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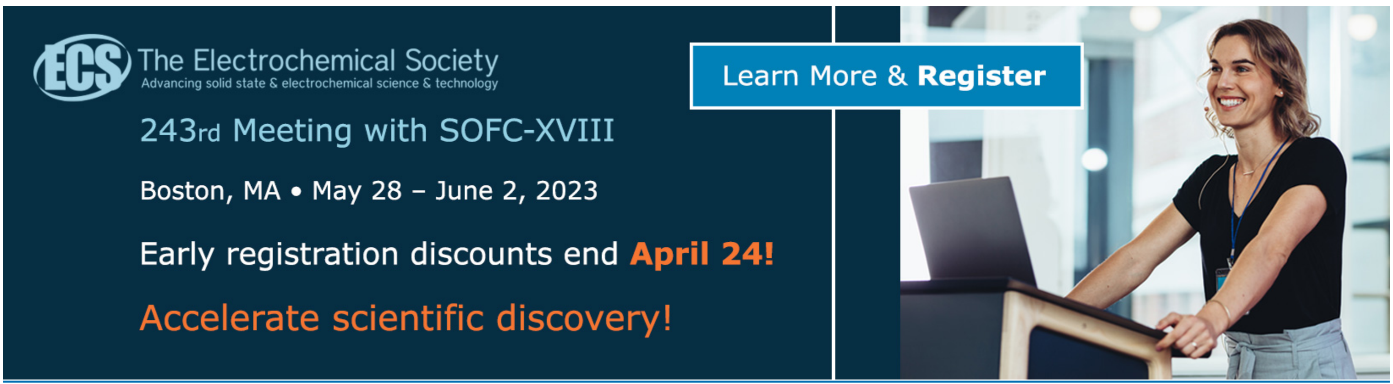

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Proceeding of 1st International Conference of Education on Science, Technology, Engineering, and Mathematics (ICE-STEM)

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Proceeding of 1st International Conference of Education on Science, Technology, Engineering, and Mathematics
(1st ICE-STEM) 2017

Preface

Science, Technology, Engineering, and Mathematics (STEM) has become a remarkable headline in todays' world. It is an educational program developed to prepare students in improving competitiveness in the fields of science, technology, engineering, and mathematics. It aims to foster inquiring minds, logical reasoning, and collaboration skills. Mathematics as the queen of science can support the blooming STEM for better education in the 21st century. Mathematics pervades every part of our dynamic lives. To succeed in this new information-based and highly technological society, developing mathematics proficiency is the inevitable consequence. Hence, the role of mathematics in STEM development is essential. It is needed a forum to discuss the role of mathematics in STEM development. Therefore, the First International Conference of Education on Science, Technology, Engineering, and Mathematics (ICE-STEM) held and took place in Jakarta on October 17th-19th, 2017. The conference was organized by University of Muhammmadiyah Prof. DR. Hamka (UHAMKA) in collaboration with Indonesian Mathematical Society (Indo-MS).

There were 186 participants from countries all over the world attended the conference. The scientific program consisted of in total 136 talks, a big part of them presented in 15 mini-symposia. Four talks were invited plenary lecturers given by Budi Nurani Ruchjana (Indonesia), Somporn Chuai-Aree (Thailand), Kamisah Osman (Malaysia), and Imam Robandi (Indonesia). Topics included pure and applied mathematics, science, technology engineering, and science, technology, engineering, and mathematics education.

We would like to express our appreciation to many people who contributed to the success of the conference: the plenary and keynote speakers, the authors, the participants, the session chairs, and the members of the Committees who nominated plenary and keynote speakers. The editors are especially grateful to those who reviewed the manuscripts included in this special issue.

