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Test of VAK Learning Style on Student Learning Outcomes Using Single-Test Reliability

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Abstract. This study aims to examine the effect of the VAK Learning Style (Visual, Auditory, and Kinesthetic) on learning Basic Physics Techniques using a digital simulation model using the Single-Test Reliability application on the learning outcomes of cadets at the Aviation Polytechnic of Surabaya. The research method is descriptive quantitative with a quasi-experimental design, namely research that is intended to determine whether there is a consequence of something imposed on the subject under investigation. The participants in this study cadets of the Airport Electrical Engineering Study Program at the Aviation Polytechnic of Surabaya. The data generated is the tendency of cadets' learning styles in doing exercises and final tests using the Single-Test Reliability application on learning outcomes. The data obtained shows that cadets who have a tendency for visual learning styles get higher exercise and final test scores than cadets with auditory and kinestatic learning styles. The use of the Single-Test Reliability application increased learning outcomes from the initial class average of 64.2 become 81, with the highest average score obtained by cadets with visual learning styles.

Keywords. VAK Learning Style, Single-Test Reliability, cadets

Introduction

In life and daily activities, it will be difficult if you have useful knowledge, therefore knowledge is very important, because it can make life more meaningful. A branch of science to find out the regularities of nature to master knowledge, both facts, concepts, principles, the discovery process as well as a scientific attitude, and physics is one of the Natural Sciences (Gunawan, 2015). Nowadays, problem solving is very important, especially in physics. Problem solving skills are a person's basic ability to solve a problem that involves critical, logistical, and systematic thinking. Memnun, et al (2012) also suggested that enabling individuals to acquire problem-solving skills and train individuals who can overcome problems encountered during their real life, is the main goal and main goal of education today. This shows that problem solving has a very important role in education. In the realm of science, one of the competencies expected to be achieved in the educational process is the ability to solve problems. In addition, one of the goals of education is to improve critical thinking, logistical responses, and develop problem solving abilities (Dogru, 2008). It is not an easy thing to achieve good problem solving learning skills in students, therefore the application of learning methods using digital simulations is one of the right choices in learning that requires repeated practice. Where we know that all information given repeatedly can increase information on memory in the brain, in

accordance with information theory. If the information obtained has settled, then when the information is needed it can be recalled, and with its memory it will be easier to solve problems that have been solved. (Nur,2008) Learning style is a consistent way that is done by a student In learning, ideally we should be able to use the five learning styles, but in reality it is not possible to do this. Of the five learning styles above, there are the most dominant and most frequently used learning styles, namely:

1. Visual learning style (vision)
2. Auditory learning style (hearing)
3. Tactile/kinesthetic learning style (touch/motion)

Learning style refers to the way students prefer to study. According to DePorter (2000) "A person's learning style is a combination of how he absorbs, and then organizes and processes information". It is generally considered that a person's learning style comes from the variables of personality, knowledge, psychology, socio-cultural background, and educational experience. Basically, every student has this learning style, but all of them do not develop in a balanced way, but there are those who dominate a balanced learning style. This causes students to like learning that varies according to the stored learning style. The diversity of student learning styles requires a selection of suitable teaching strategies so that student learning strengths develop properly. By involving visual, auditory, and kinesthetic aspects, it is expected to increase learning activities. Visual learning style is a learning style that utilizes sight more. People with visual learning styles will see or imagine what is being said. In addition, he has a strong experience with color, besides having a good understanding of art problems. Every student has different abilities in receiving and processing information. resulted in students also taking different ways to receive the information. One of them is. This situation certainly does not take into account the tendency of students' varied learning styles. Based on this description, this study aims to examine the effect of VAK learning styles on learning outcomes using digital simulations. Digital Simulation in learning means learning activities using information technology through the development of web-based teaching materials.

