Proceeding
International Seminar on Mathematics, Science and Computer Science Education
2013

Turning Dreams into Reality: Current Trends in Mathematics, Science and Computer Science Education

Head of MSCEIS: Dr. Sufyani Prabawanto, M.Ed.
Secretary: Didik Proyandoko, S.Pd., M.Si., Ph.D.
Treasure: Dr. Wawan Setiawan, M.Kom.
Secretariat: Yayang Sanjaya, S.P., M.Si., Ph.D.

Editors:
Prof. Dr. Rr. Hertien K. Surtikanti, M.Sc.E.S.
Prof. Dr. Anna Permanasari, M.Si
Prof. Dr. Munir, MIT
Drs. Turmudi, M.Ed., M.Sc., Ph.D.
Dr. Ida Kaniaawati, M.Pd
Dr. Diana Rochintaniawati, M.Ed.
Dr. Stanley Dewanto
Dr. rer.nat. Mufti Petala Patria, M.Sc.

Published by:
Faculty of Mathematics and Science Education
Indonesia University of Education
Jl. Dr. Setiabudhi No. 226 Bandung 40154 West Java, Indonesia
Official website: http://fpmipa.upi.edu
PREFACE

The Seminar under the theme “Turning Dreams into Reality: Current Trends in Mathematics, Science and Computer Science Education” is conducted by Faculty of Mathematics and Science Education, UPI at October 19, 2013. The aim of the seminar is to provide a forum where teachers and researchers can exchange didactical, pedagogical, and epistemological ideas on mathematics, science, and computer science education which is expected to stimulate research in those areas. The seminar also provides an exceptional opportunity for all participants to contribute to the world of mathematics, science, and computer science education.

Some of outstanding scientists and educators from Germany, Australia, Hongkong, Malaysia, Singapore, Netherland, and Indonesia joined in this seminar made the seminar truly international in scope. There were 485 participants, had many fruitful discussions and exchanges that contributed to the success of the seminar. 153 papers discussed in the parallel session. The papers were distributed in 6 fields. 42 papers in mathematics or mathematics education, 19 papers in physics or physics education, 23 papers in chemistry or chemistry education, 25 papers in biology or biology education, 9 papers in computer science or computer science education, and are 18 papers in science education. Of the total number of presented papers, 153 included in this proceeding.

Generous support for the seminar was provided by SEAMEO QITEP in Science and Himpunan Sarjana dan Pemerhati Pendidikan IPA Indonesia. The support permitted us to gave an opportunity for a significant number of young scientists and persons from many universities and other institutions brought new perspectives to their fields.

All in all, the seminar was very successful. We expect that these future seminar will be as stimulating as this most recent one was, as indicated by the contribution presented in this proceeding.

Chief of Organizing Committee,

Dr. Sufyani Prabawanto, M.Ed.
# TABLE OF CONTENT

PREFACE ............................................................................................................. i
TABLE OF CONTENT ............................................................................................ iii
MATHEMATICS .................................................................................................... vi

1. GOAL PROGRAMMING MODEL OPTIMIZATION ON RAW MATERIALS PRODUCTION OF TANNING GOAT SKIN AND SHEEP SKIN
   Elis Ratna Wulan ............................................................................................. 1

2. THE STOCHASTIC SIS EPIDEMIC MODEL WITH VARIABLE POPULATION SIZE
   Respatiwulan, Purnami Widyaniangsih, Sri Kuntari, Irwan Susanto, Felin Yunita, Silvia Kristanti ........................................ 10

3. THE SPACE OF REAL CONTINUOUS FUNCTIONS ON \([A,B]\) AS N-NORMED SPACE
   Enjun Junaeti and Hendra Gunawan ................................................................. 16

4. OPTIMIZATION MODEL OF TRAIN SCHEDULING (A Case Study of Train Schedule in PT Kereta Api Indonesia (Persero) Daop 2 Bandung Path Bandung – Cicalengka)
   Dwi Agustina Sapriyanti, Khusnul Novianingsih, and Husty Serviana Husain .......... 22

5. CONVERGENCE OF BINOMIAL AND TRINOMIAL MODEL IN PRICING EUROPEAN OPTIONS
   Entit Puspita, Fitriani Agustina ........................................................................ 31

6. VISIBLE ALGEBRAS
   Isnie Yusnitha .................................................................................................... 40

7. SOFTWARE FOR DETERMINING THE BEST CELL PHONE PROVIDER AND PLAN
   Rini Marwati, Khusnul Novianingsih, Fitr Agustina, Entit Puspita ....................... 44

