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Developing A Mathematics Instructional Model Based On Child Friendly, Innovative , Creative and Realistics (CFICR) At Junior High School

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Abstract. The aim of this study is to develop the mathematics instructional model based on CFICR (Child Friendly, Innovative, Creative and Realistics) at Junior High School. This study is a development research, conducted in the form of development model proposed by Tjeerd Plomp as in [6]. It consists of four development phases: (1) the preliminary investigation phase conducted to get information about mathematics instructional model theories, learning theories and the analysis of the mathematics in Junior High School, (2) the design phase conducted to design the instructional model based on CFICR, (3) the realization phase conducted to develop mathematics instructional model by following the design phase and (4) the revision, evaluation and test phase of the mathematics instructional model prototype being developed and was validated by an expert in learning mathematics and try out. This research was conducted at the Junior High School Muhammadiyah Program Khusus Surakarta. These result of this study shows that: (1) the learning management based on CFICR by teacher was in " very good" category with score 3,50 , (2) the prototype model had improved students' activities were in "very good" category and (3) the students' responses toward the mathematics instructional model was included in "positive" category. Besides that, it was obtained the instructional mathematics model based on CFICR with the following syntaxes: (1) explaining the learning objectives and motivating students, (2) giving the contextual problems that are familiar with students, (3) processing mathematics' abstraction (mathematics vertically), (4) formulating the solving strategies, (5) communicating the result of discussion and (6) giving the inferences of mathematics material.

Keywords: *child friendly, creative , innovative and realistic*

I. INTRODUCTION

Education is a conscious effort of man to guide humans in order to develop the personality and ability in accordance with the values that prevail in society. Education in school can not be removed from the process of learning and interaction between teachers and students. Reference [2] giving definition of learning is a permanent change in response highly potentiality which accurs as a result of reinforced practice. From this definition, it means that learning can produce behavior change relatively permanent students and teachers as doer change. Thus, learning is the assistance given by teachers in order can occur the process the acquisition of science and knowledge, mastery of skills and behaviour, as well as the formation of attitudes on students. In other words, learning is a process to help students to learn well. Thus, the teacher is a spearhead for feeding children contributed. The magnitude of the responsibility, then the Government gives awards for teachers by placing teachers as professionals who poured in to law teachers and professors in 2005. Teachers as professionals must have the four competencies that are teaching competence, professional competence, social competence and personality competence.

However, as in [10] states based on the results of a survey conducted by the Directorate General PMPTK informed that the most of the teachers have a low competence and the most of them have not been trained on the pedagogics. This condition is in line with research conducted Herry W as in [4] which informs the low ability of teachers in the assessment of learning outcomes and learning management. This means there are still many teachers that have low competence in teaching and learning. Because of that , they still dominate in teaching a class, do not involve students actively in the learning. They still adhere to

pragmatism is everything, teachers consider the students as an object not as the subject. So with this condition, it resulted in a low level of activity and creativity of students in learning.

On the other hand, the results of research conducted by Slamet Hw, Nining as in [9] said that students need to have (1) the ability related to mathematics that can be used in solving mathematical problems, another lesson, or problems related to real life; (2) the ability to use mathematics as a tool of communication; and (3) the ability to use mathematics as a way of reasoning that can be used in any circumstances, such as critical thinking, logical thinking and systematic thinking. Reference [5] and [8] also conclude in their research that in learning mathematics liveliness, creativity and communication of mathematics students are urgently needed to improve the understanding of mathematical concepts. This will not be easily filled by students, if it is not supported the ability of teachers in teaching as well as learning resources . The learning resource limitations is one of the obstacles during the process of learning. In addition to these problems and supported teachers' ability in learning conditions are also very poor, it is necessary to find solutions to solve those problems.

From the above explanation , then it needs to be developed the mathematics instructional model based on Child Friendly, Innovative , Creative and Realistics. This research needs to be done in order to support the implementation of the curriculum of 2013 and also to increase students' activity and to improve the creativity of teachers in the teaching and learning of mathematics.

