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Exploration of Teaching Skills of Pre-service High School Teachers' Through Self-regulated Learning Based on Learning Style

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ABSTRACT

An expert in the field of science is often difficult to teach his knowledge to students. Conversely someone who is expert in the field of education is certainly more expert in transferring knowledge. The purpose of this research is to explore the skill of teaching skill preservice of physics teacher of High School. Samples were taken randomly as many as 50 people in two universities in Indonesia. The data collection used a Self-Regulated Leaning Based on Learning Style (SR2LS) questionnaire to detect their teaching skills through learning styles. The management of the learning class depends largely on the teacher's mastery of teaching materials. A good teaching strategy is needed in teaching abstract concepts to be more effective for students to understand. Students will experience misconception if the concept of teachers is not understood by students as in the lessons of the concept of atoms. Material physics is one of the lessons about the concept of atoms. The results showed that 60% of students had a "visual learning style", 30% "visual" and 10% "kinesthetic". Most preservice teachers can tailor their teaching strategies according to their own learning styles. But most of them have difficulty in analogizing the abstract concept on the atom.

KEYWORDS
Self regulated learning, Learning style, Teaching skill

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Introduction

Self-regulated learning is the process of organizing one's learning independently (Zimmerman, 2002). While learning style is the uniqueness of how someone understands something (Franzoni & Assar, 2009). Zimmerman (2002) has listed 15 different learning strategies based on self-regulation: 1) Self-evaluation, 2) Organizing and Transformation, 3) Determining and Planning Objectives, 4) Finding Information, 5) Maintaining records and monitoring, 6) Structuring Environment, 7) Self Consequences, 8) practice and

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memorize, 9-11) Seeking social as sistance, 12-14) Reviewing records, and 15) others. Research reports on the suitability of "learning styles" and "teaching skills" are widely used as a reference for establishing the teaching process (Chatterjee, Srabasti, 2005).

The research was conducted to explore the teaching skill of "Pre-service physics teacher". The material taught is the atomic concept of the crystal. Teachers who master teaching strategies and good teaching materials will be able to transfer their knowledge easily. Mastery of both things is closely related to self learning style. One simple question that needs to be known, namely whether the 15 learning strategies that have been described by Zimmerman et al. (1989) have differences according to individual learning style ?

In the previous study, this research strategy was tested separately. Based on the "learning style" of each student so as to enhance self-learning motivation and cognitive ability, as well as their social attitudes (Bautista; Johnson, 2012; Shea & Bidjerano, 2010). Similarly, 'learning styles', many of the results of research that relate them to various 'teaching models' in the teaching and learning process to be easily understood so as to have a good impact on student achievement, (AY Kolb & Kolb, 2005; Franzoni & Assar, 2009; Xu 2011 ; Aljaberi; Fayombo, 2015).

In keeping with the "Self Regulated" characteristics and learning styles that have been described, researchers detect how to set up 'self-learning' through personal learning styles. This result can be used as a guide for designing a learning model according to the lecture. A prospective teacher must also have a learning style according to each individual. A teacher's learning style will be seen from how the teaching strategy he/she uses.

Literature Review

Self-regulated Learning

'Self-regulation' is the controlling processes or activities that engage students in solving problems in the case of Physics, (Johnson, 2012). Besides, it is also an extra effort to take advantage of existing capabilities to monitor and enhance the learning process in depth, (Pintrich & De Groot, 1990). In-depth process can help students to organize thoughts and behaviors, as well as manage their emotions in order to successfully navigate of their learning and experience. This process occurs when the actions of students and the process is directed to the acquisition of information or skill, (Zimmerman, 2002)

In other words, 'self-regulated learning' refers to a plan in the learning process and to monitor the cognitive and affective processes that involve the ability in completing academic tasks (Zimmerman, 2002). Self-regulated learning is also a cognitive process that begins by presenting some information or instructions, process and integrate a knowledge that was obtained and repeat the information as a reflection, (Zimmerman, 1990).

