

# Profile of students' learning styles in Sorogan-Bandongan organic chemistry lecture

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## Profile of students' learning styles in Sorogan-Bandongan organic chemistry lecture

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**Abstract.** Individual-based independent curriculum as one of target of national education of Indonesia in XXI century can be achieved with the implementation of Sorogan-Bandongan model. This kind of learning model highly facilitates students in understanding various concepts with their own, respective learning styles. This research aims to perceive the effectiveness of Sorogan-Bandongan in increasing the mastery of concept in various learning styles. The samples of this research are students majoring in chemistry amounted to 31 students. Using pre-test and post-test instrument, data are analyzed in descriptive-qualitative method. Based on the result of the data analysis, it is found that 16% of students have mathematical/logical learning style, 22.6% naturalist, 9.7% visual/spatial, 13% kinesthetic, 6% linguistic, 13% intrapersonal, 9.7% interpersonal, and 10% musical. After the implementation of Sorogan-Bandongan model in the Organic Chemistry lectures, improvement of classical learning outcomes as 11.07 is obtained. Six out of eight learning styles of students experienced increase in mastery of concept, where 7 students have the naturalist learning style, 4 students experienced decrease in mastery of concept while 1 student is stagnant (0); meanwhile, 2 out of 4 students that have the interpersonal learning style experienced decrease in mastery of concept.

### 1. Introduction

Knowledge of the educators about the learning style of learners is a very important information, because it can assist in preparing and creating a suitable learning environment. Educators have to use learning strategy that is appropriate with different learning styles, so the learning activity is more effective, fun and able to maximize the potency of the learners [1]. If in one class consists of learners with various learning styles, then the educator has to use various learning strategies that are able to accommodate all type of learning styles. Learning process that accommodates different learning styles will be able to increase the interest of each person so that academic achievements will also increase [2]. Learning process of every person is different because there are differences mentally, psychologically, and physiologically.

Course materials also influence the study result of the student, and in organic chemistry course several methods that can increase attention [3], more effective lectures, involving creative student, centered on student, increasing the use of technology [4], increasing the passion in learning [5],



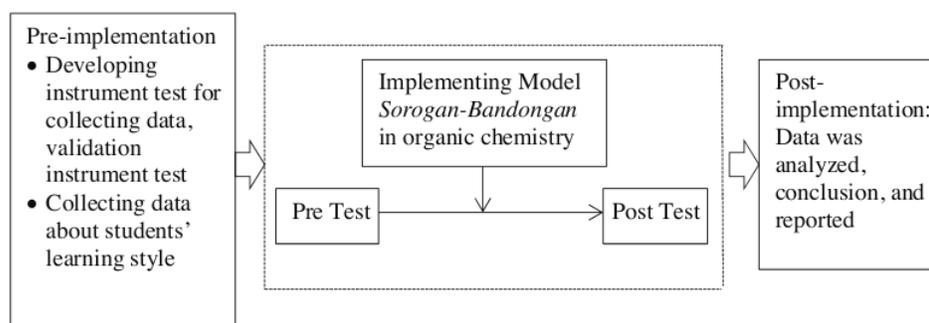
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increasing the performance capabilities [6] should be implemented. This can be done with oral examination, giving assignments, arrangement of classroom, development of syllabus, quiz, power point presentation using IT [7] and integrated lectures [8,9], to be able to increase learning prestige and increase the awareness in designing and synthesizing natural organic chemistry [10]. This article will discuss the implementation of organic chemistry courses that emphasize on individual learning, which is a combination of several methods, so it can improve the attention and involvements of the student.

The *Sorogan-Bandongan* model explained in this article is a model of individual learning that is a combination of *Sorogan* method and *Bandongan* method, implemented at Islamic boarding school (*Pondok pesantren*). The *Sorogan* method is an individual learning method where the students (*Santri*) must give the outcome (*sorog*) of the concept material that they understand to the *Kyai* (teacher) [11]; [12]; [13]; [14]. *Bandongan* method is a learning method where student experience learning in groups and are given opportunities to discuss about the material that is taught [14]; [15]. Both methods are very helpful in training the independence of the students at Islamic boarding schools. However, those model need to be implemented in organic chemistry course with the intention of knowing the improvement of learning outcome with the learning style difference.

