



Development of Innovation House to improve the competence of developer teachers

Eka Murdani¹*, Ari Widodo², Andi Suhandi²

¹Program Doktor IPA Universitas Pendidikan Indonesia, Bandung, Indonesia.

²Prodi S3 IPA Universitas Pendidikan Indonesia, Bandung, Indonesia

* Coressponding Author. E-mail: ekamurdani@upi.edu

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Abstract: The Innovation House program has been developed with the validation criteria of 'Very Good' based on expert judgment. The Innovation House was developed using the ADDIE method (Analysis, Design, Develop, Implement and Evaluate). The vision of the Innovation House is to prepare teacher developers as reflectors, problem solvers, and decision-makers in science learning. The Innovation House aims to improve science teachers' competence in developing curriculum, especially lesson planning (objectives, steps, and assessments). On average, 80% of the lesson plans made by teachers were by the content and constructs of the lesson plans, while at the beginning of the program, the average suitability of new content and constructs was about 56%, with an N-gain score of 0.5 or a moderate increase category. Based on the average assessment of RPP content and constructs, the Rumah Innovation Program effectively improves teacher competence in making Innovative RPP by increasing the aspects of reflection, problem-solving and decision making. The teacher participants' response during the programs was 'imposing' and gave a 'positive response' based on the attitude scale instrument.

Keywords: innovation house, developer teacher, reflective teacher, learning-log, teacher professional development

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INTRODUCTION

Facts in schools, from primary to secondary levels, show that the competence of teachers in the curriculum domain, in the planning aspect, especially in making lesson plans (RPP), is still at the stage of adopting or adapting the existing lesson plans. However, the teacher's activities in adopting and adapting are also balanced with the process of developing lesson plans, even at a low level (Stieler-Hunt & Jones, 2019; Rapanta, et al., 2021). The ideal condition that is expected is that the teacher can develop at a high level (as a developer teacher) (Furuhagen et al., 2019; Yuan, 2019), namely teachers who can make RPP as a whole and do not depend on the existing RPP. In the end, teachers can ultimately develop RPP. Teachers need the ability to innovate and be creative, involving reflective, problem-solving, and decision-making abilities, either individually or in groups. Thus, we need a program that can accommodate teachers to collaborate in solving problems. The program offered to make it easier for teachers to innovate called the "Innovation House Program".

Innovation House Programs is developed based on the principles of sustainable teacher professional development from Redman & Redman (2018), which focuses on target key sustainability competencies, fostering sustainability leaders, co-learning support, intensive and long-term contact, engaging pedagogy, practised oriented, and formative evaluation. In addition, the innovation house focus on content and active learning, supports collaboration, uses models and modelling of effective practice, provides coaching and expert support, offers opportunities for feedback and reflection and takes over time for a sustained duration. The target of the critical sustainability competencies in the Innovation House program is to develop curriculum and learning plans to promote the main competencies, namely problem analysis, critical thinking, creativity, and decision-making based on content, as well as based on the relationship of content to education, career, and life goals. The program



will develop teachers as foster sustainability leaders by targeting problem-solving and decision-making competencies on problems or cases given to teacher participants, pouring them into lesson plans, and putting them into practice in classroom learning (practised oriented).

The focus of teacher professional development in the Innovation House is the ability of teachers in groups that involve the ability of teachers to collaborate. The ability of teachers to use technology as an educational tool as required in this program requires teachers to integrate technology in lesson plans designed collaboratively in their respective groups. The technology used is expected to follow the times as a manifestation that education can keep up with the times (sustainable), and education can answer the challenges and problems of the times (reflection, problem-solving and decision making).

In this program, teachers in groups collaborate to solve factual problems on a given science learning theme and make learning plans that follow the theme and research-based problems. The problem becomes a teacher's collaborative research project to find a solution and implement it into the lesson plan. The peculiarity of this program is the collaboration of teacher developers as reflectors, problem solvers and decision makers based on research on a problem or project. Thus, this study presents the main objective of designing the ideal innovation house program for science teachers.