The Editors

Yoppy Wahyu Purnomo
Liszulfa Roza
Tian Abdul Aziz
Krisna Satria Perbowo
Syafika Ulfah

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New method in muon-hadron absorption on Th_x DUO_2 nano material structure at 561 MHz quantum gyro-magnetic

012078

M Hardiyanto and I R Ermawaty

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PAPER • **OPEN ACCESS**

Developing CORE model-based worksheet with recitation task to facilitate students' mathematical communication skills in linear algebra course

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Developing CORE model-based worksheet with recitation task to facilitate students' mathematical communication skills in linear algebra course

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Abstract. The purpose of this study was to develop a CORE model-based worksheet with recitation task that were valid and practical and could facilitate students' communication skills in Linear Algebra course. This study was conducted in mathematics education department of one public university in Riau, Indonesia. Participants of the study were media and subject matter experts as validators as well as students from mathematics education department. The objects of this study are students' worksheet and students' mathematical communication skills. The results of study showed that: (1) based on validation of the experts, the developed students' worksheet was valid and could be applied for students in Linear Algebra courses; (2) based on the group trial, the practicality percentage was 92.14% in small group and 90.19% in large group, so the worksheet was very practical and could attract students to learn; and (3) based on the post test, the average percentage of ideals was 87.83%. In addition, the results showed that the students' worksheet was able to facilitate students' mathematical communication skills in linear algebra course.

1. Introduction

Mathematics is a science whose concepts are arranged continuously, so to learn a concept, one has to master the previous concept called pre-requisite. This also applies to linear algebra courses. Linear algebra is one of the foundations of knowledge in higher mathematics courses such as numerical methods, differential, and other equations. Basic competencies to be achieved after studying linear algebra are mastery of the matrix and its operations, the system of linear equations and solutions, and their vectors and transformations. Kaltz [1] states that *"Algebra: Gateway to a technology Future"*. This shows that algebra has an important position in the development of science and technology.

Basically, algebra is not entirely new material for students, because it has previously been studied at elementary and secondary levels. This is in line with what has been stated by Mason as quoted by Becker and Rivera [2] that every students who starts school has demonstrated the ability to generalize and abstract certain cases and those things are the basic of algebra.

Linear algebra lectures are inseparable from the existence of mathematical communication activities. The communication relates to the delivery of messages/information from one party to another party. Lecturers cannot directly know the contents of the mind or student opinions without any communication. There are two reasons why learning mathematics focuses on communication, namely: (1) mathematics is essentially a language; and (2) mathematics and mathematics learning are, at heart, social activities [3].

Mathematics is a universal language, so by using mathematical form of communication, ideas and opinions possessed by a person can be conveyed clearly, precisely and briefly without having to be hampered by various local languages. In addition, mathematics is a form of social activity which involves various parties such as students and lecturers.

Ability of mathematical communication in the classroom will encourage students to respond based on various interpretations of the problems given by lecturers. Responses submitted by students to be a reference assessment by lecturers based on indicators of mathematical ability. Indicators that can be used to assess the ability of mathematical communication, to wit: (1) stating a situation, image, diagram, or real object into language, symbol, idea, or mathematical model; (2) explaining ideas, situations, and mathematical relations both orally and in writing; (3) listening, discussing, and writing about mathematics; (4) reading with the understanding of a written mathematical representation; and (5) revealing a mathematical description or paragraph in its own language [4]. Mathematical communication is generally divided into two, namely communication indicators in writing and oral. The indicators used in this research are written communication, namely (1) declaring a situation, image, diagram, or real object into language, symbol, idea, or mathematical model; (2) explaining the idea, situation, and mathematical relations in writing; and (3) revealing a mathematical description or paragraph in its own language.

The importance of mathematical communication skills is not yet in line with its implementation in classrooms. Although algebra has been introduced since elementary schools, there are still some students who still have difficulty in following linear algebra lectures. The problems that often occur in the class of linear algebra are, for example giving a story problem in the form of linear equations, asking to create a graph in accordance with the conditions given, and looking for possible settlement. Some students still make mistakes in the use of notation, for example, the notation of a matrix[ ]written as | |, which is the symbol of the determinant of matrix. In addition, there is also the problem of writing matrices and operations, such as writing a trace matrix as A^Twhich means the transpose matrix and errors in the use of problem solving algorithms. On the story problem, most students have difficulty in declaring the story into mathematical symbols, such as making a mathematical model. Other possible problem is students' difficulties in preparing argument, for example on problems that ask them to write reason in systematic and detailed problem solving. The problem that is seen during the lecture process in the classroom and also during the quiz and mid or end of the semester exam. The score of the students' linear algebra test is still largely low on the story and picture problems, whereas the material tested has been studied previously. These problems indicate the still low mathematical communication ability of students in linear algebra courses.