8. SENSITIVITY ANALYSIS OF LINEAR PROGRAMMING MODEL WITH PARAMETER COEFFICIENTS OF THE OBJECTIVE FUNCTION IN THE FORM OF TRIANGULAR FUZZY NUMBERS
   Lukman and Sufyani Prabawanto ..................................................................... 50

MATHEMATICS EDUCATION ............................................................................... 57

9. INFLUENCE OF PROBLEM POSING METHODE WITH MULTIMEDIA ON SPATIAL SENSE ABILITY AND MATHEMATICAL DISPOSITION OF THE TENTH GRADE STUDENTS OF VOCATIONAL SCHOOLS IN BOGOR
   Nanang Priatna and Dwi Atmojo ..................................................................... 58

10. THE APPLICATION OF PROBLEM BASED LEARNING MODEL ONLINE TUTORIAL IN MATHEMATICS CURRICULUM ANALYSIS
    Mery Noviyanti .................................................................................................. 63

11. CALCULUS LEARNING MODEL FOR PROSPECTIVE TEACHERS BASED E_LEARNING
    Supandi, Widya Kusumaningsih, Lilik Ariyanto, Ellah Nurlaelah, Turmudi ............. 70

12. PROBLEM-BASED LEARNING APPROACH USING DYNAMIC GEOMETRY SOFTWARE TO ENHANCE MATHEMATICS CRITICAL AND CREATIVE THINKING ABILITIES
    Hedi Budiman ................................................................................................. 74

