The influence of the inquiry learning model and learning style on the drawing technique of students

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ABSTRACT: The purpose of this study was the following: to examine the influence of the inquiry learning model on students drawing technique ability; to examine the influence of learning style on students' drawing technique and to examine the joint influence of the inquiry learning model and learning style on students' drawing technique. A quasi-experimental approach was applied to this study, with a non-equivalent control group and 2 x 3 factorial design. There were 79 students as participants from the Engineering Faculty of the Universitas Negeri Makassar (State University of Makassar), Indonesia. Research data were analysed using an analysis of variance. The results show that there was an influence on students' drawing technique from the inquiry learning model and learning style.

INTRODUCTION

One of the important aspects of the learning process is to examine the learning experience to determine how students learn. DePorter says that learning is dynamic and full of risks [1]. Witkin and Goodenough consider that the learning process consists of three steps, viz. acquisition, storage and retrieval [2]. There are various methods implemented as part of the learning process to facilitate students in remembering, understanding, implementing and evaluating. Every method has advantages and disadvantages compared with other methods. In the learning process, an educator should choose an appropriate method relevant to the needs of the students.

The inquiry method is one of the strategies used by teachers to inculcate independent learning in the students. By using this method, students will try to find a solution to every problem faced in the learning process. Intrinsically, the inquiry method is appropriate where students are expected to grasp the procedures, facts and concepts of a scientific discipline. The inquiry method can be used to teach students a specific concept, fact or skill needed to tackle a problem [3].

By implementing the inquiry method, the critical thinking skills of students can be improved, such as how to develop a question; how to source information; and how to identify a new aspect of a problem [4-6].

Another factor, which can influence students' success in the learning process is the learning style of students. Students have various learning styles and so this is an important area that needs to be examined [7-11].

In this study, an examination was made of the influence of learning method and learning style in improving a student's drawing technique. Both aspects, learning method and learning style, can be said to be independent variables, which can influence the student's ability in drawing technique; therefore, it is the dependent variable, drawing technique that is the object of study in this research.

METHOD

A quasi-experimental approach was applied to this study, to find the relationship among the research variables [12-14]. Two groups were organised for study, i.e. an experiment group and a control group. The experiment group used the inquiry method, while the control group used an expository method. For the research, a factorial 2 x 3 design was

applied to the non-equivalent control groups [15]. The aim of this design was to examine separately the influence of the two independent variables on the dependent variable [16][17].

The *learning method* was an independent variable, which could take the values *inquiry method* or *expository method*. The other independent variable was *learning style*, which could take the values *visual*, *auditory* or *kinesthetic*. Learning style was measured using the visual auditory kinesthetic (VAK) scale developed by DePorter [1][18-20]. The dependent variable of the study was the student's ability in drawing technique.

Participants of this study were students of the Department of Agriculture at the Universitas Negeri Makassar (State University of Makassar), Indonesia, in their second semester. There were 79 student participants divided into two classes with 40 students in class A, the experiment class, and 39 students in class B, the control class. The VAK scale used for this study measures the learning style of students through a check-list instrument. This measures ten aspects of students' drawing technique, viz.

1. conceiving the technical picture as a language;
2. making a measurement line;
3. making a measurement number;
4. making a picture line;
5. designing picture etiquette;
6. making a projection line;
7. reading an American projection;
8. reading a European projection;
9. drawing an American projection;
10. drawing a European projection.

Data collection techniques used were scales/instruments, interviews and observation. The data were tested by applying the Kolmogorov-Smirnov test (K-S test or KS test) to determine the normality level of the data and the data were analysed using analysis of variance (ANOVA) [13]. The ANOVA was carried out with a 2 x 3 factorial design to test the research hypothesis, and a double ANOVA was applied to test the different effects of the two independent variables. The significant level was 0.05 (5%), and the data analysis software used was SPSS 21.00 for Windows.

RESULTS

Description of Learning Style Variable

Table 1 shows the distribution of participants by the independent variables, learning style and learning method, displayed as a 3 x 2 matrix of values together with totals.

Table 1: Distribution of participants by learning style and learning method.

