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Preface

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Preface

Following up on efforts to improve the quality and quantity of international publications of lecturers and students of UPI (Indonesia University of Education) Postgraduate Schools, Master Program in Chemistry, Physics, Biology, Science and Mathematics Education and Doctor Program in Science and Mathematics Education collaboratively conducted International Conference on Mathematics and Science Education 2019 on Saturday 29 June 2019 at the Grand Mercure Setiabudi Bandung.

The theme of the conference was "Mathematics and Science Education Research for Sustainable Development", with coverage of Mathematics Education, Physics Education and STEM (Science, Technology, Engineering and Mathematics).

The main objective of this conference is to improve the academic atmosphere within the UPI environment, particularly at the UPI Postgraduate School and strengthen the lecturer and student publications through the International Conference on Mathematics and Science Education (ICMScE)2019. Specific objectives to be achieved regarding this conference are (1). Increase the number of scientific publications of lecturers and Postgraduate students in conference proceedings, and (2). Increase the number of citation index lecturers and students of the UPI Graduate School in the Master Program in Chemistry, Physics, Biology, Science and Mathematics Education and Doctor Program in Science and Mathematics Education.

At the Main Session, presentations were held and presentations were followed by discussions from 5 Keynote Speakers namely Prof. P. John Williams from Curtin University Australia, Prof. Kin Eng Chin from Flinders University Australia, Prof. Jun-Ki Lee from Chonbuk National University of South Korea, Prof. Shein Shin from Chungbuk National University in South Korea and Prof. Minshu Ha from Kangwon National University of South Korea. The Plenary Session has presented a presentation followed by discussion from 5 Invited Speakers namely Prof. Liliasari (Chemistry Education), Prof. Nuryani Rustaman (Biology Education), Prof. Ari Widodo (Science Education), Dr. Parsaoran Siahaan (Physical Education) and Dr. Al-Jupri (Mathematics Education). At the Parallel Session, presentations and presentations were held followed by discussions from 269 presenters (263 presenters from Indonesia, 3 presenters from South Korea, 1 from Thailand, 1 from Malaysia, and 1 from Britain). At the Session Poster 139 presenters were present and presented the poster. The total participants were 423 people with the number of presenters as many as 408.

I would like to thank those who supported ICMScE 2019, especially the advisory board, scientific committee, and organizing committee for their invaluable contribution in organizing the conference and in the peer-reviewing process of selected papers. I sincerely hope that ICMScE 2019 had been a forum that facilitated excellent discussions for improving the quality of research and development of science education that promoted collaborative researches among participants.

Chairman of the Committee,

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PHOTOS OF EVENT

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Peer review statement

All papers published in this volume of *Journal of Physics: Conference Series* have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

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Self-regulated learning (SRL) design to enhance student achievement in the environmental science course facilitating by e-learning

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Self-regulated learning (SRL) design to enhance student achievement in the environmental science course facilitating by e-learning

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Abstract. This research is based on the characteristics of dependently the second semester students in college who do not have the readiness to learn independently as needed. The purpose of this study is to develop self-regulated learning (SRL) design for environmental science course facilitating by e-learning. This development research was adapted from the 4D Thiagaradjan development model. The results showed that: (1) SRL design consist of seven stages which do in class and online through e-learning; (2) the validation of the learning design concept is 97% and instrument validation is 87.5%, it is concluded that the design good and feasible to be used in the class; (2) there are differences in student learning outcomes, the results of pretest 62 and posttest 75.4, n-gain results are 0.35 or medium category, which means the design is effective to enhance student achievement.

1. Introduction

Based on the Indonesian national qualification framework, graduates with sixth level are required to have capability to apply, assess, design, use of technology, and problem-solving. This competency can be achieved if the college curriculum and educators facilitate students. On the other hand, learning awareness and their efforts are important considering that information or guidance can be accepted by students if they have awareness and want to changes themselves.

First year is a transitional period. A student usually still adapts the learning method [1]. Students can control their study by observing, assessing, and responding to themselves [2]. The ability to self-regulate and awareness to develop their knowledge in the learning process is called the ability of Self-Regulated Learning (SRL). Student-centered learning is suitable for learning because it can increase motivation, interest, creativity, initiative, independence, and enthusiasm for learning [3]. Besides, students must be guided to have good SRL ability so they have an effort that supports them in the learning process. SRL will help students of understanding about goal setting, time management, learning strategies, self-evaluation, self-motivation, and self-interest. Moreover it also helps them to realize what the exact time he needs friends or lecturers help [4]. SRL become an important topic in educational research in the last two decades because it can train students to organize their learning and increase their achievement [5]. SRL conceptualized as a cyclical process with three phases namely forethought, performance and self-reflection [6]. This phase is cyclic because each process in each stage of self-regulation affects the next phase.