METHOD

This study was development research. The ADDIE method was used in the development of the Innovation House with the consideration of the steps that were influential in building a learning tool, professional practice, and dynamic and supporting learning (Branch, 2009; Kaye & George, 2009; Lafleur et al., 2021). Experts then validate the product development to analyze readiness in terms of content and program flow (Creswell, 2008). The target of this program is science teachers in West Kalimantan.

The first stage of development programs, called A (Analysis), identifies problems arising from teachers' professional practice. Observation results indicate that the competence of teachers in the curriculum domain in planning learning is still at the level of adoption, not yet developing. The second stage, called D1 (Design), is carried out based on what has been formulated in stage A. Based on the analysis in stage A, it is concluded that a program design (with several ideal stages) is needed to accommodate teachers collaborating to solve problems by innovating. Several things that are designed in phase 2 (design) are designing: (1) program vision, (2) program objectives, (3) program competencies or outcomes, (4) program activities, and (5) post-program activities.

The third stage is called D2 (Develop), the production or program development stage where everything made in the design stage is actualized into actual work. Vision, objectives, competencies or program outputs, program activities, and post-programming are not limited to design but have been validated and implemented. The fourth stage is I (Implementation), implementing the Innovation House program into an available platform or can be accessed online at the link <http://rumahinovasi.online>. The results of expert validation of the Innovation House Program are calculated based on equation 1 (Rusilowati, 2014).

$$V_a = \frac{\sum_{i=1}^n A_i}{n} \quad (1)$$

Where V_a is the average value of the total validator assessment for all aspects, A_i is the average value of the i -th aspect, and n is the number of aspects. The criteria for validity by experts are given in Table 1.

Table 1. Criteria of product validity by Expert Judgment

Average	Criteria
$1.00 \leq V_a \leq 1.80$	Poor
$1.80 \leq V_a \leq 2.60$	Fair
$2.60 \leq V_a \leq 3.40$	Good
$3.40 \leq V_a \leq 4.20$	Very Good
$4.20 \leq V_a \leq 5.00$	Excellent

The fifth stage, called E (Evaluate), is carried out in two forms of evaluation: formative and summative. Formative evaluation is carried out during and between stages of ADDIE. The purpose of this evaluation is to improve the Innovation House programs, which were made before the last version was implemented, regarding the appearance and accessibility of the website by I.T. experts and program content by pedagogical experts and teacher professionalism. The summative evaluation was carried out after the last phase was implemented and aimed to assess the effectiveness of the Innovation House program through an online questionnaire available on the Innovation House platform regarding the benefits of the program for users and the impact of changes after participating in the program.

RESULT AND DISCUSSION

Analysis

The most crucial stage in development is the analysis stage. This stage identifies the problems arising from the teacher's professional practice. Facts about teacher professionalism show that teacher competence in learning planning (RPP) is still at the stage of adopting or adapting the existing RPP (Nurtanto et al., 2021; Zazkis et al., 2009). The analysis results indicate the low innovation index owned by the teachers. As classroom facilitators, the teachers should be able to innovate to provide an optimal learning experience for students. The characteristics of students and different learning content are the main factors that require teachers always to innovate. This cannot be done simply by adopting and adapting existing lesson plans.

Design

The design is based on what has been formulated in the analysis stage. Based on the analysis in stage 1, we need a program design (design stage) that can accommodate teachers collaborating to solve problems by innovating. The program that was designed was later called the Innovation House Program. The Innovation House Program is the home/container for innovator teachers to collaborate to improve competence in developing: curriculum, learning planning (objectives, steps and assessments), learning technology, reflection, collaboration, problem-solving and decision-making abilities.

The assumptions used in determining the design of the Innovation House are based on the principle of sustainable teacher professional development from Redman & Redman (2018), which focuses on Target key sustainability competencies, foster-sustainability leaders, co-learning support, Intensive and long-term contact, engaging-pedagogy, practice-oriented and formative evaluation. The key sustainability competencies targeted for the Innovation House program are developing curriculum and lesson plans to promote: problem analysis, critical thinking, creativity, and content-based decision making, as well as content-based relationships with education, career, and life goals.

