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Development of competency-based continuous professional development (PKB) training management model to improve competence and research culture for middle school teachers in Pematangsiantar City

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Abstract--The objectives of this study were to: (1) determine the design of competency-based sustainable professional development training management model to improve competence and culture of researching SMP teachers in Pematangsiantar City; (2) determine the effectiveness of the competency-based sustainable professional development training management model to improve competence and culture of researching SMP teachers in Pematangsiantar City. This research is a development research with ADDIE model. The subjects of this research population were all SMP City Pematangsiantar teachers totaling 1,094 people and the sample subjects of this study were SMP City Pematangsiantar teachers totaling 80 people where the sample was determined by purposive sampling technique. Data collection techniques were carried out by observation, interviews, documentation, questionnaires and tests. The results of the research are: (1) The competency-based sustainable professional development training management model to improve competence and culture of

researching junior high school teachers in Pematangsiantar City was developed using the ADDIE model which includes analysis, design, development, implementation and evaluation; (2) The competency-based continuous professional development training management model is very effective in improving teacher competence and research culture.

Keywords--Training Management Model, Continuing Professional Development, Competence.

Introduction

The quality of Indonesian education continues to decline. The low competence of teachers is the main trigger for the decline in the quality of Indonesian education (Fadhli, 2017); (Sennen, 2017); (Sitting, 2019). The low competence of teachers also occurs in Pematangsiantar City Junior High School as evidenced by the UKG value of Pematangsiantar City Junior High School Teachers which only reached 55.59. Teachers as the key to improving the quality of education must improve their competence in order to improve the quality of education (Lin, 2019); (Drossel and Eickelmann, 2017); (Lu, Y. L., & Lien, 2016); (Lomibao, 2016).

Continuous professional development is an effort to improve teacher competence (Kastawi, Nurkolis Siri and Yuliejantiningasih, 2019) which is carried out based on teacher needs and is carried out gradually and continuously to improve teacher professionalism (Law Number 16, 2009); (Sumarsono et al., 2018); (Priansa, 2017). The teacher's obligation to carry out sustainable professional development can be done through self-development, scientific publications or innovative work (Permendiknas Number 35, 2010); (Priansa, 2017). Continuous professional development can improve the pedagogic, professional, social and personality competencies of teachers which have an impact on improving teacher careers for now and in the future (Dermawati, 2013).

The facts that occur in the field are not in line with research (Dermawati, 2013). Teacher competence has not increased even though they have carried out continuous professional development. Not increasing teacher competence is due to the lack of optimal implementation of sustainable professional development due to the challenges and obstacles faced by teachers and management in the implementation of sustainable professional development that has not been managed properly in each cycle (Murni and Sumardjoko, 2015); (Sujiyanto, Mukhadis, 2012); (Wiranti, 2015); (Basri et al, 2020); (Burns, A. and Westmacott, 2018); (Latif, I.A., Sari, D.R. and Riyadi, 2017). The lack of improvement in teacher competence can be seen from the number of teachers who have not been able to meet the adequacy of the credit score required for proposing promotions and teacher functional positions, especially scientific publications and innovative works (Wulandari et al, 2020); (Nuruzzaman and Sutarto, 2019); (Kaolan and Basrani, 2017).

The same phenomenon also occurs in Pematangsiantar City Junior High School. The implementation of sustainable professional development does not increase

teacher competence due to the lack of knowledge of Pematangsiantar City Junior High School teachers in making classroom action research and innovative works. Even the Pematangsiantar City Junior High School teachers, especially private junior high schools, do not know the obligation to implement sustainable professional development. They have the perception that the obligation to carry out continuous professional development is only for public teachers because it is related to promotion and career development. Meanwhile, Pematangsiantar City Junior High School teachers themselves do not have the knowledge or even the competence to make scientific publications or innovative works so that Pematangsiantar City Junior High School teachers carry out their obligations for sustainable professional development through the "cathering" system.

The problem phenomenon can be overcome by providing training to teachers (Rahyasih et al, 2020); (Sumarsono et al., 2018); (Kaolan and Basrani, 2017); (Windrawanto, 2015); (Fernández, 2013). Training is a short-term human resource development process to provide, improve and enhance individual knowledge and technical skills (Febrianty, 2020); (Lubis and Haidir, 2019); (Rumukaun et al, 2019); (Struthers, 2017); (Slameto et al, 2017). Training can improve teacher knowledge and teacher competence in supporting the learning process in order to achieve national education goals.