E-learning can be used to train SRL's capabilities for students, e-learning can help SRL implementation if used to attract students' interest, task assignments, assessment or giving feedback quickly to student's assignments. SRL learning requires students to learn independently, this is in accordance with e-learning that requires students to be independent in completing the assignments that they get. E-learning would be more effective as an interactive learning if knowledge construction strengthened with class and online discussions [7]. This method will be effective in teaching SRL because e-learning will complement the shortage of class learning.

2. Methods

The research model used in this study was adapted from the development model 4-D by Thiagarajan [8]. Step in the 4-D development model are define, design, develop and disseminate. At the define stage, researchers analyze problems in learning, students, and curriculum analysis. At the design stage, researchers plan SRL design steps for e-learning based on the theory and problems, so the findings could be a solution for the problems. At develop stage researchers analyze the prototype, do validation, do revision and do class test. The validator assessed the prototype steps of design SRL in e-learning based on aspects of learning, language and learning instruments. The class test was conducted at the Biology Education, Faculty of Teacher Training and Education, the University of Jember in academic year 2018/2019 using a group sample namely Offering B with 30 students. The class test was conducted in environmental science course. Class testing is carried out in five cycles where each cycle is improvement based on observer's assessment and suggestions. The instrument used in this observation was the questionnaire of the implementation of learning. The Observer is a lecturer who usually takes environmental science courses and a science graduate student. In the dissemination stage, researchers provide the results of the development of an SRL design for lecturers of environmental science at Faculty of Teacher Training and Education, University of Jember.
Result and Discussion

2.1. Steps for Applying SRL Design in E-learning

Development of SRL design needs to explain how teachers prepare interactive learning, encourage students to learn independently and be able to develop the knowledge they have. Learning steps in applying SRL adapted from Zimmerman [6] which was later developed by researchers. Learning steps can be seen in Figure 1.
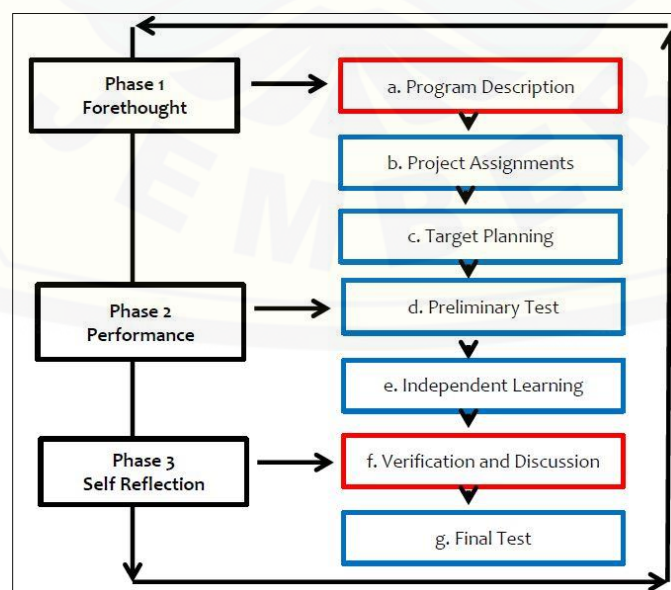

