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Improved professionalism of teachers through CAR based thematic integrative learning with realistic-scientific approach using e-schoology

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Abstract. Science and technology program for elementary school teachers Kalicari Semarang with difficulties in integrative thematic learning based on realistic-scientific approach using schoology (TIRSS). Program objectives to solve problems; (1) how to overcome the difficulties of elementary school teachers in elementary school Kalicari 01-02 in developing a valid and practical TIRSS learning tool; (2) how to overcome the difficulties of Kalicari elementary school teachers 01-02 in implementing TIRSS?; (3) how to improve the professional competence of teachers that can make better student learning outcomes. Targeted audiences are elementary teachers in elementary school Kalicari 01-02 Semarang. To achieve the purpose of this activity using several methods; (1) observation; (2) a test to determine the level of knowledge, understanding, skills of CAR based on TIRSS learning on pre-training and post-training conditions; (3) questionnaires to find out the extent to which teacher learning has applied TIRSS learning; (4) training methods for planting concept of CAR based TIRSS learning; (5) assignment and mentoring make CAR proposal and implement CAR in class (6) focused observation method to know teacher profession competency. The result; (1) there is an increased knowledge, understanding and skills of teachers on CAR based TIRSS learning that can overcome difficulties in developing a valid and practical TIRSS learning tools, and implement learning in the classroom; (2) The improvement of professional competence of elementary school teachers after the training and mentoring CAR based on TIRSS learning is predicted to improve mathematics learning outcomes of elementary students.

1. Introduction

The current situation is still a lot of elementary school teachers including teachers in the Elementary School Kalicari Semarang that is not stable and have difficulties in planning and implementing integrative thematic learning between subjects, especially classroom teachers with realistic-scientific approach with media e-schoology of infinite space class and time and, so it is necessary to strengthen the application of integrative thematic learning with realistic-scientific approach with media e-schoology. The quality of education in Indonesia is still low, including the quality of learning, one of which is triggered by the quality of teachers who have not been optimal, in terms of teachers play a major role and become the most influential factor on the results of quality education. Therefore, all components of the Indonesian nation should always strive to improve the quality of teacher learning, especially to improve the professional competence of teachers so that the learning outcomes of students will also continue to increase. To maximize the implementation of the 2013 Curriculum that designs thematic-integrative learning (theme-based integrated) Primary School teachers who are classroom



teachers need to have the professional ability to manage classroom thematic-integrative learning. This is what demonstrates the importance of conducting science and technology program for people in Elementary School of Kalicari who have difficulties in integrative thematic learning with realistic-scientific approach that utilizes e-schoolology which is not limited to classroom and time, in the form training and mentoring of CAR based on integrative thematic approach of realistic-scientific use of e-schoolology (TIRSS) to improve the professional competence of elementary school teachers and improve learning outcomes of learners.

Asikin and Iwan have researched that a realistic approach (PMRI) can foster communication skills which are a component of mathematics literacy for junior high school students [1]. PMRI makes mathematics learning more meaningful and fun for students [2]. The RME according to Webb et al., is not only because of its relationship to the real-world context, but related to the emphasis on RME placing on the problem of students' problems with real-life situations [3]. RME (PMRI) learning students become able to easily understand the language of mathematics, solve and construct problems, especially to recognize mathematical concepts in certain situations [4]. Using realistic math education with the use of software for tablets produces better learning outcomes [5]. The implication of this finding is that realistic mathematics education is suitable to be used to replace ordinary learning in junior high schools in the city of Yogyakarta in order to improve students' ability to solve mathematical problems [6]. Learning with the PMRI learning (realistic) approach to learning quadrilateral flat building material is better than the constructivism learning approach using hypnosis in teaching and conventional learning approaches [7]. To study mathematics, student should know that mathematics is regarded as a universal science which becomes the underlying of other disciplines; it also supports the development of science and technology [8]. The innovative interactive learning PBL model based on PMRI-Scientific using ICT effective and can improve the ability of mathematics literacy and independence-character [9]. PMRI learning (realistic) with media Schoolology effectively improve the ability of mathematics literacy [10].