## 2. Methods

This study used quasi experimental with one group pre-test post-test design. Design in this study can be seen in Fig. 1 below:



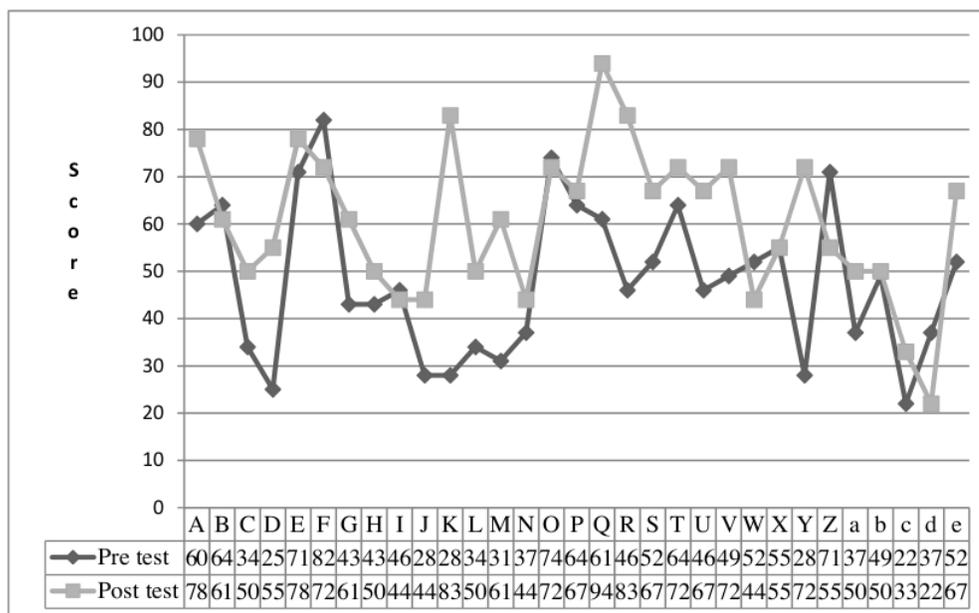
**Figure 1.** Research design in this study

Experimental research design in this study includes three steps: pre implementation, implementation, and post implementation. Pre implementation is done by the development of test instrument (pre-test and post-test); also, the learning style of student is decided by using instruments that have already been developed by the previous researchers. Before the implementation of Sorogan-Bandongan model in organic chemistry, pre-test is conducted and after the implementation, post-test is conducted. After the implementation, the research was continued with data analysis, conclusion and research report.

Sample used in the research are students majoring in chemistry at UNESA who are taking Organic chemistry course, 1<sup>st</sup> semester batch 2013/2014, amounted to 31 students. In order to take the organic chemistry course, students are required to have finished Basic chemistry I and Basic chemistry II course. Instruments used are students' preliminary knowledge test (*pre-test*) and learning outcome test (*post-test*). After the *pre-test*, individual learning that is in accordance with the preliminary knowledge of the students was carried out. To help the individual in learning, firstly MFIs are developed in accordance with the learning stages of each student. Data analysis was done by qualitative descriptive approach to describe the result of the the students' concept development based on the learning result.

### 3. Results and Discussion

Result of the research discussed cover the process of development of student learning outcomes, as shown in Figure 2 below