Learning Style

The concept of learning styles have a logical appeal and an extraordinary intuition, as well as the impact on the willingness of educators to focus on learning styles, (Landrum & McDuffie, 2010). Through this learning style, a teacher can differentiate an instruction that is easy to understand, especially in

heterogeneous classes. Everyone has a different way of learning and use of different learning resources, (Franzoni and Assar, 2009). Learning styles can be adapted to provide different media representation for each learner. Auditory always count on hearing so it can be maximized by learning through audio or audio streaming. As for attracting visual and kinesthetic learning styles can be adapted through the appearance and motion, (Franzoni and Assar, 2009).

Each child has a unique to learn but may also have similarities with other people about learning style of the course to the same goal of understanding, (Boyatzis & Kolb, 1995; A. Y. Kolb & Kolb, 2005). Each individual will be able to absorb and store a variety of information based on the concept of setting their own learning, (Dunn 1983). Three categories are very important that can be affect the learning process is a variety of styles in learning, models approach, and the level of intellectual development, (Felder & Brent 2005).

Previous studies have been published regarding the compatibility between learning style with achievement. Likewise, the results of Chatterjee, Srabasti, (2015) asserts that the nature of the subject has a very important contribution to analyze the suitability of learning styles and teaching styles that can be used to describe the results of student performance.

Concept of Atom on crystallography

Crystallography is a subject of the structure and properties of crystals. Crystals can be defined as a solid consisting of a pattern that repeats periodically in three dimensions. Crystals are solid materials are homogeneous and usually anisotropic and translucent also follow the laws of science that resulted in the structure of the field in accordance with the laws of geometry. The number and position of the plane of a crystal is always certain and has regularity. The crystals are always limited by some of the plane in which the amount and the specific position. The crystals are composed of natural particles in very large numbers and form a solid and arranged regularly. However, because of the size of atoms, ions and molecules is the size of 1 Å (10^{-10} m or 10^{-8} cm) that a piece of material looks like continuously. The crystals are composed of natural particles in very large numbers and form a solid and arranged regularly. However, because of the size of atoms, ions and molecules is the size of 1 Å (10^{-10} *m or* 10^{-8} *cm*) that looks like a piece of material continuously. Different materials can be distinguished from its tendency to maintain the characteristics and volume as well it also includes the shape. Gas can adjust the volume and it also the shape of the container, Liquids have a constant volume, but always follow the shape of the container, while the solid always maintain the shape and it also volume of its own (do not follow the shape of the container).

The formation of solids occurs when the temperature of the object (fluid) drops below freezing the kinetic energy of the particles to be very small so that the interaction between molecules so attached to each other. In the three-dimensional framework can be created for the interaction of gravity that make up the molecular structure becomes solid. The movement of molecules or atoms in solids is just vibrations at certain positions. The results of these molecular interactions can last up to a certain limit. Random distribution of molecules is no longer as in the form of gas or liquid, but everything is homogeneous on a periodic basis; thus forming a periodic distribution in three dimensions, (Razeghi 2009).

Method

Research Subject

This study used questionnaires instrument containing 14 strategy *"self-regulated learning"* strategies based on *"learning styles"* to derive information about their relationship in the skills of pre-service teacher to present about concept of atom on chrstallography in the class. Total item questionnaire *(table 1)* that served as many as 71 statements were modified from zimmermen (1989).

Table 1. The items of questionnaires strategy of *Self Regulated Learning*

Strategi	Item
Environmental structuring	42-49
Organizing and transforming	11-18
Seeking information	29-34
Seeking social as sistance	62-66
Keeping records and monitoring	35-41
Reviewing record	67-71
Goal-setting and planning	19-28
Self-consequences	50-56
Self-evaluation	1-10
Rehearsing and memorizing	57-61

Strategy of Self-regulated Learning Zimmerman (Zimmermen & Pons, 1986).

Subject matter of chrystallography were discussed include: Crystal lattices and the seven crystal systems, the unit cell concept, The Wigner-Seitz cell, Bravais lattices, Point groups, space groups, Directions and planes in crystals: Miller indices, Real crystal structures, The reciprocal lattice and the Brillouin zone (Manijeh Razeghi 2009).