There are many training models such as critical events model (Nadler, Zeace and Nadler, 1983), training design process model (Noe, 2010), training transfer model (Burke L.A. and Hutchins H.M., 2007); (Baldwin, Timothy T and Ford, 1988), competency-based training model (Azevedo et al, 2015), ADDIE model ((Branch, 2009), Dick and Carey training model (Reiser, 2012) and Kemp model (Gustafson and Branch, 2002) Among the existing training models, the most effective model in improving adaptability, well-being, growth, creativity and innovation, knowledge, skills, expertise and organizational performance of trainees is the competency-based training model (Azevedo et al, 2015).); (Wu, 2013); (Malik, 2016); (Nurrahmi, 2015); (Marguerite, 2014); (Wongnaa and Boachie, 2018). However, there are research results which state that competency-based training management is not effective in improving teacher competence. (Julifan, 2015).

Management of training greatly affects the achievement of training objectives. The management of training at SMP Pematangsiantar City is less than optimal, causing the training carried out to be ineffective in achieving the training objectives. The phenomenon of training management problems at Pematangsiantar City Junior High School can be seen from the training carried out not based on needs analysis, participants who took part in the training were chosen because they were known by the education office and training instructors did not master the training material, the training was carried out not according to planning both in terms of implementation time, facilities and infrastructure as well as the involvement of school principals and the education office in the supervision and results of training are not implemented in the workplace so that they cannot improve teacher competence as well as organizational performance. Based on the description of the background above, the authors are interested in developing a competency-based sustainable professional development training management model to improve competence and culture of researching junior high school teachers in Pematangsiantar City.

Research Methodology

This study uses the type of Research and Development (R&D) which consists of two stages, namely qualitative methods to obtain product designs in the first stage and quantitative methods to test the effectiveness of the products produced in the second stage (Sugiyono, 2011). The competency-based sustainable professional development training management model to improve competence and culture of researching junior high school teachers in Pematangsiantar City was developed using the ADDIE model. The research was conducted in a junior high school in Pematangsiantar City. The time of the study was carried out from July 2021 to March 2022. The subjects of this study were 1,094 SMP Pematangsiantar City Junior High School teachers and the sample of this study was 80 teachers who were determined by purposive sampling technique. Research data were collected using questionnaires, interviews, FGDs, observations, documentation studies, expert validation and tests.

Results and Discussion

This research uses the Research and Development (R&D) type of research. The competency-based sustainable professional development training management model to improve competence and culture of researching junior high school teachers in Pematangsiantar City was developed using the ADDIE model. The stages and results carried out can be described as follows:

Analysis Phase

Analysis is the first stage of model development which includes problem analysis based on performance gaps and training needs analysis. Based on the results of interviews with the Head of the Middle School PTK Development Section that the Pematangsiantar City Junior High School teachers did not carry out their ongoing professional development obligations seriously as evidenced by the results of the performance assessment, they obtained the lowest average score of 3.64 with good answer criteria for professional competence dimensions of professional development through reflective action. The continuous professional development carried out by Pematangsiantar City Junior High School teachers can be seen in the following table:

Table 1. Implementation of Continuous Professional Development (PKB)

No.	Elements of PKB	Components of Each PKB Element	Percentage
1.	Self-development	Functional Training	68%
		Teacher's Collective Activities	52%
2.	Scientific Publications	Presentation at Scientific Forum	12%
		Scientific Publications in the form of Research Results or Scientific Ideas in the Field of Formal Education	15%
		Publication of Textbooks, Enrichment Books and/or	15%

		Teacher Guidelines	
3.	Innovative Works	Discovery of Appropriate Technology	22%
		Invention/Creation or Development of Artwork	25%
		Manufacture/ Modification of Learning/Display/Practice Tools	58%
		Preparation of Standards, Guidelines, Questions and the Like at the National and Provincial Levels	52%

Source: Pematangsiantar City Education Office (August, 2021)

Based on the table above, it can be seen that the implementation of sustainable professional development, especially elements of scientific publications for SMP Pematangsiantar City teachers, is still low. The Head of the Middle School PTK Development Section stated that scientific publications, especially CAR, were only done by teachers to meet the adequacy of credit scores for promotion, teachers did not do it seriously, as evidenced by the copy and paste results of CAR reports submitted by teachers for promotion. Based on the results of interviews, Pematangsiantar City Junior High School teachers did not receive training in making CAR to change the teacher's mindset and increase teacher competence in doing CAR as well as improving the culture of researching teachers. This is the cause of teachers not carrying out their obligations of continuous professional development seriously. At the analysis stage, an analysis of training needs for SMP City Pematangsiantar teachers is carried out with the results of the training needs analysis can be seen in the following table:

Table 2. Training Needs Analysis

No.	Aspect Analysis	Percentage
1.	Teacher participation in CAR training	12,5%
2.	Understanding in making PTK	8,75%
3.	The need for the development of PTK training	100%
4.	The need for CAR training	100%
5.	Willingness to take part in PTK training	100%

Source: Questionnaire Results (January, 2022)

Based on the results of the needs analysis, it can be concluded that 100% of teachers stated the need for CAR training development and needed and were willing to participate in CAR training.

