

# Analysis of Student Learning Outcomes Based On Field Dependent and Independent Cognitive Learning Style Through Quantum Teaching Assisted by Music on Stoichiometry

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**Abstract**—Field dependent and independent classify as cognitive learning style. Relate to learning process it can apply through quantum teaching to analyze which one of them have higher learning outcomes. Quantum teaching is one of fun strategies learning, it can assist by music to balancing the ability both of right and left brains. Total number of samples in this study was 37 student of class X MIPA 3 in SMA Negeri 5 Samarinda and this study was descriptive quantitative. Data collects using questionnaires of student's learning style and written test. The result shows that 22 of 37 student have field independent cognitive learning style and higher learning outcome with percentage 100% of them have good category in average of 87.07. However, percentage the student who have field dependent learning style only 80% have good category with average learning outcomes 75.86.

**Keywords**—Field dependent, field independent, cognitive learning style, quantum teaching.

## I. INTRODUCTION

Education basically is related to teaching and learning, while in the process using a communication and information from a teacher to student [10]. The great learning process must be a transformation two side, not only a teacher gives them information but also the student needs to give feedback too [11]. The information contents share or inform about education theories, ideas and media to shows the ideas [1]

The one of indicator successfully of education is increasing of student learning outcome. It focuses to achievement of student to getting a good mark in learning process [8]. The purpose of study can achieve with a good learning outcome, it means the quality of education is also good [2]

The schools always have vision and purposing their student to achieve good learning outcome and reach the target that have been decided [16]. But the fact, a lot of students still have low learning outcome. It also has been happening in student of X MIPA SMA Negeri 5 Samarinda. The value average of their chemistry subject is low, because some of student still have value under "Kriteria Ketuntasan Minimal (KKM)". This condition must not to ignore, because it proves some of student have not understood enough with the subject. It getting worse if the teacher still

continues to the next material, they will so hard to understand and it predicted affect to the low of their learning outcome.

The low of student's learning outcome is affecting by several factors, one of them is student's learning style [5]. Every student has difference learning style one to each other. The problem comes when student learning style does not appropriate with teacher's style. Despite, the student sometime does not know enough how to using their learning style and to determining the good one of it, so they can not to understand enough [14]

Fun learning is an alternative to solve the problem. Quantum Teaching is one of kind fun learning [9,13]. It is a learning strategy to give a positive suggestion and its interaction with environment can affect the process and student learning outcome [6]. The one of technique is using music as a background in class room [4]. Many kinds of music can use as a background such as classical, instrumental, modern and etc [12]. Utilization of music in learning process gives many advantages such as, student feels relax and decrease their stress (stress really inhibits learning process), decrease undisciplined, stimulates their creativity and interest to read the books [7]. It really effective for learning process which needs high order thinking [3].

Stoichiometric is one of the difficult subjects in chemistry. It combines among the concepts, application, and good mathematic ability to solving the tasks. The way to explains this subject being a fun learning can change it to be more interesting. Music utilities to improve their concentration and make a better body's condition when solving a task of stoichiometry [15]

Based on the explanation above, the topic of study is analysis of student learning outcome based on field dependent and independent cognitive learning style through quantum teaching assisted by music on stoichiometry.

## II. METHOD

This research is descriptive quantitative research. Technique sampling uses purposive sampling, which is the class sampling must be the heterogenous class (Natoatmodjo, 2010). Instruments for collecting data are 1) questionnaire of learning style, it is for grouping student to field dependent or independent cognitive learning style. Interval score in these questionnaires  $0 < x \leq 100$ , with the categories of field dependent learning style  $50 < x \leq 100$  and  $0 < x \leq 50$  for field independent learning style. 2) posttest and daily test use to determine the successfully of learning process with Quantum teaching strategy which assist by music. The mark of posttest and daily test calculate with formulation (1) and (2) for averaging the mark of three times meeting and including the daily test:

$$\text{Score} = \frac{\text{Test Score}}{\text{Maximum score}} \times 100$$

$$\text{Score} = \frac{20\%PT\ 1 + 20\%PT\ 2 + 20\%PT\ 3 + 40\%UH}{4}$$

3) observation sheets of teacher and student activities. Observation sheets having a scale 1- 5. The percentage of assessment teacher and student activities calculate with formulation (3):

$$\%Activity = \frac{\sum \text{test score}}{\sum \text{maximum score}}$$

## III. FINDING AND DISCUSSION

Learning process of quantum teaching strategy assist by music in stoichiometry having three times meeting with 2 x 45 minutes for each meeting and in the last 4th meeting use for daily test. This strategy based on the theory of balancing utilization both of right and left brains. It explains that the human brains separating in two parts, right and left brains. Thinking process of left brain is more logical field, linearity and rational that relevant with the tasks, facts, symbolic, and etc. However, the right brain is randomly, irregular things, intuitive like to know the nonverbal field such as feeling and emotional, introduction shapes and patterns, music, art and etc. This strategy is aimed to balancing and maximizing brain working. It is appropriate to increasing the student ability to understanding of chemistry subject.