The subject matter of crystallography given to subjects for Material Physics Students majoring in physical education who took the 7th semester of the academic year 2016/2017. This course is an elective courses as a continuation of solid-state physics.

Data analysis

Data were analyzed to determine the average score of the items respondents were based on the relationship between *SRL* and their own of learning styles. The criteria for each interval of the data shown in Table: 2 below:

Table 2. Likert scale scores

Category	Average	Criteria
I	3.25 - 4	Strongly Agree (SA)
II	2.5 - 3.25	Agree (A)
III	1.75 - 2.5	Disagree (D)
IV	1 - 1.75	Strongly disagree(SD)

The average score of each item is used as a reference to determine the tendency of domination of learning styles can affect self-regulated of any teacher candidates. However, these results will have an impact on the maturity of a teacher to teach their students.

Research Finding

The result showed that, based on the average score of the questionnaire, a number of 60% of the "pre-service teacher" have a visual learning style, others are auditory and kinesthetic as much as 30% and 10%. The relationship between self-regulated learning based on learning styles with the physics teacher candidate's performance can be seen from the strategy SRL and the average number of students of visual, auditory, and kinesthetic. It is supported by the results of Fayombo (2015), which detects that the majority of a person when it became Students have a predominance of visual learning style and then followed auditory and kinesthetic.

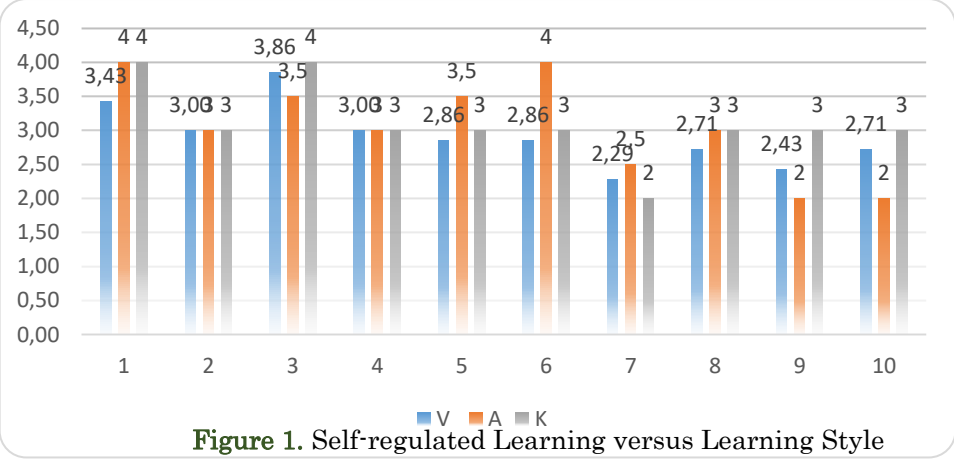

Figure 1. Self-regulated Learning versus Learning Style

Description: 1) *Self evaluation, 2) Organizing and transforming, 3)Goal-setting and planning, 4) Seeking information, 5) Keeping records and monitoring, 6) Environmental structuring, 7) Self consequences, 8) Rehearsing and memorizing (9-11) Seeking social assistance, 12-14) Reviewing records.*

Table 3. Category SRL with Learning styles

Strategy of SRL	Visual (V)	Auditorial (A)	Kinesthetic (K)

1	*SA*	*SA*	*SA*
2	*A*	*A*	*A*
3	*SA*	*SA*	*SA*
4	*A*	*A*	*A*
5	*A*	*SA*	*A*
6	*A*	*SA*	*A*
7	*SD*	*SD*	*SD*
8	*A*	*Agree*	*A*
9-11	*SD*	*SD*	*A*
12-14	*A*	*SD*	*A*

In the "*Self evaluation"* strategies and "*goal-setting and planning"*, the average ability to evaluate themselves from teacher candidates were very good for auditory, kinesthetic, and visual. The ability of "*organizing and transforming"* and "*seeking information"* hey are seeking the same average that is good categorized (see fig 1.)