In the analysis stage, an analysis of the instructor in training is also carried out because the instructor will determine the success of the training. The instructor has a positive and significant effect on the effectiveness of the training program (Rohmad, 2020; Bahtiar, 2018). In this study, the instructor in the training was Mrs. Kasminar Limbong, S.Pd., M.M., who is the head managerial supervisor of Pematangsiantar City Junior High School. He was chosen as an instructor in the training because he has met the competency standards of an instructor in

accordance with the Regulation of the Minister of National Education of the Republic of Indonesia No. 41 of 2009 concerning Advisory Standards in Courses and Training and has fulfilled the requirements to become an instructor in training as stated in the Guidebook in Chapter III. The requirements in question are (1) Indonesian citizens who have the status of widyaiswara in national training as well as school supervisors who have received certificates as national instructors; (2) Have expertise relevant to the training objectives; (3) Physically/mentally healthy and have commitment, good performance and high work ethic; (4) Graduated with Masters degree and has graduated as a teacher-instructor for Batch 3 and a facilitator for a Class 2 driving school; (5) has experience as a widyaiswara for 12 years and has the position of Associate Teacher, Level I Supervisor (IV/b).

Design Phase

The design stage is the stage for designing competency-based continuous professional development training management which includes:

First: module framework design. The module is divided into 4 parts, namely introduction, learning activities, evaluation and closing. The introduction contains the background, objectives, competency map, scope and suggestions on how to use the module. Learning activities are divided into 6 parts, namely the basic concepts of scientific publications, the basic concepts of classroom action research, characteristics of classroom action research, preparation of CAR proposals, systematics of CAR proposals and preparation of CAR reports. Each part of the learning activities includes learning objectives, indicators of competency achievement, material descriptions, learning activities, exercises, feedback and follow-up as well as answer keys. The evaluation contains pre-test and post-test questions to measure the level of understanding of the material.

Second: determine the systematics of the module. The presentation of material in the module is arranged systematically starting from the basic concepts of scientific publications, the basic concepts of classroom action research, characteristics of classroom action research, preparation of CAR proposals, systematics of CAR proposals and preparation of CAR reports.

Third: the design of the manual. The manual provides an understanding of the basic concepts of continuous professional development to support the improvement of teacher competence and professionalism. This handbook is used as a basis, reference, guideline, guide in implementing the continuous professional development of teachers to improve teacher competence and professionalism. The guidebook consists of a cover, an introduction covering the background, legal basis and objectives, an overview of the model of sustainable teacher professional development through competency-based training management to improve the education quality of Pematangsiantar City Junior High School, preparation for implementation, implementation and assessment.

Fourth: preparation of evaluation tools. In this module, the evaluation tool used is in the form of learning activities and exercises that are already equipped with

answer keys and assessment criteria. Evaluation was carried out in the form of pre-test and post-test evaluations.

Fifth: compiling assessment instruments. The assessment instrument consists of an assessment of the training model, an assessment of the training module and an assessment of the manual. The assessment is carried out through a questionnaire with a Likert scale to assess the feasibility of the training model as well as the training modules and guidebooks developed.

Development Phase

Development is a stage as a follow-up to the design that has been made. The development stage includes:

First: Pre Development. At the pre-development stage, the author prepares a design (blue print) consisting of a module structure framework (outline), training materials and the design of evaluation tools. Then the author determines the systematics of the training module which consists of a cover page, introduction, table of contents, list of pictures, list of tables, introduction, learning activities, evaluation, closing, bibliography and attachments. The training materials in the form of learning activities include the basic concepts of scientific publications, the basic concepts of classroom action research, characteristics of classroom action research, preparation of CAR proposals, systematics of CAR proposals and preparation of CAR reports. The design of the evaluation tool is in the form of learning activities, exercises from each learning activity and evaluation. Learning activities are practical tasks that must be done by trainees after completing each learning activity. exercises in the form of essay questions that must be done by trainees after completing each learning activity. evaluation includes pre-test and post-test.