13. DESIGN AND EFFECTIVENESS OF INTERNATIONAL STANDARD MATHEMATICS LEARNING PACKAGES
    Hamzah Upu, Muhammad Basri Djafar, Salam .................................................. 82
<p>| 14. | HYPNOTEACHING: A WAY TO DECREASE MATHEMATICS ANXIETY | Eline Yanty Putri Nasution | 91 |
| 15. | EFFECTIVENESS OF THE DIFFERENTIAL CALCULUS LECTURE BY USING TEACHING MATERIALS BASED ON OPEN ENDED APPROACH | Syarifah Fadillah, Eka Kasah Gorda | 101 |
| 16. | THE DEVELOPMENT OF ANALYTIC GEOMETRY TEACHING MATERIAL BASED ON SOLO TAXONOMY (STRUCTURE OF THE OBSERVED LEARNING OUTCOME) AS AN EFFORT TO ENHANCE STUDENTS’ MATHEMATICAL COMPETENCE | Eys Sudihartinih | 107 |
| 17. | THE MODIFIED LEARNING OF MODEL-ELICITING ACTIVITIES (MEAS) TO ENHANCEMENT OF STUDENTS’ STATISTICAL THINKING ABILITY AND STATISTICAL DISPOSITIONS | Bambang Avip Priatna Martadiputra | 112 |
| 18. | DEVELOPMENT LEARNING MATERIAL FOR STUDENT MATHEMATICAL THINKING ABILITY | Risnansanti | 121 |
| 19. | MATHEMATIC'S TEACHER WITH GOOD CHARACTER: A KEY FOR SUCCESSFUL IMPLEMENTATION OF CHARACTER EDUCATION THROUGH MATHEMATICS INSTRUCTION | Nurjanah | 128 |
| 20. | BABY WATER MELON FOR CREATING THE FORMULA OF CYLINDER VOLUME IN JUNIOR SECONDARY CLASSROOM: AN EXPERIENCE IN LESSON STUDY | Turmudi, Usep Suherdi, Dudung Kusmana | 133 |
| 21. | DEVELOPING STUDENTS’ 21ST CENTURY SKILLS THROUGH INDONESIAN REALISTIC MATHEMATICS EDUCATION: AN ALTERNATIVE APPROACH | Anisa Fatwa Sari | 146 |
| 22. | ABDUCTIVE-DEDUCTIVE STRATEGY: HOW TO APPLY IT IN IMPROVING STUDENT MATHEMATICS LITERACY IN JUNIOR HIGH SCHOOL? | Ali Shodikin | 154 |
| 23. | USING METAPHORICAL THINKING APPROACH IN ENHANCING JUNIOR HIGH SCHOOL STUDENTS’ MATHEMATICAL REASONING | Nurbaiti Widyasari, Jarnawi Afgani Dahlan, and Stanley Dewanto | 167 |
| 24. | THE DEVELOPMENT OF MATHEMATICS WORKSHEET BASED ON CRITICAL ACTIVITIES FOR JUNIOR HIGH SCHOOL STUDENTS | Rahayu Kariadinata, Wati Susilawati, Istikomar | 172 |
| 25. | IDENTIFYING STUDENTS’ MISTAKES IN SOLVING THE PROBLEM ABOUT SET THEORY | Nila Kesumawati | 177 |
| 26. | USING GEOGRAPHIC SPECIFIC CONTEXT IN LEARNING MATHEMATICS TO ENHANCE CREATIVE THINKING SKILLS OF SECONDARY SCHOOL STUDENTS | Kadir and La Masi | 182 |
| 27. | INSTRUMENT OF MATHEMATICS HIGH-ORDER THINKING SKILLS OF JUNIOR HIGH SCHOOL STUDENT | Sri Hastuti Noer | 189 |
| 28. | LEARNING GEOMETRY THROUGH PACE MODEL ASSISTED GEOGEBRA AS EFFORT TO IMPROVE MATHEMATICAL COMMUNICATION AND REASONING ABILITIES IN JUNIOR HIGH SCHOOL STUDENTS | Nurfadilah Siregar | 194 |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.</td>
<td>THE ANALYSIS OF ALGEBRAIC THINKING SKILLS OF THE STUDENT IN SECONDARY SCHOOL</td>
<td>Yumiati</td>
<td>203</td>
</tr>
<tr>
<td>30.</td>
<td>DEVELOPING INSTRUCTIONAL INSTRUMENTS OF MATHEMATICS USING THE GROUP INVESTIGATION MODELS TO ENHANCE MATHEMATICAL REASONING SKILLS OF PRESERVICE TEACHERS</td>
<td>Cita Dwi Rosita, St. Budi Waluya, Hartono</td>
<td>213</td>
</tr>
<tr>
<td>31.</td>
<td>RECONTEXTUALISING DIDACTICAL SITUATIONS IN PRIMARY MATHEMATICS INSTRUCTION</td>
<td>Endang Mulyana, Tatang Suratno, Didi Suryadi</td>
<td>218</td>
</tr>
<tr>
<td>32.</td>
<td>CRITICAL THINKING ABILITY AND EMOTIONAL INTELLIGENCE IN MATHEMATICS LEARNING</td>
<td>Saleh Haji</td>
<td>224</td>
</tr>
<tr>
<td>33.</td>
<td>CONTRIBUTIONS THE MATHEMATICAL THINKING OF STUDENTS ABILITY TO WRITE ARGUMENTS ON PGSD</td>
<td>Karlilah</td>
<td>229</td>
</tr>
<tr>
<td>34.</td>
<td>EFFECT OF REACT MATHEMATICS LEARNING STRATEGY ON THE IMPROVEMENT OF JUNIOR HIGH SCHOOL STUDENTS MATHEMATICAL UNDERSTANDING, REASONING, AND COMUNICATION SKILLS</td>
<td>Ena Suhena Praja</td>
<td>237</td>
</tr>
<tr>
<td>35.</td>
<td>CLASSROOM REFORMATION ON MATHEMATICS LEARNING (Learning from Misconception through Lesson Study)</td>
<td>Karso and Ade Rohayati</td>
<td>248</td>
</tr>
<tr>
<td>36.</td>
<td>IMPROVING THE SIXTH GRADERS’ COMPREHENSION ON PERCENTS CONCEPT USING PERCENTAGE BAR</td>
<td>Achmad Badrun Kurnia</td>
<td>254</td>
</tr>
<tr>
<td>37.</td>
<td>DIDACTICAL DESIGN OF KITE AREA DIMENSIONAL CONCEPT ON MATHEMATICS LEARNING IN THE FIFTH GRADE OF ELEMENTARY SCHOOL</td>
<td>Aji Setiaji and Epon Nur’aeni</td>
<td>266</td>
</tr>
<tr>
<td>38.</td>
<td>EXPERT JUDGMENT MATHEMATICS LEARNING DEVICES ON EXTENSIVE MATERIAL CUBE AND CUBOIDS-BASED ANCHORED INSTRUCTION</td>
<td>Lilik Ariyanto</td>
<td>273</td>
</tr>
<tr>
<td>39.</td>
<td>DESIGN RESEARCH: PLACE VALUE IN DECIMAL NUMBERS USING METRIC SYSTEM</td>
<td>Ekasaty Aldila Afrriansyah</td>
<td>281</td>
</tr>
<tr>
<td>40.</td>
<td>THE ENHANCEMENT OF MATHEMATICAL COMMUNICATION THROUGH METACOGNITIVE SCAFFOLDING APPROACH AMONG PRESERVICE ELEMENTARY SCHOOL TEACHERS IN BANDUNG</td>
<td>Sufyani Prabawanto and Wahyudin</td>
<td>288</td>
</tr>
<tr>
<td>41.</td>
<td>USING DYNAMIC GEOMETRY SOFTWARE TO SOLVE CHALLENGING PROBLEM IN GEOMETRY</td>
<td>Joko Suratno</td>
<td>298</td>
</tr>
<tr>
<td>42.</td>
<td>ENHANCING STUDENTS’ MATHEMATICAL REASONING IN JUNIOR HIGH SCHOOL THROUGH GENERATIVE LEARNING</td>
<td>Yaya S. Kusumah and Eva Dwi Minarti</td>
<td>304</td>
</tr>
</tbody>
</table>
CALCULUS LEARNING MODEL FOR PROSPECTIVE TEACHERS BASED E_LEARNING