Teachers need to be developed professionally by improving competence through training and mentoring CAR based TIRSS learning for practical reasons and academic reasons. Practical reasons for teacher career development are obstacles in conducting research / research that is part of professional competence that must be developed. If the teacher participates in this training and mentoring CAR based TIRSS learning, the knowledge, understanding, skill of CAR based TIRSS learning will increase. Implementation of CAR by teachers who are trained either by the core teachers on elementary school or by Educational Institution of Education Personnel lecturers will increase the spirit of teachers in implementing CAR to make CAR reports. Academic reasons for the implementation of CAR can help (1) the development of teacher competence in solving learning problems include the quality of content, efficiency, and effectiveness of learning, process, and the achievement of student learning outcomes, (2) improvement of learning ability will have an impact on pedagogic competence improvement, social, and professional teachers [11]. Many developed countries have implemented Thematic-Integrative to VI grade elementary learning systems such as Finland, England, Germany, Scotland, France, the United States, South Korea, Australia, Singapore, New Zealand, Hong Kong and the Philippines.

Based on the framework that has been described above will be conducted training CAR based TIRSS learning to teachers of Kalicari Elementary School in hopes after the teachers follow training CAR based TIRSS learning professionalism of teachers maintained and increased in the sense of an increase performance, there is an increased understanding, knowledge, skills of CAR that support teacher profession and can even have a positive impact on improving student learning outcomes, enhancing the more noble character of the more creative students leading to their independence and increasing pleasure in learning.

After conducting a situation analysis, we as a Community Service Team can identify issues that are: (1) Indonesian human resources are still low; (2) quality of education and learning quality is still low; (3) The competency of the teachers of the elementary school needs to be improved; (4) The learning outcomes of elementary school students should be continuously improved; (4) The noble character of the students is still low and still needs to be improved especially the creative character of independence;

(6) Teachers still have not mastered ICT media such as e-learning schoology which is unlimited classroom and time, (5) Students' pleasure in learning still need to be improved. In this community service activity, we will implement science and technology, which is training and mentoring of TEAK based on TIRSS teaching with creative potency of self-reliance. The formulation of partner problems raised in the dedication to the community for this lecturer as follows; (1) how to overcome the difficulties of Kalicari elementary school teachers 01-02 in developing a valid and practical TIRSS learning tools, through CAR based on TIRSS learning,(2) how to overcome the difficulties of Kalicari elementary school teachers in implementing TIRSS learning through CAR based on TIRSS learning, and (3) how to improve the professional competence of Kalicari elementary school teachers through training and mentoring of CAR based on TIRSS learning that can improve the learning outcomes of elementary school students.

2. Methods

Priority difficulties faced by partners in this activity are elementary teachers in Kalicari Elementary School who have difficulty in implementing the curriculum demands of 2013 is how to develop learning TIRSS tools that should have been implemented starting new academic year 2017/2018 in class 1,2 , 3, 4, 5 and 6 will come as well as the difficulties of how to implement the TIRSS lesson. Partners of this activity is the teachers Elementary School Kalicari 01-02 which is part who have difficulty how to develop TIRSS learning that can increase professionalism teachers and at the same time can improve student learning outcomes, especially for teachers- grade teachers 5 and 6 proposed in the 2013 curriculum change element compared to the previous curriculum of the 2013 curriculum proposes the application of CAR based TIRSS learning in all grades 1 through 6.