Child friendly learning refers to the the condition of the school/class that is a friendly place for students to learn. Friendly defined as a condition that is safe, joyful, and free. Safe refers to a condition that is free of violence and arbitrariness. Joyful is a condition of class that make students learn with pleasure. Free refers to the freedom of students to speak their opinion. According to Ricardo, Molly as in [7] said that the inclusion of mathematical activities in the museum, science center and other informal inveroments has the potential to complement formal learning in school mathematics classrooms, promote possitive attitudes to ward of the mathematics. This means the learning process does not have to occur in the classroom, but it can be done outside the classroom even outside of school. Thus, with this condition will be created in the process of learning, in which students free expression and gives an opinion, so that students will participate actively in teaching and learning. One type of approach in learning mathematics is a realistic approach. According to refrence [3] stated that learning mathematics with the realistic approach is an approach in which mathematics is seen as something human activities.

II. MATERIAL AND METHOD

Child friendly learning refers to the the condition of the school/class that is a friendly place for students to learn. Friendly defined as a condition that is safe, joyful, and free. Safe refers to a condition that is free of violence and arbitrariness. Joyful is a condition of class that make students learn with pleasure. Free refers to the freedom of students to speak their opinion. According to reference [7] said that the inclusion of mathematical activities in the museum, science center and other informal inveroments has the potential to complement formal learning in school mathematics classrooms, promote possitive attitudes to ward of the mathematics. This means the learning process does not have to occur in the classroom, but it can be done outside the classroom even outside of school. Thus, with this condition will be created in the process of learning, in which students free expression and give an opinion, so that students will participate actively in teaching and learning.

One type of approach in learning mathematics is a realistic approach. According to reference [3] stated that learning mathematics with the realistic approach is an approach in which mathematics is seen as something human activities. The principal activities done in learning mathematics with the realistic approach are (1) using real-life contexts as a starting point for learning; (2) connecting to among strands, to other disciplines, and to meaningful problems in the real world; (3) using models as a bridge between abstract and real, that help students learn mathematics at different levels of abstractions; (4)

using student's own production or strategy as a result of their doing mathematics; and (5) interacting as an essential for learning mathematics between teacher and students, students and students. By using a realistic approach, students doing troubleshooting informally (using its own language), but after some time the familiar with the processes of solving similar, they will use more formal language and end the process students will find an algorithm.

This research includes the type of research development that the research oriented on the development of a product development process are described carefully and products obtained have been evaluated. The product of this research is a mathematics instructional model based on CFICR. The development model of learning mathematics based on CFICR is the main activity in this research. The development model used to develop this learning model refers to the model of development of public education from Tjeerd, Plomp as in [6]. It consists of four development phases: (1) the preliminary investigation phase conducted to get information about mathematics instructional model theories, learning theories and the analysis of the mathematics at Junior High School, (2) the design phase conducted to design the instructional model based on CFICR, (3) the realization phase conducted to develop mathematics instructional model by following the design phase and (4) the revision, evaluation and test phase of the mathematics instructional model prototype being developed and was validated by an expert in learning mathematics and try out.

This research was conducted at the Junior High School Muhammadiyah Program Khusus Surakarta grade VII. The source of the data for the validity of the model is an expers competent in the fields of the development of the model and the source of the data for the practicality of the model are an expert in the field of development, researchers and teachers who carry out learning . The source of the data for the effectiveness of the model are students.

The data analysis techniques used in this research to know the validity of the model are (a) doing the recapitulation statement validator and (b) determining the validity of the results of the compatibility with the criteria already defined. For knowing the practicality of the model are (a) doing the recapitulation statement validator and (b) determining the practicality with compatibility results with criteria that are already determined. And to know the effectiveness of the model at the end of the cycle will be given the question form of students' response about implementation models as well as the activity of students in learning.

III. RESULT AND DISCUSSION

The results of the development of mathematics instructional model based on **CFICR** of every phase are as follows:

a. The results of the preliminary investigation phase, i.e. the concept and theory of the curriculum of 2013, child friendly school (child-friendly), creative learning, innovative and realistic learning model and analysis of the material fractions grade VII about comparing fractions and operations of fractions.

b. The results of the design phase are : (1) design of mathematics instructional based on CFICR with the phases of the syntaxes are as follows (a) explaining the learning objectives and motivating students, (b) giving the contextual problems that are familiar with students, (c) processing mathematics' abstraction (mathematics vertically), (d) formulating the solving strategies, (e) communicating the result of discussion and (f) giving the inferences of mathematics material; (2) the design of the learning environment or social system, i.e. the situation or atmosphere and norms that apply in the model of learning that will be developed , such as the role of the teacher and the student to do activities for learning to take place, (3) the principle of reaction, that is related to how teachers in the notice and treat students in the learning process, (4) supporting model based on CFICR, i.e, materials/devices/media tools and learning that supports

the implementation of the model and (5) the evaluation is to evaluate achievement of learning objectives pertaining to the mastery of the material with a learning model based on CFICR.