Supandi(1), Widya Kusumaningtyah(1), Lili Ariyanto(1), Elijah Nurzaelah(2), Turmudi(2)

(1)Department of Mathematics Education, IKIP PGRI Semarang, Indonesia. (2)Department of Mathematics, University of Indonesia Education

ABSTRACT

Information and communication technology (ICT) is a set of tools and other technologies that are used for the manufacture, storage, management and communication of information. ICT is used in education to support the teaching and learning process in collaboration with student activity. This study focused on the development of learning tools in the form of Lesson Plan and the Student Worksheet to improve the creativity of students in the learning process. From the creativity of students is presented in the form of their work in completing the Student Worksheet. In Student Worksheet has also been on the characters that have been written in the indicator in the Lesson Plan. This research is using a learning-based Learning Management System (LMS) with Moodle application. Through the application of Moodle LMS with the characters that appear include: discipline, responsibility, self-contained. The research was conducted in the Department of Mathematics Education at Teachers’ Training College (IKIP PGRI) Semarang Calculus course for first year students. A questionnaire has been administered for collecting the data. The results of this research are: learning using ICT, which is characterized by the development of learning tools and enhanced student’s creativity, as well as advantages and disadvantages of learning using ICT.

Corresponding Author:
Supandi
Department Of Mathematics Education , IKIP PGRI Semarang, Indonesia
Phone : 081383101134
Email : hspandi@gmail.com

1. INTRODUCTION

Learning in Teachers’ Training College Calculus PGRI Semarang current study focuses on the development of cognitive abilities but rather over ride character education. Results of research that has been conducted in Teachers’ Training College PGRI Semarang conclude that e-learning is used in an effective web-based learning. Previously, Ariyanto [1], also conducted a study on the material Geometry, Geometry conclude that learning using multimedia such as instructional video is very effective to increase the activity and motivation f learners. Character in the learning achieved include improving student discipline and creativity that has a positive effect on student learning outcomes.

Mathematics education requires a new paradigm made innovations and integrated learning, including using ICT media. As one example of the results of research Rosenberg [2], states that e-learning that uses Internet technology to transmit a series of solutions to improve the knowledge and skills of students buzzing. This is supported by the Ritz [6] states that the useful application of technology to aid learning and increase knowledge. This can be done by integrating technology into science and maths. The research of Manuela Paecler, Brigitte Maier [3] showed that when the concept of a material science or applied already obtained expertise in student learning will refer to a top advance, whereas when the independent learning skills already acquired, refer students to online learning. While Prayito [5] in his research concluded that e-learning has been implemented which provide good impact is that it can complete the learning outcomes of students and foster active learners.

On the other hand character education through a planned effort that planting system behavior values (character) to resident education, which includes knowledge, awareness and volition, and actions will shape the whole person[7]. Since one of the goals of character education by Su’ud, et al[7] is to develop students'
ability to be self-sufficient, human, creative, responsible, and insightful nationality. The results that have been done [5] that explores the character education lesson study shows that through the character of students, among others, discipline, responsibility, and ability to work together to increase. Results of this study indicate that the use of models of learning can increase and develop character.