Second: Drafting the Training Model Framework. The draft was prepared after conducting field studies, document studies, observations and interviews with school supervisors, principals, and junior high school teachers in Pematangsiantar City while still coordinating with the Pematangsiantar City Education Office. The draft module was then discussed in a FGD (Focus Group Discussion) which was attended by promoters, co-promoters, material experts, media experts, Head of Pematangsiantar City Office, school supervisors, principals, lecturers and teachers of Pematangsiantar Junior High Schools to get input before being tested in order to obtain the module. quality training, which can be used in an effort to guide teachers in improving teacher competence in making CAR. The results of the FGD are (1) classroom action research training into a teacher competency development program; (2) training is carried out based on an analysis of teacher needs; (3) evaluation of training is used to fulfill credit points in proposing promotions and teacher positions; (4) teacher competency assessment includes knowledge, skills, attitudes and results (product); (5) the training module is suitable for use in the implementation of teacher competency development.

Third: Development of Training Modules. The developed training module includes a cover module, a module structure framework, training materials, and an evaluation tool design.

Fourth: Guidebook Development. The developed guidebook contains a guide book cover, introduction, an overview of the model for continuous professional development of teachers through competency-based training management to improve the quality of education in Pematangsiantar City Junior High School, preparation for implementation, implementation and assessment.

Fifth: Questionnaire Development. The questionnaire developed consisted of a training model assessment questionnaire addressed to media experts, a training module assessment questionnaire addressed to material experts, participants and facilitators as well as a training program assessment and training impact questionnaire aimed at training participants.

Sixth: Validation. Validation is a stage to determine whether the developed training model and module is feasible to be tested. Based on the results of material expert validation, the percentage of 98 categories was very good and the results of media expert validation obtained a percentage of 95 very good categories. Thus, it can be concluded that in terms of the feasibility of the material and the feasibility of the media, the competency-based sustainable professional development training management model is very feasible to use. Based on the results of the FGD, a competency-based training management model design was obtained which can be seen in the following figure 1:

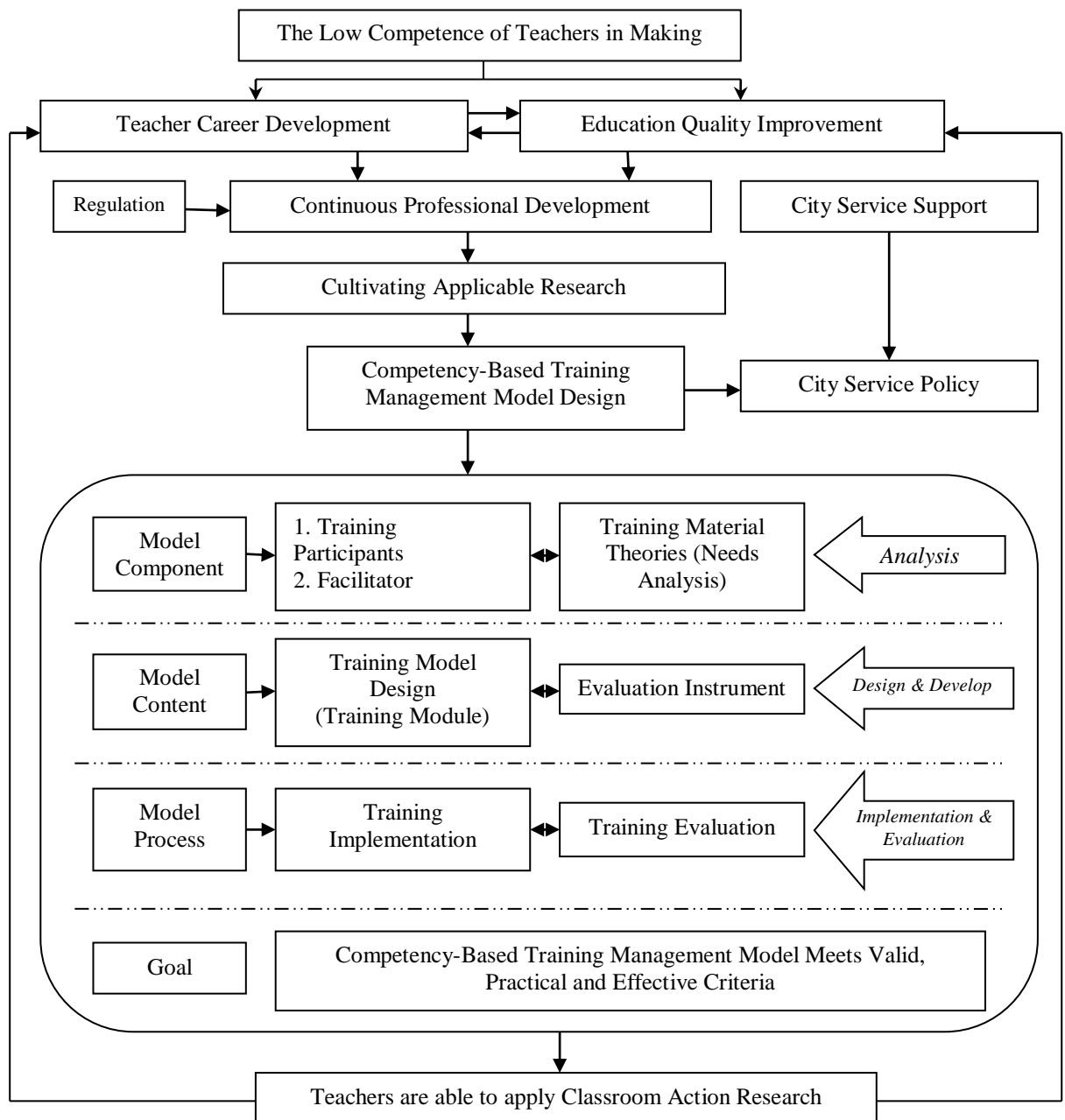


Figure 1. Design of competency-based continuous professional development training management model

The competency-based training management developed has the following advantages: (1) The material presented in the module can motivate participant participation; (2) The material presented in the module is related to the participants' experiences in everyday life; (3) The training materials are prepared based on the needs and work of the participants as a teacher; (4) The material

presented in the module becomes a reference in overcoming problems relevant to the professional needs of a teacher; (5) Motivating participants' attitudes to become lifelong learners; (6) Using media, methods, techniques and learning experiences; (7) The module discusses theory to produce a product; (8) The module is equipped with a concept map of the final product of the training; (9) Training is held to understand the material in the module with a contextual instruction approach; (10) At the end of each learning activity there are learning activities and exercises.

Implementation Phase

The implementation in the first trial was carried out on 30 teachers with an allocation of 48 JP @ 60 minutes where the implementation was carried out face-to-face and discussions through the Telegram application. The training activities started from a pre-test to measure teacher competence before training, then continued with learning activities and at the end of the training a post-test was conducted to measure teacher competence after training. After the first trial, there is input for the model revision which can be seen in the following Figure 2:

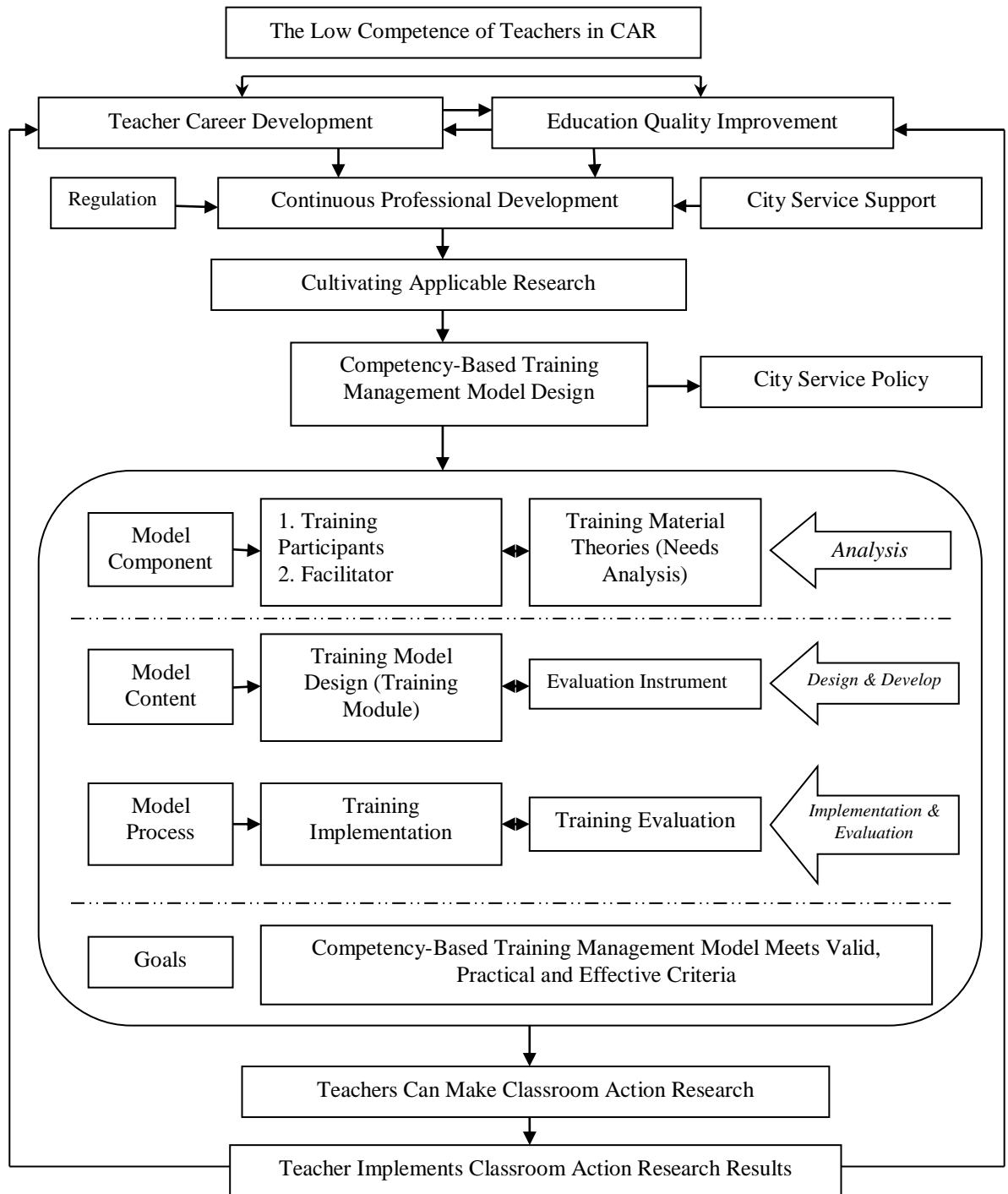


Figure 2. Phase I model design revision

The implementation in the second trial was carried out on 50 teachers with an allocation of 48 JP @ 60 minutes where the implementation was carried out face-to-face and discussions through the Telegram application. The training activities started from a pre-test to measure teacher competence before training, then continued with learning activities and at the end of the training a post-test was conducted to measure teacher competence after training. After the second trial has been carried out, there is input for model revision which can be seen in the following Figure 3:

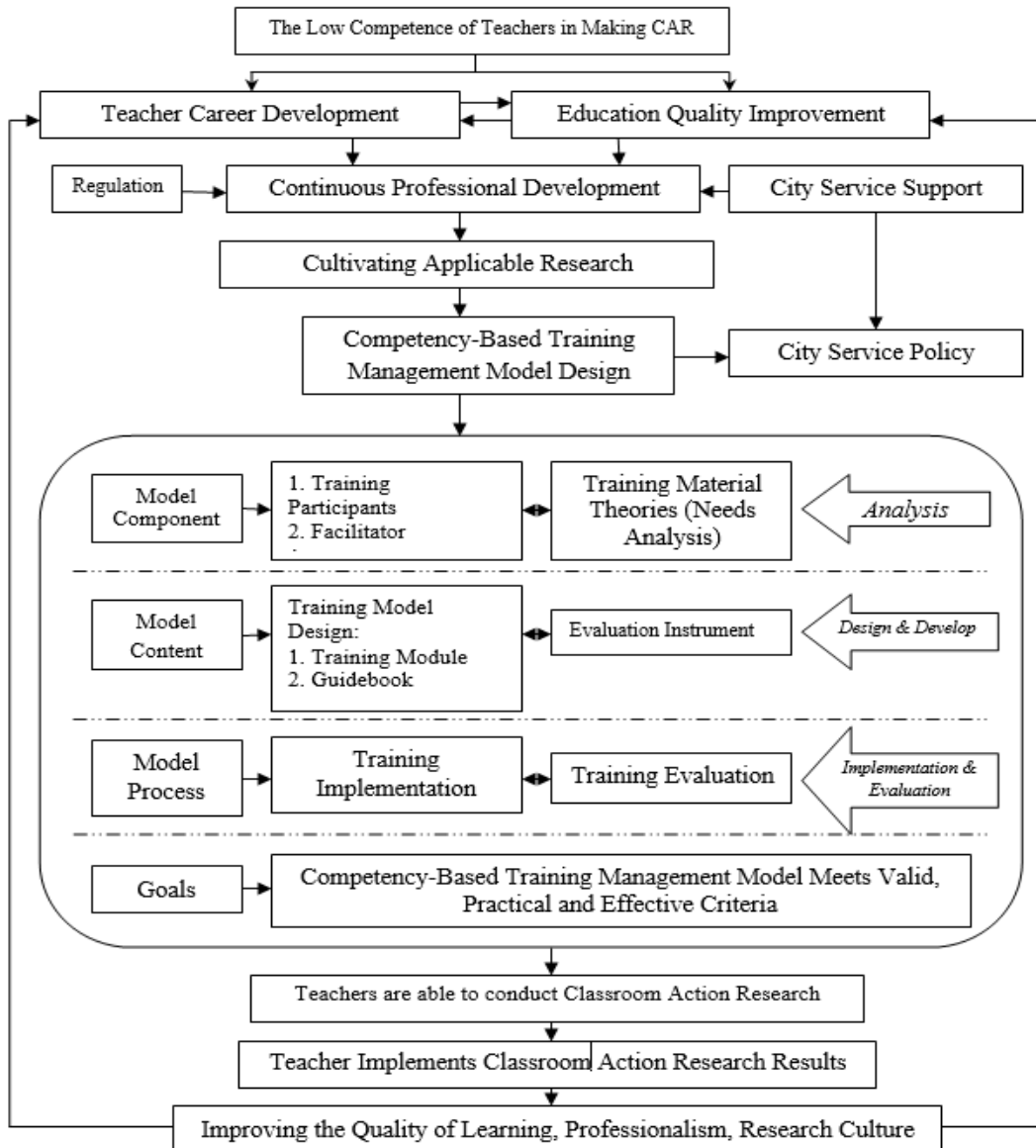


Figure 3. Phase II Model Design Revision

The training is carried out with a heutagogical approach which is characterized by face-to-face and online training through the Telegram application which is used as a community for instructors and trainees to share knowledge and experiences with each other. In the heutaogy approach, the instructor's role has changed to become a mentor and director for training participants, motivating trainees to become lifelong learners, learning leaders, directing learning resources, directing community networks and opening communication (Hotimah et al, 2020); (Sulistya, 2019); (Hiryanto, 2017).

Evaluation Phase

At the evaluation stage, an assessment of the learning tools developed is carried out, an assessment of the training model and its effectiveness as well as an assessment of the training program. Based on the results of the study, the average score of the training module assessment was 95% in the very good category and the average score for the guidebook assessment was 96% in the very good category. Thus, all aspects assessed in the developed learning tools have met the eligibility criteria. Assessment of the training model obtained an average score of 94% with a very good category. Thus, it can be concluded that the developed training model received a very good response from the training participants. The effectiveness of the training model is seen from whether there is an increase in competence and research culture on teachers after attending training.

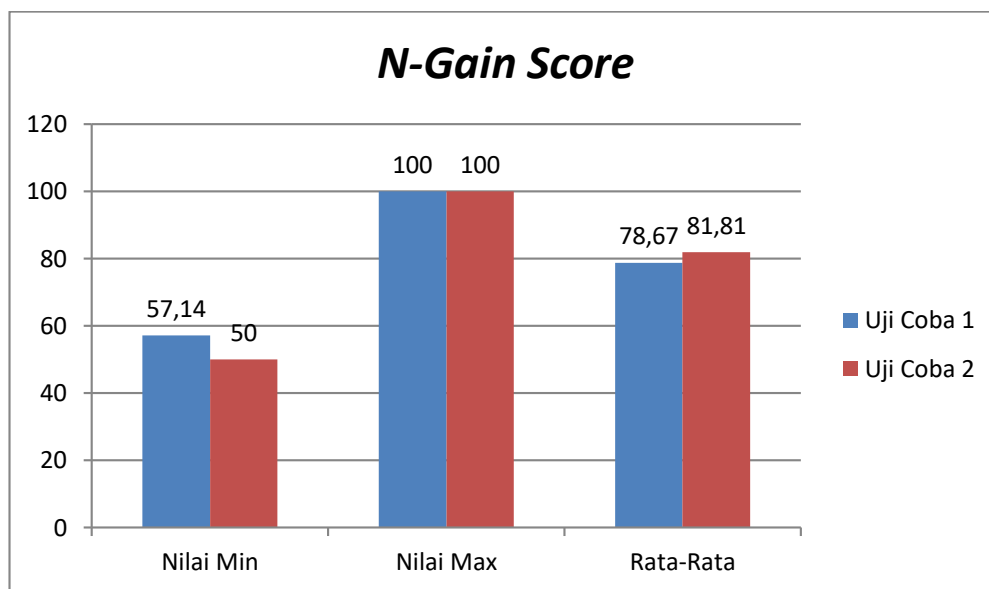


Figure 4. Result of *N-Gain Score*

Source: Results of Pre Test and Post Test Data Processing (February, 2022)