	Inquiry method	Expository method	Total
Visual	7	12	19
Auditory	16	9	25
Kinaesthetic	17	18	35
Total	40	39	79

Pre-test and post-test data for the dependent variable student drawing technique ability is shown in Table 2.

Table 2: Pre-test and post-test data for student drawing technique ability.

No.	Learning method	Learning style	Pre-test mean (M)	Post-test mean (M)
7	Inquiry	Visual	26.57	35.43
16		Auditory	25.75	37.19
17		Kinaesthetic	28.06	38.18
40		Inquiry mean	26.86	37.30
12	Expository	Visual	26.08	32.58
9		Auditory	25.33	34.22
18		Kinaesthetic	25.22	34.94
39		Expository mean	25.51	34.05

Based on Table 2, it can be seen that the control group pre-test ability was 25.51, which increased to 34.05 post-test, whereas the experiment group ability increased from 26.86 pre-test to 37.30 post-test.

The results from testing the hypotheses related to the effect of the enquiry learning and expository learning methods on student drawing technique are shown in Table 3. There are three conclusions that can be drawn from Table 3:

1. There is a significant difference related to student ability between the experiment group, which used the inquiry learning method, and the control group, which used the expository method, with the former being superior. This is based on the learning method's F value = 16.489 being greater than F table = 3.96.

2. There is a significant difference related to the students' ability, between students who learn using visual, auditory and kinesthetic style. This is based on the learning style F value = 3.973 being greater than F table = 3.96.

3. The learning method (inquiry and expository) and learning style (visual, auditory and kinesthetic) do not together influence a student's ability. This is based on the learning method *learning style F value = 0.027 being less than F table = 3.92.

Table 3: The ANOVA test of learning method and learning style for drawing technique.

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected model	286.670[a]	5	57.334	5.945	< 0.001
Intercept	87856.924	1	87856.924	9109.659	< 0.001
Learning methods	159.025	1	159.025	16.489	< 0.001
Learning style	76.642	2	38.321	3.973	0.023
Learning method *learning style	0.514	2	0.257	0.027	0.974
Error	704.039	73	9.644		
Total	101654.000	79			
Corrected total	990.709	78			

DISCUSSION

The results of this study showed that the inquiry learning method can significantly increase a student's drawing technique ability. This ability was based on the ten aspects mentioned above, i.e. conceiving the technical picture as a language; making a measurement line; making a measurement number; making a picture line; designing picture etiquette; making a projection line; reading an American projection; reading a European projection; drawing an American projection and drawing a European projection.

The value of an independent learning process can be seen in the approach students take to undertaking assignments [6][21][22]. The inquiry learning method encourages students to learn lesson material together.

Students have a variety of learning styles. It is shown from this study that this variable is not significant in predicting a student's ability in drawing technique. However, as outlined in the results above, there are other variables that are significant predictors of a student's ability.

Talent and motivation can be seen as dominant factors, which influence a student's interest in drawing technique. The learning syle has a role in guiding students toward finding information related to drawing techniques. Visual and kinesthetic learning styles help students to read graphs, tables, diagrams and pictures [23-25].

It is shown from this study that the inquiry method paired with the learning style does not positively influence the ability of students. It is determined from the statistical analysis that the inquiry method has a bigger impact on ability than learning style.

CONCLUSIONS

Based on the research, it was found that the inquiry learning method had a significant, positive influence on the students' ability in drawing technique. In addition, the learning style - visual, auditory or kinesthetic - also influenced the students' ability. Another finding is that both variables, learning style and inquiry method, did not jointly influence the ability of students. Further study should be undertaken related to other variables that could influence a student's ability.

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BIOGRAPHIES

Muhammad Rais completed his doctoral degree in learning technology at Universitas Negeri Malang, Indonesia, in 2011. Earlier, he received his Master of Mechanical Engineering degree from the Universitas Brawijaya, Malang, Indonesia. Currently, he teaches mechanical engineering in the Faculty of Engineering at Universitas Negeri Makassar. He has taught many courses in the area of engineering, education and educational technology. He is actively involved in a number of research and training programmes, such as teachers' training and education; developing project-based learning; developing the guidelines for disaster mitigation education; and the reflective learning model.

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