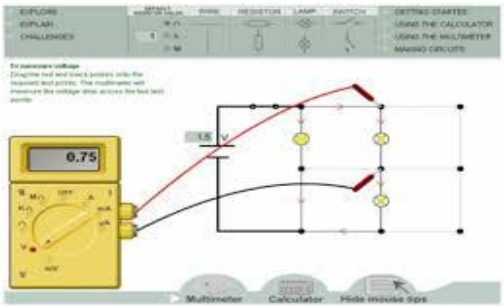
The results of the analysis of the research report on concept understanding and misunderstanding of electrical material found the findings that many students did not fully comprehend and comprehend some concepts. Based on the findings of the study, the researcher determined the electrical material to be remediated through the development of virtual simulation media for construction-oriented physics learning the concept of electrical material is divided into 6 (six) concepts, namely: Ohm's Law, the electrical circuit is closed, electricity, dissipation of electrical power, parallel circuit, open circuit.

Based on the results of a preliminary study of the level of understanding that has been done as in Table 3, it can be concluded that most students understand the concept of physics as a whole. Efforts

are needed to construct a scientific conception using SV-FM using Macromedia Flash 8.0 software. Analysis of the availability of simulation media on dynamic electrical material, shown in Table 3.

Table 2. Analysis of availability of electrical material simulation media

Electrical Simulation that has been developed	Source	Information
	https://phet.colorado.edu/en/simulation/legacy/circuit-construction-kit-ac	Some of these simulations have shown the physical process of electricity microscopically, but have not been able to show the effect of the number of currents with strong currents.
	http://www.physicsclassroom.com/Physics-Interactives/Electric-Circuits	This simulation shows the physical process of electrical electric circuits but has weaknesses which cannot show the movement of electrons in the cable.
	http://www.bbc.co.uk/schools/scienceclips/ages/6_7/electricity.shtml	The simulation only shows how the series works so that it has not displayed the physical, physical process microscopic
	https://nationalmaglab.org/education/magnet-academy/watch-play/interactive/alternating-current-1	This simulation has the advantages of being portable because every part of the electrical component can be adjusted according to need, but having a deficiency cannot show the process of electric current movement

Electrical Simulation that has been developed	Source	Information
	http://www.leeds.ac.uk/educol/documents/00003702.htm	This simulation does not display the physical process of electricity microscopically; it has not facilitated model manipulation and extension in learning (extension)

5.2. Model of understanding

The information obtained from the average understanding model from high to low is successively after the application of the construction concept of physics conception by using a virtual simulation of microscopic phenomena on the concept of electricity. Figure 1 shows the average percentage of understanding models of electrical material.

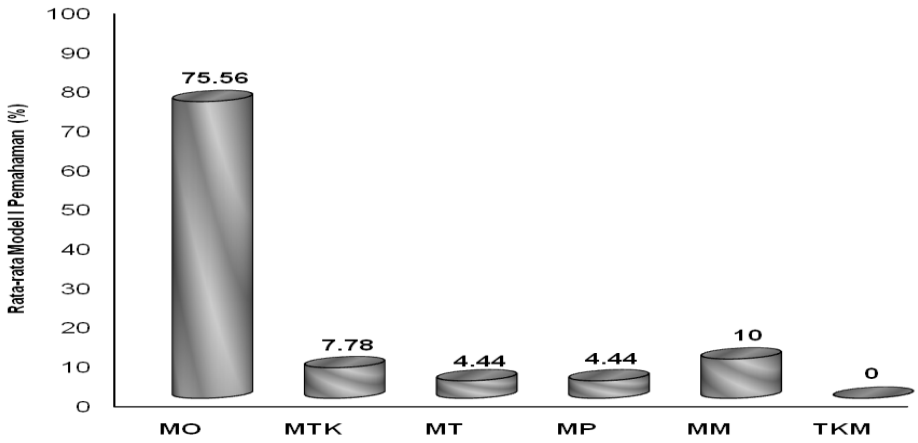


Figure 1. Percentage of an average understanding model of electrical material

Based on Figure 1, we obtained information in a row the average understanding model from high to low after the application of the construction concept of physics conception by using a virtual simulation of microscopic phenomena on the concept of electricity. The highest understanding model is the Optimal Model (MO) of 75.56%, Non-Creative Model (MTK) of 7.78%, Theoretical Model (MT) of 4.44 Practical Model (MP) of 4.44%, memorising the Model of (MM) 10%, and No Model (TKM) of 0%.

5.3. Results of training

The VSI training two times, on 8 August 2018 and August 18, 2018, the centre of learning activities of Insan Madani School and Dewi Sartika School in Baros, Serang, Banten Province, Indonesia, as shown in Figure 2.

Figure 2. The VSI Training in Insan Madani School and Dewi Sartika School

6. Conclusion

The virtual simulation instructional (VSI) recommendations are a strategic alternative in the development of small digital scale industry businesses and their use for digital mathematics entrepreneurship pilot learning. Based on the results of research of the conclusions of this research are the results presented here show that students training effectively working with VSI significantly for model of understanding. Our findings strongly support that VSI can be used as an alternative instructional tool, to help students develop an understanding of digital entrepreneurship in 4.0 industry.

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