Based on the picture above, it is known that the average N-Gain Score in the first trial was 78.67% and in the wide trial it was 81.81% > 75% was in the effective category, it can be concluded that the competency-based training management

model is effective improve the competence of SMP City Pematangsiantar teachers in the field of classroom action research.

Based on the results of the Wilcoxon test, the Asymp value was obtained. Sig. (2-tailed) of $0.000 < 0.05$, which means that the competence of SMP City Pematangsiantar teachers in conducting classroom action research after attending the training is higher than before the training.

The increase in the culture of researching teacher trainees was seen from 93.33% (first trial) and 84% (second trial) of teachers being able to produce products in the form of classroom action research reports. Apart from the products produced, the improvement of the culture of researching teachers can also be seen from the effectiveness of the training program. This aspect of the assessment uses the Kirkpatrick model where the assessment of the effectiveness of the training program is assessed from four stages, namely (Personal, 2014): First, the reaction stage which focuses on the participants' reactions to the implementation of the training program. The results showed that the aspect of the assessment of the trainees' reactions got an average percentage value of 93% for limited trials and broad trials, which means that the trainees gave a positive assessment of the training because the training held was relevant to the needs and useful to support the duties and work of a person. teacher. Second, the learning phase is focused on obtaining data and information related to the learning outcomes of the trainees. The results showed that the aspect of the assessment of the learning outcomes of the trainees got an average percentage value of 90% for the limited trial and 91% for the broad trial, which means an increase in the competence of the trainees after attending the training.

Third, the behavioral stage (behavior) which is focused on collecting data and information to find out whether there is a transfer of learning process in the trainees themselves. The results showed that the aspect of the assessment of the behavior of the trainees got an average percentage value of 90% for the limited trial and 92% for the broad trial, which means that the trainees are more disciplined in applying competence in conducting classroom action research in their respective schools and teachers also conduct encouragement to other teachers to be motivated in carrying out classroom action research. Fourth, the results stage is carried out to measure the contribution of the program as a whole to the company's performance. The results showed that the assessment aspect of the trainees' contribution to school performance got an average percentage value of 90% for limited trials and 92% for broad trials, which means that by implementing classroom action research competencies obtained from training, performance can be improved through improving the quality of learning at the same time improve professionalism as a teacher.

The results showed that the overall assessment of the classroom action research training program obtained an average score of 92% with a very good category, which means that the classroom action research training program is very effective in improving teacher performance and career development as well as improving school performance through improving the quality of classroom learning.

Conclusion

The conclusions from the research and discussion can be described as follows: (1) A competency-based continuous professional development training management model to improve competence and culture of researching SMP teachers in Pematangsiantar City was developed using the ADDIE model which includes analysis, design, development, implementation and evaluation. The developed model has the following advantages: (i) The material presented in the module can motivate participants' participation; (ii) The material presented in the module is related to the participants' experiences in everyday life; (iii) The training materials are prepared based on the participants' needs and work as a teacher; (iv) The material presented in the module becomes a reference in overcoming problems relevant to the professional needs of a teacher; (v) Motivating the attitude of participants to become lifelong learners; (vi) Using media, methods, techniques and learning experiences; (vii) The module discusses theory to produce a product; (viii) The module is equipped with a concept map of the final product of the training; (ix) Training is held to understand the material in the module with a contextual instruction approach; (x) At the end of each learning activity there are learning activities and exercises. (2) The effectiveness of the competency-based continuous professional development training management model can improve teacher competence as evidenced by the N-Gain Score g score $> 75\%$, namely 78.67% (limited trial) and 81.81% (wide trial), and the Wilcoxon test value with the Asymp value. Sig. (2-tailed) $0.000 < 0.05$, which means that the competency-based sustainable professional development training management model is effective in improving the competence of SMP teachers in Pematangsiantar City. The increase in the culture of researching teachers can be seen from 93.33% (limited trials) and 84% (wide trials) of teachers being able to produce products in the form of classroom action research reports.

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