The problems found in lectures of linear algebra are such as less effective and efficient teaching materials. The material presented in textbooks is largely unstructured according to the curriculum used. In addition, the material contained in the book to be taught and the problems in the book sometimes less appropriate with the level of students' ability. Such teaching materials sometimes make students to have difficulty in seeking reference sources other than those described by the lecturer during the course. Lack of reading resources, references, and examples of problems might result in class conditions that tend to be passive. The students usually only focus on finding the results of a number of problems given by the lecturer. Students are less familiar with different questions. Therefore, various ways to communicate mathematically are less likely to be facilitated. The effort to overcome these things is to develop an appropriate teaching material. The intended teaching materials are those can facilitate students to develop students' mathematical communication skills. One of the teaching materials is students'worksheet.

The use of students' worksheet is to help students shape their own understanding and communicate every ideas in the form of numbers, pictures, graphics, diagrams, words as well as other forms of written communication individually. Students' worksheet developed are teaching materials that contain short material useful as a reference for students to understand the material, but not presented thoroughly. In addition, the students' worksheet also contains various presentation of varied issues, so that students could be facilitated to communicate mathematically in linear algebra lectures. The variation in the given problem provides an opportunity for students from various levels of mathematical ability to be able to communicate mathematically.

The use of students' worksheet in the linear algebra classes should be supported by classroom conditions that are more conducive such as in group-based learning model i.e. the CORE model. The application of the CORE model leads students to perform four frameworks proposed by Miller and Calfee, namely connect, organize, reflect, and extend [5]. Based on these four frameworks, it is found that the stage in the CORE model is connecting old knowledge with knowledge to be learned, organizing knowledge based on relevant and reasonable sources, carrying out reflection on various issues that have been discussed, and deepening and expanding the concept by applying these concepts to further mathematical problems.

CORE model requires students to learn and comprehend the concept thoroughly and continuously so that the lecturer should get students to make preparation before starting the lesson such as giving assignment. The task given before presenting new knowledge is called a recitation task. According to Pasaribu [6], a recitation task is a form of task that is not only aimed at memorizing but also contemplating its contents, representing it in own words, understanding, and interpretation. The assignment aims at reviewing new lessons, memorizing knowledge given, solving problems, collecting materials, giving exercises, assisting lecturers in enhancing more lecturers and in assessing students' readiness and mastery of a lecture material. Therefore, the task should not only be given after lecture, but also can be given beforehand. Giving task before commencing lesson is still rare conducted by most lecturer [7]. It is revealed that the tasks assigned by teachers tend to be carried out at the end of the lesson so that in the process of learning mathematics, most mathematics teachers always use lecture and expository methods [7]. This is not only happening at school but also on classes in higher education. Most lecturers tend to give tasks after teaching a material. Therefore, researchers designed a task given before a lecture so that students have prepared to learn a new material in the next lecture.

Until now, researchers have not found the CORE model-based student' worksheets and recitation assignments aimed at providing student learning aids in linear algebra courses so that students' mathematical communication skills are facilitated effectively and efficiently. Therefore, researchers are interested in conducting and developing the study. The research questions are as follows:

1. How to develop a CORE-based students' worksheet model and provide recitation tasks to facilitate students' mathematical communication skills?
2. What is the student's mathematical communication skill after attending CORE model-based students' worksheet and providing recitation task?

2. Methodology

This research is a sort of development research on linear algebra lecture. This research was conducted to thirty students of mathematics education department of one public university at Riau in the even semester of the academic year 2015/2016. The development procedure of this model uses a model developed by Lee and Owens, namely ADDIE that uses five stages of development i.e. analysis, design, development, implementation, and evaluation [8]. Analysis stage consists of two steps, to wit: needs assessment and front-end analysis (preliminary analysis). The design stage includes activities determining: (1) the schedule, (2) the work team, (3) the design specification, (4) the creation of the material structure, and (5) the evaluation. At this stage, evaluation is carried out by media and material experts. The next stage is development stage which is a trial stage before implementation. The trial consisted of a small group trial consisting of seven people and a large group trial consisting of thirty people. The next stage is implementation which is the application of student worksheets developed. At this stage of implementation, researchers will conduct field trials, which aims to determine whether the resulting product has a good effectiveness in learning. The final step is the evaluation. It is conducted to see the effectiveness of students' worksheet that has been developed.