The program will develop teachers as foster sustainability leaders by targeting problem-solving and decision-making competencies on problems or cases given to teacher participants, pouring them into lesson plans, and putting them into practice in classroom learning (practised oriented). The innovation house was also developed concerning the seven elements of effective professional development according to Hammond et al. (2015) and Caena & Vurorikasi (2021), namely, focus on content and active learning, support for collaboration, use of models and modelling of effective practice, providing coaching and expert support, offer opportunities for feedback and reflection and take over time for a sustained duration.

In this program, teachers in groups collaborate to solve factual problems on a given science learning theme and make learning plans that follow the theme and research-based problems. The problem becomes a teacher's collaborative research project to find a solution (problem-solving) and then pour it into the lesson plan. The peculiarity of this program is the collaboration of teachers as reflectors, problem solvers and research-based decision makers on a problem or project. Several things that are designed in phase 2 (design) are designing: (1) program vision, (2) program objectives, (3) program competencies or outcomes, (4) program activities, and (5) post-program activities. Activities after the program are essential and designed as a continuous professional development effort.

Development

This stage is the production stage, where everything made in the design stage becomes real. Vision, objectives, competencies or program outputs, program activities, and post-programming are not limited

to design but have been validated and implemented. The vision of the Innovation Home Program is "to produce teachers as collaborators, reflectors, problem solvers, and decision-makers in the field of research-based science learning". The appearance of the innovation house website that was developed is shown in Figure 1.