Figure 1. Steps SRL Design

Learning is carried out in class and online through e-learning. Steps a and f are carried out in class while steps b, c, d, e, and g are online through e-learning. In step a, students understand the assignments in SRL design. In step b, students are given a project that they must plan and carry out within a certain time. In step c, students plan how to complete the assignments and projects that they get (as a help the lecturer could reference the planning table). In step d, before learning process started, the students independently conduct a pretest related to the topic to be discussed in class. In step e, students are expected to independently learn material that they do not understand yet. In step f, students discuss the topics studied in class. Students verify the knowledge that they had and discuss the difficulties of the topic being studied. In step g, the students independently conduct a final test on the topic they have learned. The model of the final test via e-learning is shown in Figure 2.
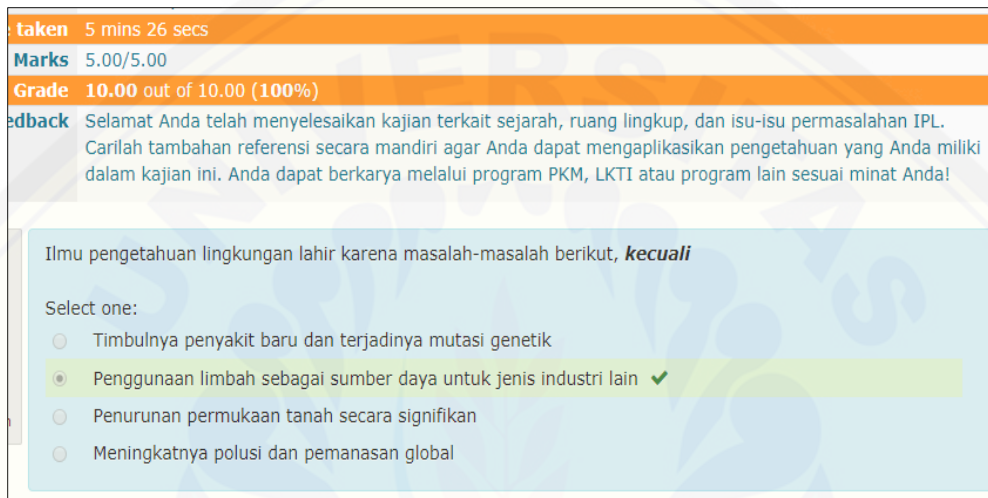
Figure 2. Model of Final Test and Feedback in E-Learning

E-learning can maximize learning activities because lecturers can give assignments, monitor the task collection times accurately, and provide feedback automatically in granting assessment, so students will be more independent and know the results or feedback directly.

2.2. Validation Test Results
This validation aims to find out the aspects of renewal, needs, the suitability of the scientific stages used, the logical aspects of the display, the language and content of the development products. The results of the SRL application validation data in e-learning based learning are in Table 1.

Table 1. Results of Data Validation of Application of SRL in Learning

Aspect	Indicator	Percentage average	Category
1. Steps of SRL in e-learning	a. Supporting theory	100%	Very valid
	b. Learning structure	98.2%	Very valid
	c. Selection of media or learning resources	91.6%	Very valid
	d. Language feasibility aspects	100%	Very valid
	Average Validation	97%	Very valid
2. Learning Instruments	a. Semester Lesson Plan	88,5%	Very valid
	b. Unit Lesson Plan	86,4%	Very valid
	Average Validation	87.5%	Very valid

Based on Table 1, the results of the average validation of SRL design in e-learning by experts is 97% which is very valid category so the product can be used in the class. Validation result of learning

instruments is 87.5%, very valid category, so the instrument can be used to support the application of SRL design. In addition to quantitative results, qualitative data are obtained in the form of critics and suggestions from observers. Based on the results of the validation, criticism, and suggestions from the observer, researchers repair the product, so it can be used in the class test.

3. Conclusion

3.1 Class Test Results

The research data in this class test is quantitative data obtained from observational learning data, cognitive achievement in the pretest and posttest form, and SRL ability score. In every single meeting, the students carry out 7 phases of SRL design with the different topics in environmental knowledge courses. In each meeting the observer made observations on the implementation of learning in the assignment of e-learning and discussion process in class. Data from the observation of the learning implementation in class test are outlined in Table 2.

Table 2. Data Results of the Implementation of Learning

Meeting (M)	Number of Students	Score	Category
M1	30	70%	Practical
M2	30	72%	Practical
M3	30	77%	Practical
M4	30	80%	Practical
M5	30	100%	Very practical
	Average score	79 %	Practical

Based on Table 2 it can be seen that the average score of learning implementation gets 79%. It is included in the practical category. The results of student achievement are described in Table 3.

Table 3. Student Achievement on Class Test

Meeting (M)	Number of Students	Average score		Difference	N-Gain	Category
		Pretest	Posttest			
M1	30	55	70	15	0.33	Medium
M2	30	59	70	11	0.27	Low
M3	30	54	74	20	0.43	Medium
M4	30	59	73	14	0.34	Medium
M5	30	83	90	7	0.41	Medium
	Average score	62	75.4	13.4	0.35	Medium

Based on Table 3 it can be seen that the student achievement in the class test gets 62 average *pre-test* score, 75.4 average *post-test* score and the total mean score of N-gain is 0.35 as a medium category. Data from the student's SRL ability as described in Table 4.

Table 4. SRL Ability Score Data

Number of Students	Average score		Difference	N-Gain	Category
	SRL 1	SRL 2			
30	50	62	12	0.40	Medium

The data in Table 4 state that the student ability scores before SRL treatment (SRL 1) get score 50, after treatment (SRL 2) get score 62 and *n-gain* score get 0.40 which is classified as a medium category. Higher education has a responsibility to motivate students to learn more and develop their SRL capabilities [9]. At the higher education, various opportunities of self-development such as the olympics, scientific writing competitions are widely available, these things can be used by students if they have a good SRL. Students with good SRL skills can apply their knowledge independently, not

limited by class activities. The students who have a higher SRL ability are more adaptive and they will show higher achievement because they have more effective learning style [10]. This can be understood because students who have good SRL ability will be able to make a strategy to complete the tasks.