Overview Theory

Practical lessons, especially in physics, can provide students with opportunities to develop problem solving skills, and applied skills. There is no appropriate learning approach yet, because physics lessons need experimentation and through experimentation students can gain direct experience in problem solving. In the Basic Engineering Physics lesson at Poltekbang Surabaya, it has not shown problem solving activities as the main process activity. Because of these circumstances, the author tries to apply learning by using the Digital Simulation method, especially by using Single-Test Reliability interactive simulations. This simulation is more effective if applied with an inquiry learning approach because it can facilitate students to learn independently so that the cognitive changes that occur can be maximized. Inquiry learning can involve students to make observations, measurements, hypotheses, interpretations, build theories, plan investigations, experiments, and reflection (NRC, 1999). So that the Single-Test Reliability simulation can be used by students to help find or clarify the concepts being studied through an inquiry learning approach. Based on the background of the problem, the authors are interested in researching problem solving skills between students using digital simulations (Single-Test Reliability interactive simulations) and those without using simulations. Learning with problem solving strategies based on Polya's theory at the Aviation Polytechnic of Surabaya. In accordance with the problems described in the problem formulation above, the

purpose of this research is to determine the effect of applying digital simulations on improving problem solving skills in students who use digital simulations (Single-Test Reliability interactive simulations) and those who do not use simulations.

Data collection

In the process of finding answers to the problem formulation and research objectives, it is necessary to collect relevant data. These data were collected in various ways, including literature studies, filling out questionnaires with several instruments from both knowledge and readiness variables.

Data analysis

In this research, the analysis of the influence of knowledge on the entrepreneurial readiness of cadets uses descriptive data analysis with quantitative methods. Data analysis is carried out starting with organizing the data because the nature of quantitative data is generally very much and varied. Organizing the data so that the data obtained is neat, structured, systematic, and complete. In the process of organizing the right data, researchers can obtain good quality data, document the analysis carried out, store the data and analyze it for the completion of the research carried out. Data analysis that is carried out is to use .

Research methodology

This research is a quantitative descriptive method and applies a quasi-experimental method. According to Setyosar (5, p. 42), quasi-experimental research is research that is intended to determine whether or not there are consequences of something imposed on the subject being investigated. The research participants cadets of the Airport Electrical Engineering study program. The cadets will be grouped according to learning styles which consist of 3 types, namely:

1. Visual (vision) is the dominant learning style in visualizing images, projections, mental images and internal and external space considerations
2. Auditorial (hearing) is a learning style that tends to hear where they can better learn what they hear.
3. Kinesthetic (moving) is a way of learning by experimenting, touching and manipulating objects directly.

There are several benefits of knowing learning styles, both for lecturers and for cadets. The benefits of knowing learning styles for lecturers, namely: being able to assist in delivering learning that is in accordance with the diversity of learning styles. While the benefits of knowing learning styles for cadets are: being able to gain important knowledge about themselves, understanding strengths and weaknesses in learning, increasing motivation to learn and helping cadets to learn faster and understand a lesson so that they get good grades with a learning style that suits each cadet. -each cadet.

Tabel 1. Descriptive Statistics

	Visual		Auditorial		Kinesthetic	
	Female	Male	Female	Male	Female	Male
Valid	7	17	7	17	7	17
Missing	0	0	0	0	0	0
Mean	16.000	14.882	11.714	11.529	10.429	10.824

Tabel 1. Descriptive Statistics

	Visual		Auditorial		Kinesthetic	
	Female	Male	Female	Male	Female	Male
Std. Deviation	2.582	2.956	4.751	2.982	2.299	3.557
Minimum	12.000	10.000	6.000	6.000	6.000	4.000
Maximum	19.000	20.000	17.000	16.000	13.000	16.000
Sum	112.000	253.000	82.000	196.000	73.000	184.000

Respondent data consists of 24 respondents divided into 7 female respondents and 17 male respondents

Data Retrieval

The instruments in this study were in the form of a learning style questionnaire and tests in the form of essays and problem solving which were divided into pre-test and final test.