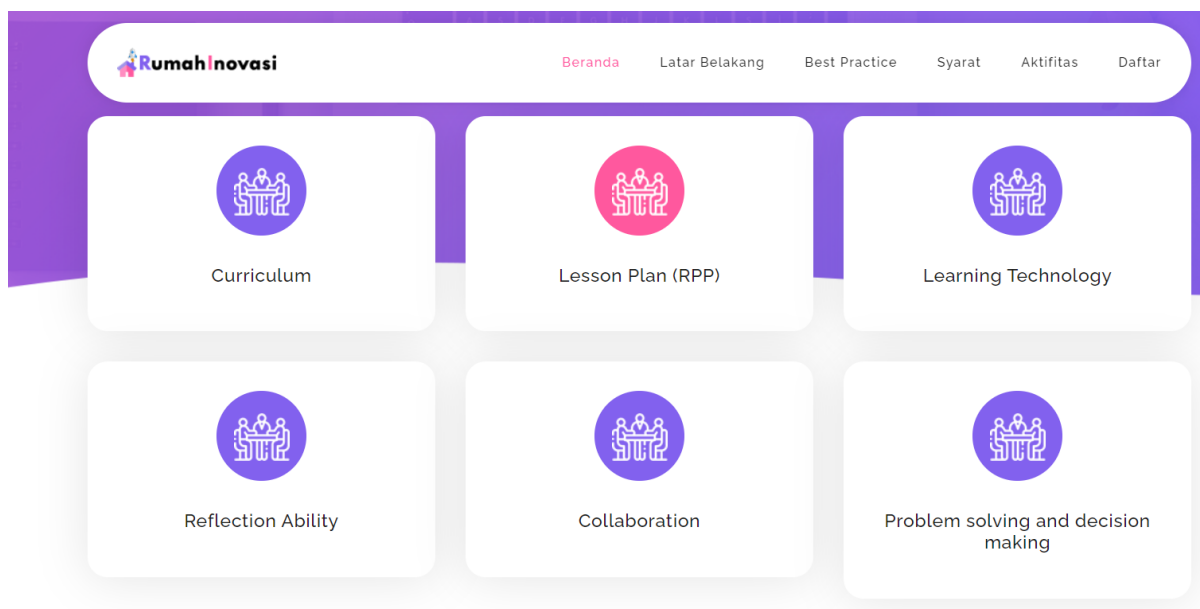


Figure 1. Features in Innovation House Program

Website development is designed for teachers to follow the program through best practices. Best practice in innovation house program consists of curriculum domain; competencies in the form of "Developing and implementing a coherent and focused science curriculum that is consistent with the needs, abilities, and interests of students"; sub competence "planning instruction that promotes: problem analysis, critical thinking, creativity, and decision-making based on subject matter content, organization and integration of content and the relationship of content to education, career, and life goals"; the competency level "develops instructional planning plans that are able to promote: problem analysis, critical thinking, creativity, and content-based decision making lessons, organization and integration of content and the relationship of content to education, career, and life goals"; and a program description of the program in the form of "Innovation House Program to improve teacher development competencies from adapting lesson plans to developing collaborative plans together research-based learning".

After participating in the activities at the Innovation House programs, it is expected that teachers have the competence to develop learning plans which include competencies: developing curriculum, formulating learning objectives, designing learning activities, developing learning assessments to measure the achievement of learning objectives, developing learning technology and integrating it into learning, and having collaboration capabilities, reflection, problem-solving and decision making based on research (research-based) in groups (teamwork).

The results of the validation by 3 experts on the activities at the Innovation House, which consist of activity phases, are given in Table 2.

Table 2. The validation of the phase's activities at the Innovation House

Phase	Activity	Average	Criteria
Phase 1	Teacher participants are divided into small groups (3-4 teachers) The committee provides case studies of learning on a learning theme to each group, and the group's task is to formulate problem-solving in the lesson plan.	3.6	Very Good
Phase 2	Each group presented their problem-solving and lesson plan design. The other group serves as a critic for the group that makes presentations The committee prepares a team of experts from academics and education practitioners tasked with providing input and critiquing documents and presentations.	3.5	Very Good

Phase	Activity	Average	Criteria
Phase 3	Each group revises the input and criticism from other groups and the expert team. Implement lesson plans in the classroom at one of the participating schools, teachers or group members and make video recordings.	3.6	Very Good
Phase 4	Playing video recordings of each group's learning and giving criticism. Selection of the best-recorded video through the results of the assessment of participants and a team of experts. The selection of the innovator teacher group as "The Innovator" is based on the results of an assessment from a team of experts.	3.5	Very Good

Table 2 shows that the Innovation House program has been developed with the 'Very Good' validation criteria based on expert judgment. According to Redman & Redman (2018), the principle of sustainable teacher professional development is based on the following principles: target key sustainability competencies, foster sustainability leaders, co-learning support, intensive and long-term contact, engaging pedagogy, practised oriented and formative evaluation.

The key sustainability competencies in the program that will be designed are developing a curriculum and lesson plans to promote: problem analysis, critical thinking, creativity, and content-based decision-making, as well as content-based relationships with education, career, and life goals (Seo et al., 2020). The program will develop teachers as foster sustainability leaders by targeting problem-solving and decision-making competencies on problems or cases given to teacher participants, pouring them into lesson plans, and putting them into practice in classroom learning (practised oriented).

The lesson plans must involve pedagogy (engaging pedagogy) and support shared learning between students (support co-learning). RPP is presented, and its implementation in the classroom is made. A video recording will be given input and criticism intensively (intensive) by a team of experts for the evaluation of learning (formative evaluation) (Laurillard, 2016; Bizami, 2022). Although the expert team provided input for evaluation consideration, it was the teacher who should be the actual evaluator. Provision of the ability to evaluate formative learning is expected to take place sustainably. The program manager provides space and time by providing a "ask the teacher" platform through the Innovation House website to consult and collaborate. The 'ask the teacher' service will provide feedback within 24 hours. Only the alumni teachers of the Innovation House who have passed can register and get an account to access the "ask the teacher" service. This "ask the teacher" service is a form of sustainable professional development and long-term contact.