The solution offered to overcome the above difficulties problems in community service activities is conducted Training and Assistance Program CAR based TIRSS learning charged creative self-motivation by utilizing ICT e-schoology is not limited classroom and time. Steps from training and mentoring CAR based TIRSS learning as follows; (1) Firstly held the assessment of professional competence of elementary school teachers by school principals assisted Community Service Team; (2) Pre-test of knowledge, understanding, and skills of CAR based TIRSS leraning is given to Elemetary School teachers. Teachers also fill out a questionnaire to find out how far the primary school teacher has made a CAR proposal and implement the CAR, has integrated the learner in a mixture of subjects and how the teacher's efforts to have the students feel happy in learning; (3) The team of dedication to the UNNES community together with the Principal conducts the assessment of Professional Teacher Competence of elementary school teachers. (4) The UNNES community service team conducting TIRSS learning training for elementary school teachers; (5) Community service team to provide assistance to elementary school teachers to prepare CAR proposals and implement CAR; (6) The UNNES community service team conducts the evaluation of the training of CAR.

3. Results and Discussion

PPM DIPA fund with the title IbM KKG Kalicari Elementary School which has Difficulties in Integrative Thematic Learning Based on Realistic-Scientific Approach Using Character Education-filled e-Schoology has been carried out by making preliminary observations at Kalicari 01 Semarang Elementary School and Kalicari 02 Elementary School Semarang on June 13-14 2018. The training was then carried out on 6 July 2018 - 14 July 2018 and assistance and final observation in the graduation class July 16 2018 - 24 July 2018.

The implementation of the training went smoothly. Instructor training methods / resource persons present material on Integrative Thematic Learning Based on Realistic-Scientific Approaches Using Character Education-filled e-Schoology both through video shows and direct teacher models and then review / discussion while demonstrating the emphases of implementing Integrative Thematic Learning based on Realistic Approach Scientific Using e-Schoology with Character Education in class. Some teachers have understood and implemented Integrative Thematic Learning Based on Realistic-Scientific Approaches Using Character Education-filled e-Schoology in the classroom but there are obstacles to

using Schoology media because of internet access, some other teachers are still somewhat difficult and continue to be guided and directed during the training period. Before the training held a pretest and after the training was held post test. The results of the pretest and posttest analysis are as follows;

From the Table Paired samples Test, it can be seen that $\text{sig} = 0.00 < 0.05$ means that with a significant level of 5%, there is a score difference in mastering knowledge, understanding, and integrative thematic learning skills based on Realistic-Scientific learning, which contains creative character education, independence of mathematics teachers of Kalicari Elementary School 01-02 before and after training. From the Paired Samples Statistics table it turns out that the mean score score is 92.5667 and Mean Skore pretest is 59.66667. This means that there is a significant increase in mastery of the understanding, understanding and skills of Integrative Thematic learning based on Realistic-Scientific learning which is charged with the independence of creative character education after training and workshops. This means that there is a significant increase in mastery of the understanding, understanding and skills of Integrative Thematic-based learning based on Realistic-Scientific learning, which is charged with the independence of creative character education after training and workshops. This means that there is an increase in teacher professional competence which is predicted to improve the learning outcomes of elementary school students.

The improvement of teacher professionalism competency is in line with the advantages of integrative (integrated) thematic learning namely learning that eliminates the boundaries of various subjects in the form of units or whole. For this reason, in this case the entire lesson material is expected to form an integrated personal child. An integrated approach starts from a whole or a unit that is meaningful and structured, the whole is not a sum of parts, but a totality that has its own meaning. The tendency of integrated learning is believed to be an approach oriented to the practice of learning that is appropriate to the needs and development of children as stated in the DAP (Developmentally Appropriate Practice). This approach departs from learning theory as the basis for the formation of children's intellectual structures. The innovative interactive learning PBL model based on PMRI(Realistic)-Scientific using ICT that developed valid, practical effective and can improve the ability of mathematics literacy and independence-character.