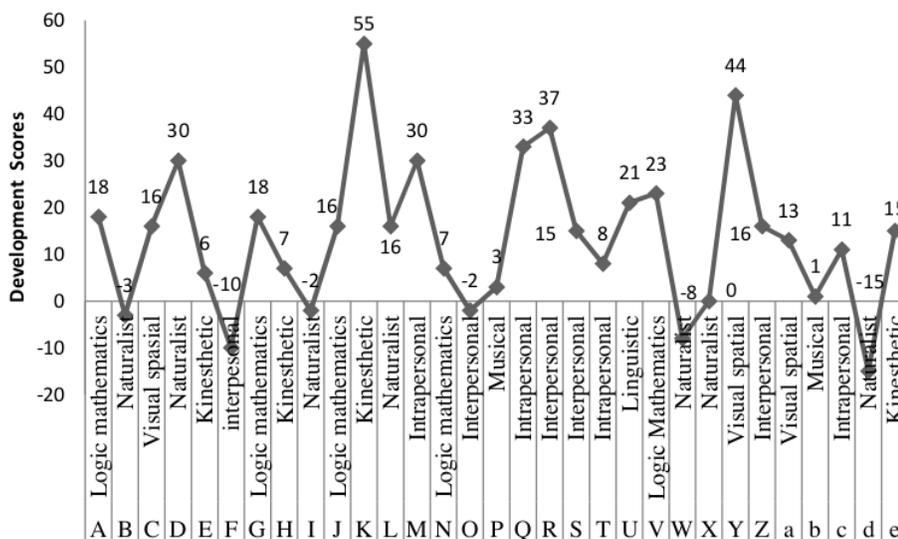
**Figure 2.** Students' Learning Outcome Development

Figure 2 clearly shows that the process of development of students' learning outcomes based on their learning styles, in which almost all (77,5%) learning types experience increasing development of learning outcomes (+) except for the naturalist and interpersonal learning styles. In line with the research that has been done by Dicks [3], the implementation of several methods on organic chemistry course can increase the interest. The Sorogan-Bandongan model is categorized into individual learning so it is very centered on the student, like the research that has been done by Franz [4], as much as 77,5% of the student experience increase in the learning result. More detail on the development is shown in Table 1.

**Table 1.** Students' Learning Styles

Learning Style	$\Sigma$ Students	Concept Mastery Development (%)	Explanation
Logic/mathematics	5	100	14% stagnant, no development
Naturalist	7	28,6	
Visual spatial	3	100	
Kinesthetic	4	100	
Linguistic	1	100	
Intrapersonal	4	100	
Interpersonal	4	50	
Musical	3	100	

The scores of the students' development in learning the reaction mechanism  $S_N1$  and  $S_N2$  according to each learning style are shown in the Figure 3 below.



**Figure 3.** Scores of the Students' Development in Learning the Reaction Mechanism  $S_N1$  and  $S_N2$

Figure 3 clearly shows that the Sorogan-Bandongan model is unable to increase the development score of some individuals that have the interpersonal and naturalist learning styles. The characteristic of naturalist intelligence are: the love of nature, animal, and plants, likes to go on a trip/excursion, sensitive to nature, like watering the flowers, having pet, likes aquarium, etc. The right way of learning is by learning through nature, recycling, flora and fauna observation, watching discovery channel, gathering animal picture and record the weather. The characteristic of interpersonal intelligence are: like to learn in group, like to interact with other people, like to organize, like to play in team, care about social issues; with the learning way as: collaborative/cooperative, group discussion, teaching peers, simulation, interview, guessing the character of other people/character riddle.

In this research, it is clear that from 7 samples that have the naturalist learning style, only 28,6% (2 students) that experience the increase of development score; those are student D and L. Student X did not experience any increase (0), also 4 sample experience a decrease of learning development (-); those are student B, I, W, and D. There are 4 students that have interpersonal learning style; those are student F, O, R and S. Among those students the one that experience decrease of learning development are student F and O.

In line with the opinion of DePorter et al. [16], although each of us learns using all models of learning style on certain condition and stage, many of us tend to use only one style, so that students that experience decrease of development clearly only use one learning style, naturalist or interpersonal.

**4. Conclusion**

The implementantion of *Sorogan-Bandongan* model on  $S_N1$  and  $S_N2$  reaction mechanism material should pay more attention to the naturalist and interpersonal learning style. Students that have the

naturalist learning style experience a decrease of development score because they find it difficult to understand the abstract characteristic of  $S_N1$  and  $S_N2$  reaction mechanism material. Students that use the interpersonal learning style experience a decrease of development score because the *Sorogan-Bandongan* model that is implemented is more focused on the individual learning, which is the opposite of the interpersonal learning style that tends to learn in group. Before implementing the *Sorogan-Bandongan* model it should be known beforehand the learning style of the students, and special attention is needed for students that use the interpersonal learning style in order for them to be able to follow the lesson better. This model needs to be tested again on more concrete learning materials.

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