The pre-test will be conducted using a google form in the form of essay questions and problem solving with a time limit of 30 minutes starting simultaneously. The final test will be carried out using the Single-Test Reliability application which allows cadets to conduct trials through the application or make simple electrical designs or even create simple prototypes that can be done through the Single-Test Reliability application.

Result and discussion

Test the validity of the questionnaire and test equipment to the cadets of the D3 Airport Electrical Engineering Study The results of the final test using the Single-Test Reliability application resulted in an increase in grades for each cadet who had different learning styles. The Single-Test Reliability application allows cadets to implement theory into tools in digital form and directly practice digitally so that the use of the Single-Test Reliability application helps improve problem solving skills and learning outcomes.

Tabel 2. Frequentist Scale Reliability Statistics

Estimate	McDonald's ω	Cronbach's α	Guttman's λ^2	mean	sd
Point estimate	0.793	0.589	0.624	11.833	2.774
95% CI lower bound	0.514	0.164	0.344		
95% CI upper bound	0.919	0.814	0.830		

Note. McDonald's ω estimation method switched to PFA because the CFA did not find a solution.

With point estimate Frequentist Scale Reliability Statistics McDonald's = 0.793 Cronbach's = 0.589 Guttman's λ^2 = 0.624 and mean = 11.833 to = 2.774

This shows that a suitable learning style affects cadets' learning outcomes, but in the pre-test the questions are in the form of essays and problem solving which require cadets to have good reasoning and logic. Description of Taruna Final Test Results using essays and problem solving using the Single-Test Reliability application

Tabel 3. Frequentist Individual Item Reliability Statistics

Item	If item dropped			Item-rest correlation	mean	sd
	McDonald's ω	Cronbach's α	Guttman's λ^2			
Visual	0.581	0.581	0.581	0.329	14.792	2.843
Auditorial	0.692	0.692	0.692	0.270	11.417	3.476
Kinesthetic	0.075	0.075	0.075	0.643	9.292	3.196

Note. The following items were reverse scaled: Visual, Auditorial, Kinesthetic.

Visual dengan Item-rest correlation = 0.329 Auditorial Item-rest correlation = 0.270 Kinesthetic Item-rest correlation = 0.643

Reliability Test on questionnaires and test equipment to the D3 Airport Electrical Engineering cadets. High reliability is indicated by the rcount value close to 1. Description of the results of the Taruna Pre test using essay questions without the Single-Test Reliability application.