The critical dimensions of shareholder value in developing sustainable teacher professionalism, according to Hart & Milstein (2013), consist of cost and risk reduction (internal and today), containing what strategies are being applied to internal aspects of the program. Reputation and legitimacy (external and today) contain what strategies are being implemented by involving external aspects/parties of the program. Innovation and repositioning (internal and tomorrow) contain what strategies will be developed with future orientation (tomorrow) based on reflection of internal aspects of the program. Finally, the growth path and trajectory (external and tomorrow) contain what strategies will be developed with a future-oriented orientation (tomorrow) by involving external aspects/parties of the program for the sake of program sustainability. From the 4 key dimensions above, the sustainable professional development program includes strategies that reflect on today's conditions and are future-oriented (tomorrow) by involving/paying attention to internal and external aspects of teachers. This strategy does not appear by itself but with a backcasting process: "at present, what do I do today to achieve this vision? Moreover, the vision of what I want is tomorrow or the future."

The steps of the backcasting process can be written as follows: (1) Begin with the end in mind: start by thinking about the end or future of education, future education, future teachers, and future students. The focus on future teachers is teachers who can colour the world with education through competence in technology, collaboration, reflection, problem-solving and decision making. (2) Move backwards from the vision to the present: Currently, teachers tend to move/step each their way in learning or carrying out their profession as teachers, closed to students and the outside world, monotonous, and content-oriented (knowledge), teachers are dominated by teaching students not how to teach students. (3) Move step by step towards the vision: move step by step towards the vision. In achieving the vision, it is necessary to formulate a strategic plan or stages of short, medium or long-term achievement.

Based on the steps of the backcasting process, a person, institution, or program developer needs to formulate a vision based on an analysis of professional teacher needs (wants to improve what competencies, from what competence to what, to be more specific directed). The vision of the Innovation House Program is: "to produce teachers as collaborators, reflectors, problem solvers, and decision-makers in the field of research-based science learning".

The vision will be lowered into the program objectives. The Innovation House program generally aims to improve the competence of teacher developers from adapting lesson plans to collaboratively developing research-based learning plans. To achieve the vision and objectives of the program, it is necessary to formulate a strategy for achieving the program. This strategy should consider the 4 key dimensions, 7 principles of program development and backcasting mentioned above. The strategy is the short-term strategy: Teachers follow all phases (phases 1-4) in the Innovation House to become a group of innovative teachers; and the Long-Term Strategy: The Innovation House provides a "ask the teacher" platform to consult and collaborate on lesson-planning, assessment, action research, lesson study and other professional practices as a form of sustainable professional development and long-term contact.

The teacher professionalism program in the Innovation House fulfils the following characteristics: makes teachers reflective, pays attention to the principles of conceptual change, aspects of emotions, views and beliefs of teachers, provides real examples from the field, and provides support during implementation in the field. Making teachers reflective means, they can direct teachers to be aware of and find their "weaknesses and strengths" in teaching or teaching students (Kononets, 2021). Reflection plays an essential role in planning learning and providing feedback on student learning which is part of the activities in the Innovation House. Taking into account the principles of conceptual change, meaning that everyone has prior knowledge, the teacher professionalism improvement program must also pay attention to the teacher's prior knowledge about teaching and learning (Davis, 2013; Ostendorf & Thoma, 2022; Haney & Arthur, 2012). There must be changes before and after joining the program before the program. Teachers were not accustomed to collaborating in solving problems and developing lesson plans. After the program, teachers were expected to be able to collaborate. Paying attention to teachers' emotional aspects, views and beliefs mean that a fundamental change involves cognitive and non-cognitive aspects (Kononets, 2021; Pintrich et al., 2011). In teamwork (teamwork) in small groups at the Innovation House, emotional intelligence plays an essential role in creating a good family atmosphere, conducive discussion, respecting other people's opinions and not forcing opinions on others, wise and knowledge in solving problems and making decisions. Decisions provide real-world examples (Davis, 2013; Hewson et al., 2011). At the Innovation House, the teacher group was given examples of real problems that had to be solved and put into a lesson plan. Providing support during implementation in the field means that change is not a step but a gradual process (Kononets, 2021). Therefore, teachers must continue to receive support/assistance when applying what they have learned/know. Reflection and feedback as a means to support each learning process, including in planning learning. Every change in behaviour and the teacher's conception must get appreciation from colleagues in group work and collaborating at the Innovation House.