Quantum teaching strategy is consisting of 6 steps: Tumbukan, Alami, Namai, Demonstrasikan, Ulangi, dan Rayakan (TANDUR). Learning process starts with "Tumbukan" phase. It purposes to generate the interest and student attention. Teacher need to motivating and encouragement student. This phase is predicted make student more encourage and focus.

In the second step "Alami", teacher give an apperception using video or some pictures which is relate to

the subject. For each meeting must show different videos or pictures depend on the subject and presenting it uniquely and interesting.

Teacher gives an illustration that relevant with subject in each meeting. It is to make student more active in learning process. Then, student need to solving the task in LKS to knowing the question based on their level of knowledge ability. This phase calls as "Namai".

The student is separating to some group for doing their LKS in phase "Demonstrasi". This activity improves their understanding about the concepts and student will have habitual to discuss with their friends in learning process. It makes the student more active and do not be a passive learner, they must be subject. To more activated the student in each meeting, they need to present the result from discussion process.

The next activity is strengthening their result from discussing and presentation. Teacher need to repeat the explanation about the concept which is the student less understand. This phase calls as "Ulangi", student must repeat the concepts. All phase make student satisfy for the whole learning process in each meeting. To show their satisfaction, the student said loud the "jargon". It is including "Rayakan" phase.

Analysis of final score student learning outcome with field dependent learning style is obtained from average of score for each meeting and daily test. Table 1 shows distribution of percentage learning outcomes of field dependent learning style.

Table 1  
Percentage learning outcome of field dependent learning style.

Category	Percentage (%)
Very good	0
Good	32
Enough	8
Bad	0

Based on the table1, 15 of 37 student have field dependent learning style. The data shows that almost all the student (12 of 15) with this learning style having a good learning outcome. Table 2 shows average of posttest in each meetings and daily test for student with field dependent learning style.

Table 2  
Score average of field dependent learning style.

Test	Average
Posttest 1	80.6
Posttest 2	61.4
Posttest 3	77.5
Daily	80.5

Posttest 1, 3 and daily test is classifying as good categories because score is  $\geq 75$ . But posttest 2 classify as enough because  $\leq 75$ . The total average for all meetings of student field dependent learning style is 75.86 and good categories.

The student who have field dependent learning style are hard to focus when they treat with music in learning process. This treatment is affecting their learning outcome. They are more focusing and enjoying to listen the music than to paying attention in learning process.

Problems come up in learning process to student with field dependent learning style. They are more interest to social subject than exact such as chemistry subject, which it is need to understand about the concept and mathematics skill. Few students are difficult to understand the concepts because while the teacher explains the concepts and discussing process, they do not active in learning process and not having an interest for chemistry subject. And also, they cannot focus when the music assists as long the learning process.

Analysis of student who have field independent learning style Table 3 shows that 3% of the classify as very good category and 57% as good category. 22 of 37 student have this learning style. They have heterogeneous score for each kinds of test.

Table 3

Percentage learning outcome of field independent learning style.

Category	Percentage (%)
Very good	3
Good	57
Enough	0
Bad	0

The score average of each kind of test in Table 4 shows as a good category  $\geq 75$ . The total score average for the whole test is 87.07, it classify as good category. It means, the student have the ability to solve the posttest for each meetings.

The student who have field independent learning style are active and always pay attention when the teacher gives an explanation. And when they treat with the music, they still focus for the whole steps in learning process.

Table 4

Score average of field dependent learning style.

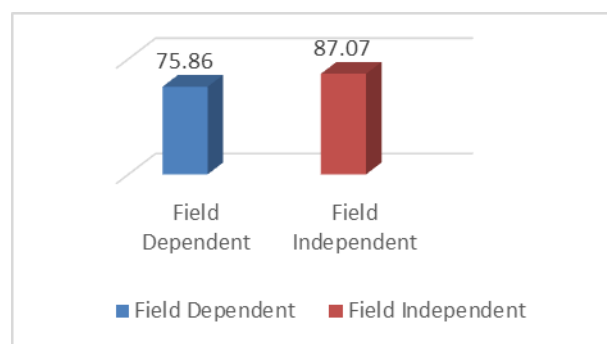
Test	Average
Posttest 1	95
Posttest 2	74.1
Posttest 3	89.3
Daily	88

Student learning outcomes of field independent learning style are higher than field dependent learning style, Graph 1. It relates to effect of music assistance in the

learning process. It have different effect to both of the learning style. Student with field dependent learning style are more less focus while listen the music. However, the student who have field independent learning style are having a contrary effect, they are more focus in the learning process.

The results are relevant to the theory that explain about the student who have field independent learning style are more interest to exact subject and mathematics than the student field dependent learning style. Because this research focuses on the stoichiometry, so the student field independent learning style have more interest than field dependent learning style.

The advantage of quantum teaching strategy assist by music is improving the student motivation in learning process, because it is more fun and balancing both of the right and left brain.



Pic 1. Average of student learning outcome field dependent and independent learning style.

#### IV. CONCLUSION AND SUGGESTIONS

Based on the data in this study, student learning outcome who have independent learning style is higher than dependent learning style with the average score are 87.07 and 75.86, respectively.

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