The implementation of chordophone enrichment book as an essential factor to create meaningful learning

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Abstract. This study aims to discuss the implementation of chordophone enrichment book as one of the essential factor to create meaningful learning for students. An Enrichment book called Chordophone Enrichment Book was developed to comprehend sound and waves unit in physics materials for junior and high school students. In this study, the instructional design is based on the principal of meaningful learning. With a quasi-experiment Pre-Test and Post-Test Control research design, a meaningful learning scale research instruments, and a valid meaningful learning questionnaires, this study is utilized. The research findings show that the students in the experimental group apparently had a higher learning achievement than the students in the control group, with notable differences. Through pre-test and post-test, the values obtained in the control class are 47.02 and 62.34 with a gain value is 0.29 (low improvement). While the value of pre-test and post-test in the experimental class are 46.88 and 71.79, with gain value obtained for 0.47 (medium improvement). Through the questionnaire, students in the experimental group highly regarded that their learning is meaningful with an average percentage score of 84%. These research outcomes hopefully can be used by teachers and educators for designing materials and provide educators with a reference for implementing enrichment book as a meaningful media material design.

1. Introduction
Meaningful learning is recognized as an important educational goal. It is a teaching strategy that goes beyond simple presentation factual knowledge and that assessment tasks require more of students than simply recalling or recognizing factual knowledge [1,2,3]. The core learning of meaningful learning is when students are able to relate new information with their prior knowledge in their cognitive structure. This learning required few provisions which are: (1) the learners should have a meaningful learning goal, (2) the material has a logical meaningfulness, (3) the ideas is similar with what the students already know, (4) the ideas presented must be found in learner’s cognitive structure and have a conceptual richness, and (5) the ideas presented have to be relevant to student’s real life [4,5].

One of the ideas that is relevant to real life is Physics. As one of the natural science branch, physics is concerned with the studies of nature and properties of matter, energy, and its motion and behaviour is relevant to student’s real life, including in arts. Elements of physical laws can be found – directly or indirectly – in numerous paintings and poems and we can also find connection between physics and music or sounds of music [6]. Sound and music are able to illustrate physical phenomena or laws,
helping a better understanding of physics because it is relevant to student’s real life. Hence, it can integrate factual knowledge of students with real life phenomena.

However, from the observations in a number of high schools indicate that there are still many students who are not able to integrate the content of knowledge they learn school with the context in real life phenomena. Such as the concept of vibration and waves in musical instruments. This information proves that the educational practices that is implemented in schools does not use meaningful learning and concentrate only on rote learning. It is a rare thing to find schools where teachers use meaningful learning in classroom since most schools use a mix of traditional rote learning activities [7].

When teachers concentrate solely on rote learning, which is teaching and assessing focus solely on remembering elements or fragments of knowledge, learners will only know how to apply formulas into physics problem. This way of learning is an isolation from any context. In other words, students cannot make any relation between the things that they learn in class with real life events. On the other hand, when teachers focus on meaningful learning remembering knowledge is integrated within the larger task of constructing new knowledge or solving new problems [8,9]. Meaningful learning reinforced the students newly acquired knowledge and formed a unique comprehension with past experiences and knowledge [10]. Physics Enrichment Books can become one of the solution to create meaningful learning for students since learners will find connection of the elements that learn in class to the context that they found in everyday life.

The Centre of Curriculum and Books in Indonesia defines enrichment books as a book that contained materials that can enrich and enhance the mastery of science, technology and arts. It is also important in developing individual’s personality [11]. Enrichment Books could enrich and develop the understanding and the reasoning of learners. It provides additional knowledge to textbooks which are used in class. Moreover, Enrichment books present a science-based topic that is a reality, factual, conceptual, procedural. An Enrichment Book could contextually link real life physics phenomenon with the content that students learn in school. One of the Enrichment Book that has been developed is an Enrichment Book on the study of Chordophone Musical Instruments.