The application of SRL in e-learning helps students to improve their achievement and SRL's ability. Individuals with good SRL abilities will develop their knowledge by using relevant methods [11]. The interest of students to understand and apply a material must be built so that students can get the best results and be able to evaluate their performance. A way to train SRL can be focused on fulfilling tasks independently so that students can form self-efficacy and develop their ideas about the reasons of doing an activity. Moreover if students make a high standard of value on a particular task, he will naturally involve himself in the task [12]. Furthermore, students are expected to be able to learn knowledge related to an event and explore self-interest independently.

The steps of SRL design are arranged to improve student achievement and SRL abilities. The learning process combines class and online learning. In the verification and discussion step, a lecturer can give guidance on students understanding based on the students' answers on the preliminary test. Furthermore, teachers can detect the level of student understanding, misconceptions, or their innovative ideas based on the answers. As a result, students can reflect their knowledge. The aims of expecting from the use SRL design in the e-learning are: (1) to train students to build interest in the task and to gain knowledge or information from self-motivation while doing assignment; (2) to train students to stay focused on performance and plan tasks using a time frame by monitoring time allocation; (3) to train students to reflect, evaluate performance, and search another effective method to complete the tasks.

4. Conclusion

Based on data obtained from the results of research and discussion, it can be concluded: (1) The validation result of the SRL design in e-learning is 97 % (very valid category). The mean results instrument validation is 87.5 % (very valid category). As the result, the product can be tested in the class; (2) The class test result show that the average *n-gain* of students' achievement in the class test is 0.35 (medium category). The mean results of *n-gain* SRL ability score is 0.40 (medium category). Therefore, it can be concluded that the product is effective to improve student achievement; (3) The development result of SRL design in e-learning consists of stages namely: program descriptions, project assignments, target planning, preliminary test, independent learning, verification and discussion, and final test. These stages are carried out interactively with class and online through *e-learning*.

5. References

[1] Darmiany 2016 Self-Regulated Learning Mahasiswa Pendidikan Guru Sekolah Dasar (PGSD) Tahun Pertama *J. Psikol. Pendidik. Konseling* **2** 1 pp.72–83

[2] Bandura A 1999 A Social Cognitive Theory of Personality, in *Handbook of Personality*, 2nd ed., (New York: Guilford Publications) pp.154–196.

[3] Hamdi Halim A and Pontas K 2015 Pengembangan dan Penerapan Modul Pembelajaran Materi Teori Dasar Bentuk Muka Bumi untuk Meningkatkan Kognitif Mahasiswa Pendidikan MIPA FKIP UNIGHA SIGLI *J. Pendidik. Sains Indones.* **03** 02 pp.22–34

[4] Zimmerman B J 2011 An Educator with Passion for Developing Self-Regulation of Learning through Social Learning *Online Submission*

[5] Steffens K 2006 Self-Regulated Learning in Technology-Enhanced Learning Environments: Lessons of a European peer review *Eur. J. Educ.* **41** 3–4 pp.353–379

[6] Zimmerman B 2002 Becoming a self regulated Learner: An Overview *Theory Pract.* **41** 2 pp.64–67

[7] Alexander S 2001 E-learning Developments and Experiences *Education+Training* **43** pp. 240–248

[8] Thiagarajan S Semmel D S and Semmel M I 1974 *Instructional Development for Training Teachers of Exceptional* (Mc Virginia: University of Minnesota)

[9] Yot-Domínguez C and Marcelo C 2017 University Students' Self-Regulated Learning Using Digital Technologies *Int. J. Educ. Technol. High. Educ.* **14** 1

[10] Dörrenbächer L and Perels F 2016 Self-Regulated Learning Profiles in College Students: Their Relationship to Achievement, Personality, and the Effectiveness of an Intervention to Foster Self-Regulated Learning *Learn. Individ. Differ.* **51** pp.229–241

[11] Tjalla A and Sofiah E 2015 Effect of Methods of Learning and Self Regulated Learning toward Outcomes of Learning Social Studies *J. Educ. Pract.* **6** 23 pp.15–21

[12] Peng C 2012 Self-regulated Learning Behavior of College Students of Art and Their Academic Achievement *Phys. Procedia* **33** pp.1451–1455.