The improvement of teacher professionalism competency is in accordance with the advantages of realistic learning approach (Indonesian realistic mathematics education), namely a realistic (realistic) approach in mathematics is a learning concept that helps teachers associate between mathematics learning material and simulated or motivated real-world or world situations. students associate mathematics and everyday life. the principles of the realistic approach used refer to the principles of the RME approach that developed in the Netherlands. Gravemeijer formulated three RME principles: (1) guided reinvention and progressive mathematization), (2) didaktis phenomenology (didactical phenomenology), and (3) bridging informal knowledge and formal mathematics (bridging the gap between informal knowledge and formal mathematics) [12]. Van den Heuvel-Panhuizen formulated the RME principle, namely; (1) The principle of activity, namely that mathematics is a human activity; (2) The principle of reality, namely learning should begin with realistic problems for students, which can be imagined by students; (3) The principle is tiered, meaning that in learning mathematics students pass through various levels of understanding, namely from being able to find solutions to a contextual or realistic problem informally, through schematization to gain insight into basic things until they are able to formally find a solution to a mathematical problem; (4) The principle of fabrication, meaning that various aspects or topics in mathematics should not be viewed and studied as separate parts, but intertwined with each other so that students can better see the relationship between the materials [13]. To be more easily implemented in the classroom, Gravemeijer describes the four principles above into five characteristics of the realistic approach as follows; (1) Phenomenological exploration. Realistic mathematics education emphasizes the importance of exploring the phenomena of everyday life. Informal knowledge that students get from daily life is used as contextual problems to be developed into formal concepts of mathematics; (2) Bridging by vertical instrument. The mathematical process from informal to formal is bridged with instruments that are able to facilitate vertical mathematical processes, namely the abstraction process. This process can be supported by the use of models and symbols. These

symbols and models will be more meaningful for students and can also be used for generalization and abstraction of mathematical concepts; (3) Student contribution. Realistic mathematics education is student-centered learning so students are encouraged to be more active and creative in developing ideas and strategies. Furthermore, ideas and strategies found and developed by students are used as a basis for learning; (4) Interactivity [10]. Students are involved interactively, explain, and give reasons for their work solving contextual problems, understanding their work, explaining in class discussions their attitude to agree or disagree with their friend's solution, asking for alternative solutions to problems, and reflecting on those solutions. Interaction between students, between students and teachers, discussion, collaboration, evaluation and explicit negotiation are essential elements in the learning process; (5) Intertwining. Mathematical structures and concepts arising from realistic problem solving lead to intertwining between the parts of matter. Integration between units or parts of mathematics that combine applications states that the whole is interrelated and can be used to solve real life problems.

Furthermore, the improvement of teacher professional competence was also triggered by the advantages of the scientific approach, namely the scientific approach is very relevant to three learning theories, namely Bruner's theory, Piaget's theory, and Vygotsky's theory. Bruner's learning theory is also called the discovery learning theory. There are four main things related to Bruner's learning theory. First, the individual only learns and develops his mind when he uses his mind. Second, by doing cognitive processes in the discovery process, students will get intellectual sensation and satisfaction which is an intrinsic reward. Third, the only way that one can learn techniques for making discoveries is that he has the opportunity to make discoveries. Fourth, by making discoveries it will strengthen memory retention. The four things above are in line with the cognitive processes needed in learning using the scientific approach. Piaget's theory states that learning is related to the formation and development of schemes (plural schemata). A scheme is a mental structure or cognitive structure by which a person intellectually adapts and coordinates the surrounding environment. The scheme never stops changing, the schemata of a child will develop into an adult scheme. The process that causes schemata changes is called adaptation. The process of forming this adaptation can be done in two ways, namely assimilation and accommodation. Assimilation is a cognitive process by which a person integrates a stimulus that can be in the form of perceptions, concepts, laws, principles or new experiences into the scheme that is already in his mind. Accommodation can be in the form of a new scheme that can match the characteristics of existing stimuli or modify existing schemes to match the characteristics of existing stimuli. In learning, there is a need to balance or equilibrate between assimilation and accommodation. Vygotsky, in his theory states that learning occurs when students work or learn to handle tasks that have not been studied but the tasks are still within the range of abilities or tasks that are in the zone of proximal development, the area lies between the level of development of the child currently defined as problem-solving ability under the guidance of adults or more capable peers .