The ability of students who are visually weak on strategies to "*Self consequence"*, and "*Seeking social assistance*". While for other strategies setting a good average (see table 3). Auditory domination is best to first strategy "*Self-evaluation"*, then the third strategy *"Goal-setting and planning*", and followed by a fifth strategy "*Keeping records and monitoring"* and the last six strategies namely "*Environmental structuring"*. While students are auditory difficulties in arranging strategy "*Seeking of social assistance"*, and "*Reviewing records"* candidates are visual, auditory and kinesthetic, the average is not able to regulate themselves in using the "*Self strategy Consequences"*

Discussion

"Self-regulated learning" and "learning styles" strategies relate with the success in completing the coursework. Concept of atoms on "Crystallography" is a part of the discussion of the physics of material obtained in solid-state physics lectures which discussion of abstract issues. In this case, the individual strategy adjustment is necessary in particular to be able to explain and understand.

In fact, a group of students who have a heterogeneous learning style will have difficulty in receiving similar information for the other parts because of the influence of their learning styles. However, there is a possibility that the learning style of each profitable for most of the others among the 14 Self-Regulated Learning strategy that have been owned.

Visual learning style

Someone who has a visual learning style tend to rely on visual acuity. As a result, concrete things that they have to see it first so that they can understand

about something so, this kind of learning style should rely on their eyesight to be able to trust a thing.

The specificity of the characteristics of someone who tends to be stylized visual learning as an example: *1)* should see information or lessons visually to enable them to know or understand an information, *2)* have a sensitivity to images and colors, diagrams, forms of animation, and visual forms other, *3)* be able to understand the information through their artistic abilities possessed, *4)* Tend to have difficulty in engaging in dialogue with others directly, *5)* Have reactivity is high enough to sound, *6)* difficulty in following the various suggestions, especially through oral, *7)* often experience an error in the interpretation of a word or sentence length, (Franzoni and Assar, 2009).

Based on some karaketeristik owned by Students stylized visual learning, the result that they are not affected by the appreciation in a success (*self consequence*) in accordance with point (*7)*, exclusively for support in the form of reward and punishment, and less communicative to ask for help from others either teachers, friends, and their senior (*Seeking social assistance*) in accordance with the characteristics of point *(4)* of the difficulties in dialogue. The impact of their weakness at point above resulted in tasks collected in the form of a resume and a slide presentation on crystallography largely not of their work, but the result of *copy* and *paste* from the websites. They tend to be a lot of interaction with the online media than in dialogue with others.

Auditory learning style

Students who have special auditory learning style on this crystallography material have the same problems with the visual student on a strategy of "Seeking social assistance". Should be someone who has auditory learning style relies heavily on dialogue interaction with other people because there are likely to be a satisfactory explanation. Perceptions about the "auditory learning style" is antithetical to what is described by (Xu, 2011) which explains that they prefer interaction through dialogue.

Supposedly, someone who has "auditory learning style" can rely on their social abilities through dialogue to communicate about the difficulties faced. In addition, they also rely on memory when the dialogue to listen to explanations rather than notes. However, this applies in accordance with the level of difficulty of the material submitted.

Kinesthetic learning style

According perception (Xu, 2011), a person who "kinesthetic learning style" more comfortable with the the activity of drawing, playing games, as well as the design of a model and an expert in experimental settings. They rely on movement and touch to learn.

Based on analysis of data obtained that, "kinesthetic learning style" has the ability to complete college assignments well. They are capable of displaying "crystal forms" through animation can be modified so as to facilitate them to understand "forms crystals". However, in this case, they do not respond to rewards such as "visual learning style". Most likely, if they do so in a competition will use this strategy to the maximum.

Conclusion

A person will be able to use and easily adjust their learning strategies in accordance with their learning style to achieve success. However, the strategy will be influenced by the expected instructional goals. Some self-regulated learning strategies will not be maximized if it does not comply with required so that someone automatically becomes pragmatic.

Larning styles will also be dominated by one of them, depending on the system of learning in the classroom and the material covered. In this case, the material crystallography have an abstract concept and requires high imagination to understand it so it can be beneficial and detrimental to one tendency of their learning styles.

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