This study is therefore to understand the following: 1. The use of enrichment book in learning 2. The correlation analysis of meaningful learning and learning outcomes 3. The correlation analysis of enrichment book as an essential factor of meaningful learning.

2. Method

Four sections are covered in this segment which is the sample collection, experimental design, experimental procedure and reliability and validity. This is a quasi-experimental study that examines the causality by manipulating one variable in the experimental group and compare it with the control group. Since not all variables under experimental conditions can be strictly controlled, it is impossible to manipulate all relevant variables. This study aims to understand: 1. the use of enrichment book in learning, 2. the correlation analysis of meaningful learning and learning outcomes, 3. the correlation analysis of enrichment book as an essential factor of meaningful learning.

2.1. The sample collection

This study was conducted in an eastern Jakarta Senior high school. 20 students were selected as the research sample in this study. By random distribution, the sampling was done by using random sampling technique and was divided two class. One which is in an experimental group, which composed of 9 males and 11 female students, and a control group which composed of 8 male and 12 female students.

2.2. The experimental design

The pre-test post-test non-equivalent-groups design in a quasi-experiment was selected in this study. The 20 students participated in the experimental design, answer the meaningful learning questionnaire and is tested to see the learning outcomes of both the experiment and the control books.

The experimental group applied meaningful learning through the process of reading and discussing Chordophone enrichment book. The experimental group applied meaningful, while the control group
utilized general. Both groups used identical textbooks and both groups took a pre-test (X1, X3) and post-test (X2, X4).

2.3. The experimental procedure
The study took 3 weeks to conduct the overall learning activity and was designed in four stages. The first stage consisted in studying the fundamentals of wave and sound in physics. In the second stage, the teacher explained the experimental objectives and evaluation methods, and the students were asked to take a pre-test. Then on the third stage, the different group conditions were implemented; the experimental group was given the enrichment books. The students in the experimental group read the chordophone books after every physics lesson for how many minutes, reflect, and discuss the idea of chordophone musical instruments. The enrichment books helped students to learn about waves and sounds by easily allowing them to identify the theory they have learned from textbook and class activity and discover even more knowledge from the book. In the fourth stage, all students were asked to take a post-test and the experimental group were asked to answer a questionnaire (40 min). The experimental design model was as shown in Table 1 below.

| Group               | Pre-test | Experiment                     | Post-test |
|---------------------|----------|--------------------------------|-----------|
| Experimental group  | X1 X3    | Meaningful enrichment book learning | X2 X3     |
| Control group       |          | Meaningful Learning            |           |

2.4. Reliability and validity
In order to achieve the confidence level in the measured scores, the reliability and validity of the questions and questionnaire was tested. The reliability of the scales was first to analyze in order to confirm the reliability of the questionnaire. Cronbach’s α was used to calculate the reliability of the questions and questionnaire. The reliability analysis of the service satisfaction scale is shown in Table 2. The reliability analysis of the questionnaire presents the Cronbach’s α overall meaningful learning scale appears as 0.867. This reliability is greater than the standard 0.7 which indicate that the scales present significant reliability, hence are suitable to be used in this study.

| Meaningful Learning Questions                                                                 | Mean | SD  | Cronbach α |
|---------------------------------------------------------------------------------------------|------|-----|------------|
| 1. The materials presented are suitable for learning                                        | 3.25 | 0.44|            |
| 2. The materials are understandable                                                        | 3.50 | 0.60|            |
| 3. The materials presented are related to authentic environments                            | 3.30 | 0.67|            |
| 4. The materials presented is beneficial for me                                             | 3.25 | 0.44|            |
| 5. The material presented help me to solve real life problems                               | 3.45 | 0.60| 0.867      |
| 6. The material presented help me to recall the previous knowledge that I have learned      | 3.20 | 0.69|            |
| 7. The materials presented help me to connect new concepts with previous experiences        | 3.60 | 0.59|            |