Wardono & S. Mariani have said, the innovative PMRI learning (realistic) model character education and PISA assessment effectively improves the students' ability in mathematics problem solving literacy [14]. Wardono, B. Waluya, Kartono, Sukestiyarno and S. Mariani have said, learning model realistic scientific humanist charges of character education with assessment based on PISA effectively can improve mathematics literacy [15]. While the role of e-schoolology in improving teacher professionalism competencies, e-Schoolology is one of the innovative platforms built on inspiration from Facebook social media for the purpose of education. This platform was developed in 2009 in New York. Schoolology helps teachers in opening wide communication opportunities for students so that they can take part in discussions and teamwork. In addition Schoolology is also supported by various forms of media such as video, audio and images that can attract students. Schoolology directs students to apply technology use in learning. The implementation of e-learning is supported by electronic services such as computers. In a study conducted by Wardono, Waluya, Mariani, and Candra also stated that contextual learning can use learning media by utilizing the internet [16]. According to Wardono the use of the internet into mathematics learning has the potential to create a meaningful and enjoyable learning atmosphere [17]. Students who use e-learning can access learning resources and activities with steps according to the wishes of students according to students' needs.

The character instilled in the dedication that can improve the teacher's professionalism competency is the character of independence (affective domain). According to Asmani the attitude of independence is the attitude / behavior is not easy to depend on others in completing tasks [18]. Student independence is the readiness of individuals and is able to learn on their own initiative, without the help of other parties to achieve learning goals. Individual characteristics of having independent learning readiness are characterized by: (1) love of learning, (2) self-confidence as students, (3) openness to learning challenges, (4) curious nature, (5) self-understanding in learning, (6) accepting responsibility for learning activities. But according to [19] Naim said independent attitude would be even better if it was developed with a foundation of high concern for others, this is called modern man. This opinion is in line with Weiner's description [19] Naim saying that modern humans have a tendency to accept new ideas, willingness to express opinions, sensitivity at times, and prioritize present and future rather than past time, a better sense of timeliness, greater concern for planning the organization and efficiency, the tendency to view the world as something that can be calculated, appreciate the power of science and technology. Meanwhile, according to Goodman and Smart [20] states that learning independence is characterized as follows: (1) independence from others, (2) Confidence / confidence, (3) trying to meet learning needs, (4) learning based on own initiative, and (5) trying to exercise self-control. The formation of creative characters towards the creation of independence for children, develops a learning cycle that includes five aspects of learning experience namely; (1) exploring: responding to new information, exploring facts with simple instructions, sharing knowledge with other people, or exploring information from teachers, experts / experts or other sources; (2) planning: arranging work plans, identifying tools and materials needed, determining steps, designing work and other plans; (3) doing / acting: experimenting, observing, finding, making work and reporting the results, solving problems; (4) communicating: communicating / presenting the results of experiments, observations, findings, or the results of his work, sharing and discussion and (5) reflecting: evaluating the process and results achieved, looking for weaknesses to improve the effectiveness of planning.

4. Conclusion

The conclusion of the results and the discussions that have been carried out shows (1) There is an increase in the knowledge, understanding and skills of elementary school teachers about Integrative Thematic learning based on Realistic-Scientific learning which is charged with the independence of creative character education. This results in teachers being able to overcome difficulties in implementing the Integrative Thematic based on Realistic-Scientific learning which is charged with the education of independent character in the classroom. The teachers were also more enthusiastic in carrying out the Integrative Thematic learning based on Realistic-Scientific learning which was charged with the independence of creative character education. (2) There is an improvement in the professionalism competency of primary school teachers after conducting PTK mentoring training based on Integrative Thematic learning based on Realistic-Scientific learning which is charged with the independence of creative character education. This is predicted to be able to improve elementary school mathematics learning outcomes .

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