3. Results and Discussion

The development of a CORE-based students' worksheet model with recitation assignment takes three months (March-June) of 2016. Components contained in students' worksheet developed in linear algebra lectures on matrix materials are as follows:

a. Cover consisting of material title, author's name, course and so on.
b. Preface and table of contents.
c. Lecture materials consisting of pre-requisites for students' worksheet, students' worksheet instructions, material summaries and lecture evaluation questions corresponding to the four stages of the CORE model, as well as recitation tasks.
d. References, about the author.

The students' worksheet developed was validated by media and material experts. Result of the validation showed that the students' worksheet made in the category is very valid. However, there are some things that need to be revised: (1) the use of language should be more practical and concise; (2) the problem should be varied from the easiest to the most difficult; and (3) the material distribution for one lecture should not be too much.

Based on the experts' suggestions, a revision was made to the students' worksheet. After revision, a small group of seven students was tested. The result of the response obtained the average percentage is 92.14% so it can be categorized very practical. Then tested in large groups consisting of thirty students and obtained the average percentage is 90.19% and is categorized very practical. After conducting the two trials, it might be concluded that the students' worksheet that has been made was good. The next stage is implementation stage conducted to see the effectiveness of the lectures. The students' worksheet was used and implemented using the CORE model along with the assignment of recitation tasks. The recitation task was given at the end of each students' worksheet at each meeting as a direction for the next meeting.

The students' activity sheet filled by the observer showed that the students were actively involved in learning process using the developed students' worksheet. Students were able to work on the worksheet in accordance with the guidance provided, address problems correctly, and inquire and maintain actively the results of work either with group members or with other groups. The lecture process using this developed worksheet led students to interact actively with other group member in an effort to understand the material and solve the various mathematical problems given. Reflection and conclusions on the materials of each student might be different even in the same group. The reason is that the worksheet provided an independent evaluation sheet to assess the extent to which students' mathematical ability could be obtained. After that, each group presented the solutions to the existing problems. At the end of the lecture stage, the quiz was given for students to be solved individually.

4. Conclusions

Student activity in linear algebra lectures uses the worksheet developed in line with the score of the final evaluation result (post-test). The result of post-test data analysis of students' mathematical communication skills showed that the average of ideality percentage was 87.83% (high category). The results of this assessment show that lectures of linear algebra using CORE model based student's worksheet with recitation tasks were able to facilitate students' mathematical communication skills. The result of post-test showed that there were minimal mistakes of using symbols / mathematical terms, most of the students have been able to read the table/graph / diagram according to the command in the given problem. Students were getting used to doing mathematical modeling although there were still some errors in the completion algorithm. However, differences of mathematical communication skills between students who use and who do not use students' worksheet-based model CORE along with recitation tasks need to be investigated in further research using quasi-experimental research.

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References

1. Kaltz. V, J 2007 *Algebra: Gateway to a Technological Future* (University of the District of Columbia:Columbia)
2. Becker, J.R. and F.D. Rivera 2008 Generalization in Algebra: The Foundation of Algebraic Thinkingand Reasoning Across Grades *ZDM Mathematics Education* **40** 1
3. Baroody, AJ. and Niskayuna 1993 *Problem Solving, Reasoning and Communicating, K-8. Helping Children Think Mathematically* (Merril Publishing Company: New York)
4. Sumarmo, Utari 2010 *Berpikir dan Disposisi Matematik: Apa, Mengapa, dan Bagaimana Dikembangkan Pada Siswa* (FPMIPA UPI:Bandung)
5. Miller, R.G. and Calfee, R.C 2004 Making Thinking Visible: A Method to Encourage Science Writing in the Upper Elementary Grades *Science and Children* 42 **3** pp 20
6. Pasaribu, I.L 1999 *Didaktik dan Metodik* (Tarsito:Bandung)
7. Wahyudin 1986 *Kemampuan Guru Matematika, Calon Guru Matematika, dan Mahasiswa Dalam Mata Pelajaran Matematika. Studi Terhadap Tingkat Penguasaan Guru Matematika, Calon Guru Matematika, dan Mahasiswa dalam Mata Pelajaran Matematika, serta Kemampuan Mengajar Para Guru Matematika* (Thesis Universitas Pendidikan Indonesia: Bandung)