From the valid and reliable questionnaire shown in Table 2, the experimental group’s response toward the enrichment book given is calculated using Likert scale points as shown in Table 3.
Table 3. Likert scale for assessment.

| Alternative Answers | Score |
|---------------------|-------|
| Very Good           | 4     |
| Good                | 3     |
| Bad                 | 2     |
| Very Bad            | 1     |

To test the correlation between the uses of enrichment book to the learning outcomes of the students, the data obtained from the students’ pre-test and post-test is calculated to find the gain score normalization of each group as shown in equation 1 and its interpretation of the score as shown in equation 2.

\[
< g >= \frac{Post\ Score - Pre\ Score}{Maximum\ Score - Pre\ Score} \quad (1)
\]

\[
%\ interpretation\ score = \frac{\sum\ acquisition\ score}{\sum\ maximum\ score} \times 100\% \quad (2)
\]

From the gain normalization result, the gain value range is obtained as shown in Table 4.

Table 4. Range of gain values.

| Gain Values | Interpretation |
|-------------|----------------|
| \( g < 0 \) | There was a decline |
| \( g = 0 \) | Nothing changes |
| \( 0 < g < 0, 3 \) | Low improvement |
| \( 0, 3 \leq g \leq 0, 7 \) | Medium improvement |
| \( g > 0, 7 \) | High improvement |

3. Result and discussion

The research result analysis aims for the research objective in the introduction which is to understand the following: 1. the use of enrichment book in learning, 2. the correlation analysis of meaningful learning and learning outcomes, 3. the correlation analysis of enrichment book as an essential factor of meaningful learning.

3.1. The correlation analysis of enrichment book as an essential factor of meaningful learning

The questionnaire sheet was given to all experimental group participants. Table 5 below shows the student’s response of the enrichment book that they read.

Table 5. Results of the students’ questionnaire.

| Indicator | Score |
|-----------|-------|
| The materials presented are suitable for learning | 81% |
| The materials are understandable | 88% |
| The materials presented are related to authentic environments | 84% |
| The materials presented is beneficial for me | 81% |
| The material presented help me to solve real life problems | 86% |
| The material presented help me to recall the previous knowledge that I have learned. | 80% |
| The material presented help me to connect new concepts with previous experiences | 90% |
| Average (Very good) | 84% |
Based on the data on table 5 above, it appears that students who have used or read the chordophone enrichment book chordophone recognize that their learning is more meaningful.

3.2. Correlation analysis of meaningful learning and learning outcome

Pre-test and post-test given to all students to know the correlation between meaningful learning and learning outcome of the students. The Pre-test and post-test questions are made correspond to the authentic real life physics phenomenon. The data obtained are as follows in table 6.

| Test   | Control Group | Experiment Group | N  |
|--------|---------------|------------------|----|
| Pre-test | 47.02         | 46.88            | 20 |
| Post-test | 62.34         | 71.79            | 20 |
| Gain    | 0.29          | 0.47             |    |

Based on the data on table 7 above, it shows that the gain score of the learning outcomes from experimental group is higher than the control group.

3.3. Observation

Students in experimental class showed a very high enthusiasm when reading and realized that the material they had learned during the classroom was actually their everyday life phenomenon.

Figure 1. Students find the application of Physics to phenomena in everyday life.

Figure 2. Students brainstorm the application of Physics to the phenomenon that is often encountered.
4. Conclusion
Based on the results of research and discussion, it can be concluded that enrichment book can create meaningful learning for students. Enrichment book can be used thought classroom learning to create an authentic environment for students and a meaningful learning proofs to shows positive correlations with learning outcomes. Through the observation, authors saw a great deal of difference among the students in the experimental class and control class. Students in experimental class shows a great enthusiasm while reading the enrichment book and discussing about the physics phenomenon in real life. They feel a lot more meaningful when they know that the theory they learn in class is actually really close to their real life context.

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