The main problem that researchers to design a learning model-based e-learning as what is appropriate for students is the creation of an e-learning classroom learning. The purpose of this study is to develop a learning tool to improve student academic achievement through instructional design-based e-learning. In particular, the purpose of this study was the generation of design-based learning e-learning. The products 

2. RESEARCH METHOD
Preparation of design and the learning is done in a laboratory scale. Activities to be carried out include:

a. Conducting Needs Analysis
Needs analysis was conducted to determine Calculus-based Learning Design E-learning as to what is appropriate to foster student creativity and character. PGRI Semarang Teachers Training College. Needs analysis was conducted by observation, interviews with the lecturer of the course of Calculus, and reviewing the results of previous studies as well as literature from books, papers, and articles.

b. Compile Draft Learning Design
At this stage of planning to make the draft Design Learning Calculus-based e-learning to foster creativity and character, preparing materials and material sources.

c. Validate Draft Learning Design
Results of drafting Calculus-based learning design e-learning to foster creativity and character first tested the validity of the experts involved 6 people consisting of 2 people Calculus matter expert, 2 expert evaluation and learning, and 2 multimedia expert. Validation is intended to anticipate user error. Matter experts provide an assessment of the content of the material, learning experts assessing aspects of learning, while the multimedia experts provide an assessment of the aspects of the display and programming aspects. Data validation results matter experts, learning experts and multimedia specialists consider to revise the calculus-based learning design e-learning to foster creativity and character.

d. Revised Draft Learning Design
Validas by a team of experts, instructional design instructional materials and devices that have been validated to be repaired if there are discrepancies or errors in the draft, then revise the draft research design the learning according to the records and input from expert validation. The results of this revision to the students and then tested on a small scale the individual trials.

3. RESULT AND ANALYSIS
Development carried out in this study is the form of lesson learning, learning-based Student's Worksheet and e-learning. In this research, E-learning using learning management system (LMS).

3.1. Lesson Plan
The validator obtained from the assessment feedback, corrections, and suggestions are used as consideration in doing repair or revision lesson plan. Discussions with the validator while other revisions can be seen in Table 1. From Table 1, Lesson Plan general improvement lies in how the character and creativity appear explicitly in the learning process. Thus it can be used lesson plan clearly and can be used by anyone who uses it.

<table>
<thead>
<tr>
<th>o</th>
<th>Before Validation</th>
<th>After Validation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators of cognitive load on the Lesson Plan, Affective and Psychomotor Character appears on each indicator Creativity in Lesson Plan had entered in the indicator</td>
<td>Indicators on the RPP enough on Cognitive and affective. Desirable traits must not appear all Creativity is more explicitly visible in the indicator</td>
<td>Adapted to the material Customizable characters designa material</td>
<td></td>
</tr>
</tbody>
</table>
3.2. Student Worksheet

The validator obtained from the assessment feedback, corrections, and suggestions are used as consideration in doing repair or revision Student Worksheet. Some errors and suggestions validator can be seen in Table 2. In the Student Worksheet improvement is more on the questions presented in it can be a guide for students, so that students become creative mindset and not monotonous. In relation to questions about the Student Worksheet presented contextually so that students will be many different perspectives, but remains in critical thinking to find solutions of each of each matter.

<table>
<thead>
<tr>
<th>o.</th>
<th>Before Validation</th>
<th>After Validation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student’s Worksheet contains questions guided exercises</td>
<td>The questions and exercises should be building concept</td>
<td>Student creativity can flourish</td>
</tr>
<tr>
<td></td>
<td>About the matter presented in the abstract</td>
<td>Problem presented contextually</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Revision Student Worksheet

3.3. Advantages and disadvantages of E-learning

Design of e-learning instructional media as in Figure 1 below brings benefits to students that students can access lecture material anytime and anywhere as long as it has a connection to the internet. Students can do their job without having to follow lectures and to collect the duties well. With the use of e-learning in the student can work independently so the ideas can be written in the work of Student’s Worksheet. Students can interact with the professor candidly and freely regardless of others’ opinions. Thus students will increase the sense of responsibility towards himself in following the learning process.

![Figure 1. Design E-learning Calculus I](image-url)
Weaknesses of learning by using-learning or ICT in general the learning process ridak appear. Because that leads into the ICT-based learning ore-learning is the result rather than the process. Communication between students and students and even students with the professor could be very limited. So emotional, or learning discussions that appear as the lecture material alone, do not touch on things like how the social nature of communication inworking together is not visible in the process.

4. CONCLUSIONS
Design learning tools such as lesson plans and Student’s Worksheet in ICT-based learning in e-learning opportunities for students to be able to think creative in exploring the information lectures. Creativity is still within the framework of critical thinking is to look for a solution of the problem issues in the lecture Calculus I. So that characters such as self, responsibility, confidence will remain in the student mindset. With learning support learning e-learning more open to ideas.

REFERENCES