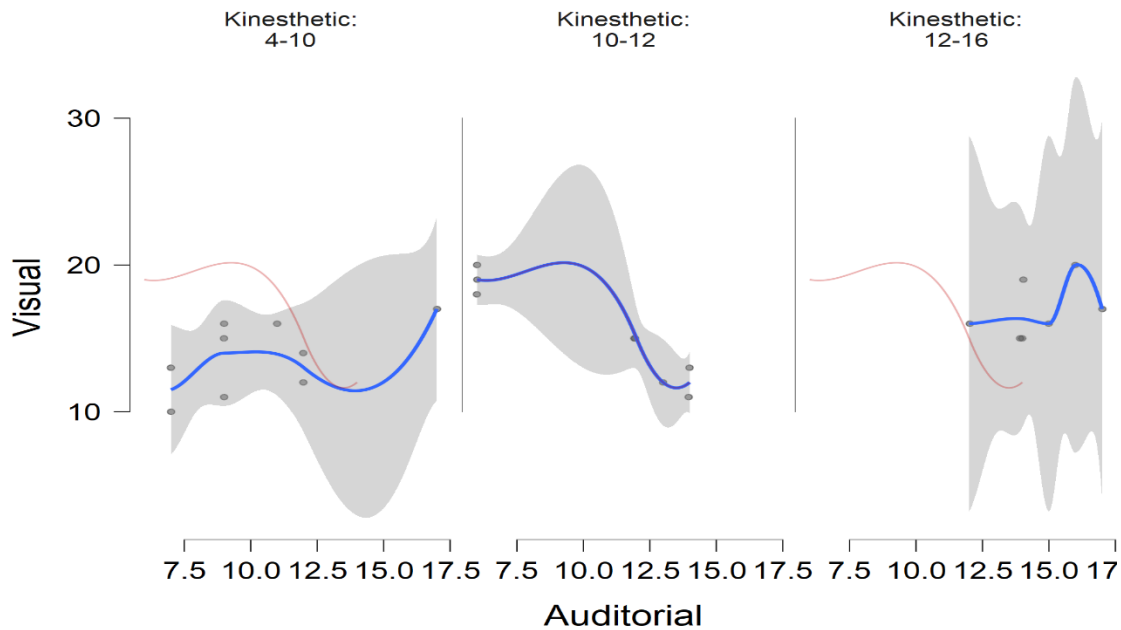


Figure 1. Flexplot

Research conducted by Dina Maulida (2008) states that there are three types of learning styles that can encourage student achievement. Learning achievement is still an indicator to assess the level of success of students in the learning process. Good learning achievement can reflect a good learning style because knowing and understanding the best learning style for him will help students in learning so that the resulting achievement will be maximal. This is certainly in line with the research of Teti Widiyanti, (2011) which states that learning styles affect the achievement achieved. The method used is the use of the Single-Test Reliability application, in general it can be seen that learning with Single-Test Reliability simulation media can encourage critical thinking skills. This shows that learning with Single-Test Reliability media can involve cadets in learning activities that require higher cognitive skills. Ennis (1996) states that critical

thinking is the ability involved in making rational decisions about what to do and what to believe. This is certainly in line with several previous studies, such as Nurhayati, et al. (2014) in his research stated that student learning outcomes on dynamic electrical material taught with the demonstration method assisted by Single-Test Reliability simulation media can affect the learning styles of cadets so that learning outcomes increase. This research is also supported by research conducted by Adams, et. al. (2008) that the Single-Test Reliability media is able to properly visualize the concept of material which is initially difficult to understand when the learning process is presented with the lecture method or directly from the teacher to students so that this will indirectly affect the factors in students. Another study conducted by Suhandi (2009) showed that the use of Single-Test Reliability simulation media reduced students' misconceptions more when compared to using teaching aids in electrical circuit material. The decrease in misconceptions can be caused by the characteristics of Single-Test Reliability simulations that can present microscopic and abstract phenomena into a real form compared to the use of visual aids.. All simulations contained in Single-Test Reliability can be used as tools or media that give cadets the freedom to choose and use according to the concept of the material to be studied (Wieman & Perkins, 2006). As a developer of Single-Test Reliability simulation media, Perkins, et. al. (2006) suggest that learning using Single-Test Reliability simulation will be more effective if it is applied with a guided inquiry approach. Supporting research related to the application of Single-Test Reliability simulation as a learning medium by educators as done by Zuhri and Zatmiko (2014) using an inquiry learning model assisted by Single-Test Reliability simulation to reduce students' misconceptions. The use of Single-Test Reliability is done because researchers consider that not all concepts in physics can be explained through real (actual) practicums. Another study conducted by Najib (2015) using the Single-Test Reliability simulation program in laboratory inquiry learning to improve conceptual skills and higher-level thinking skills.

Conclusion

This study shows that cadets with visual learning styles have the highest average scores compared to cadets with auditory and kinesthetic learning styles, and the digital simulation of the Single-Test Reliability. Teaching make a new methods that are suitable for cadets' learning styles by paying attention to the components supporting cadets' learning achievements, so that learning is more conducive and achievement will increase

Suggestion

Based on research data, then suggested for future researchers to develop research on the approach contextual through different methods or comparing several methods.

Conflicts of interest statement

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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