c. The results of the phase of realization is a model of learning mathematics based on CFICR prototype I .

d. The results of the test phase, evaluation, and revision are twofold, namely : (a) the results of the validation and (b) the results of the field cycles. The results of the validation showed that learning model based on CFICR that developed including the requirement is valid, because it meets the validity of the constructs and content. From the results of cycles conducted in field indicates that:

1) At the first cycle, as seen from the practicability of learning models showed the ability of teachers in the management of learning including categories is not good. This indicated the implementation of learning syntax CFICR not yet implemented properly, with a score of 2.75. While judging from the model effectiveness is measured from the activity and the response of students showed that 65% of students include the requirement of active in the learning process and responded positively towards the implementation of the learning model CFICR. So it can be said that the model of learning mathematics based on CFICR developed empirically is not practical and effective.
2) In the second cycle, as seen from the practicability of learning models showed the ability of teachers in the management of learning including categories less well. This indicated the implementation of 2 stages in learning syntax CFICR have not been executed and the score obtained in the learning management 3.0. So it can be said that the model of learning mathematics based on CFICR developed empirically is not yet practical. While judging from the model effectiveness is measured from the activity and the response of students showed that 75% of students include the requirement of active in the learning process and responded positively towards the implementation of the learning model based on CFICR. So it can be said that the learning model has not been effective.
3) On the third cycle , as seen from the practicability of learning models showed the ability of teachers in the management of learning including categories either. This indicated the implementation of all stages of the learning CFICR syntax was implemented by a score of 3.50. While judging from the model effectiveness is measured from the activity and response indicates that 90 % of students include the requirement of active in the learning process and responded positively towards the implementation of the learning model based on CFICR. So it can be said that the model of learning mathematics based on CFICR developed empirically is already practical and effective.

Thus, after the last cycle then it obtained a prototype of the final mathematics instructional model based on CFICR that is valid, practicality and effective. Implementation of this model will be implemented in the second year, i.e. the year 2016. From the results of those cycles indicate that the model of learning mathematics based on CFICR can increase the ability of teachers in the management of teaching and students' activities in learning as well as responded positively towards the implementation of this model.

This condition as a result of the implementation of the learning that begins at the initial phase of mathematics instructional model based on CFICR that is the teacher giving the contextual problems that are familiar with students. The teacher provides contextual problems. In this phase the teacher have to creativity and innovation in finding a contextual problem, so as to stimulate the creativity of the students. Students identify the problems individually. Based on their identification, students discuss the problems in their group in order to know the similarities and the differences of students' understanding of the problems. Afterwards, they have the same understanding regarding the problems. Students identify the

problems individually. Based on their identification, students discuss the problems in their group in order to know the similarities and the differences of students' understanding of the problems. Afterwards, they should have the same understanding regarding the problems. The teacher encourages students to express their ideas. Each student in every group presents their ideas about the problems given and makes relations to other concepts or to realistic situations. Students in their group formulate the mathematics model based on their ideas. The model can be a bridge to connect the realistic problems and the abstract forms. This research in line with refernce [1] and [11] statement, that during the course of the study, an effort was continually made to encourage students to go trough the RME approach of simplifying the contextual problem by first represeting it in their own symbols and/or words and then futher solving and interpreting it from there.

IV. CONCLUSION

The conclusions obtained in this study are:

a. A theory of development which is used to develop a model of learning mathematics based on CFICR is modifying the development theory has been said by Tjeerd, Plomp as in [6] which contains the phases (1) the preliminary investigation phase (2) the design phase , (3) the realization phase and (4) the revision, evaluation and test phase.
b. The learning management based on CFICR by teacher was in " very good" category with score 3,50 ,
c. The prototype model had improved students' activities were in "very good" category and the students' responses toward the mathematics instructional model was included in "positive" category.
d. The instructional mathematics model based on CFICR with the following syntaxes: (1) explaining the learning objectives and motivating students, (2) giving the contextual problems that are familiar with students, (3) processing mathematics' abstraction (mathematics vertically), (4) formulating the solving strategies, (5) communicating the result of discussion and (6) giving the inferences of mathematics material.

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