The description of the seven elements of effective professional development in the Innovation House Program, these elements refers to the opinion of Hammond et al. (2015) as follows: Focus on Content: at the Innovation House, science learning is presented based on a theme or case or problem to convey content. Focus on active learning at Innovation House is designed RPP for students to be active in learning (active learning). Supports for collaboration: the speciality of the program at Innovation House is that teachers collaborate in developing lesson plans. Uses models and modelling of effective practice: a model for developing professionalism at the Innovation House uses a research-based collaborative model with colleagues to develop lesson plans. Provides coaching and expert support: at the Innovation House, teacher participants are not given coaching because the background of the teacher participants is that they have developed RPP, even though it is limited to adoption. They are considered to have become developers, even though they are at a lower level; therefore, they are not trained or fostered by a coach, but they gather with fellow development teachers to develop learning plans collaboratively and get input or criticism from the expert team on lesson plans presentations and video screenings of learning implementations in the classroom. Class. This means that the professional development program at the Innovation House has expert support. Offers opportunities for feedback and reflection: at the Innovation House, each group makes a lesson plan, presents it to get feedback from the expert team, and implements the lesson plan into learning by making video recordings. Video recordings

are played back to provide feedback and reflection from the expert team. Takes over time for sustained duration: continuous teacher professional development takes a long time, so after the program is finished, program managers must make a follow-up program plan for program alums. The Innovation House program manager provides space and time by providing a "ask the teacher" platform to consult and collaborate through the Rumah Innovation website. The 'ask the teacher' service will provide feedback within 1x24 hours. Only the alumni teachers of the Innovation House who have passed can register and get an account to access the "ask the teacher" service. This "ask the teacher" service is a form of sustainable professional development and long-term contact.

The Innovation House program meets the criteria that refer to The National Staff Development Council's (NSDC) Standards for Staff Development (2015), consisting of 3 standards. The first standard context standards cover learning communities, leadership, and resources. Learning communities are implemented by gathering teachers with their peers in small groups and collaborating in groups to develop lesson plans, meaning that the collection of teachers can be regarded as a learning community. This is what is done at the Innovation House. Leadership implemented with programs designed in the Innovation House will foster teacher leadership by targeting problem-solving and decision-making competencies to problems or cases given to teacher participants in groups and pouring them into the lesson plans. Resources implemented at the Innovation House will increase the competence of teacher resources, from adapting lesson plans to developing collaborative lesson plans in groups.

The second standard of NSDC is Process Standards, covering Data-Driven, Evaluation, Research-based, Design, Learning, and Collaboration. Data-Driven is implemented by making decisions by groups of teachers on problems given at the Innovation House, for which the RPP will be made data-driven (data-driven), meaning that all decision-making must be based on data. Evaluations with lesson plans are presented and implemented in the classroom, video recordings are made, and input and criticism will be given intensively by a team of experts for learning evaluation. Although the expert team provided input for evaluation consideration, it was the teacher who should be the actual evaluator. Provision of the ability to evaluate formative learning is expected to take place sustainably. Research-based is implemented by making decisions by groups of teachers on problems given at the Innovation House based on data and data obtained based on research. Design is implemented with teachers in groups collaborating to design lesson plans. Learning is implemented with the teacher designing student-centred learning. Implemented collaboration with teachers to solve problems on the given case and then pour it into the lesson plan. The third standard of the NSDC, namely content, includes Equity, Quality teaching, and Family involvement. Equity implemented in designing learning (RPP) must pay attention to fairness between students, the learning process and fairness in student assessment. Quality teaching is implemented with collaboration between teachers in developing lesson plans and learning. It aims to provide quality teaching by teachers. Family involvement in the Innovation House program requires the involvement of parents in learning. Teachers should design learning that can involve parents as a source of children's learning, not just a source of learning and it is just the teacher, for example, regarding blood type (the mother's blood group is A and the father's blood group is B, the blood group of her child can be predicted). For example, ask your mother, do you cook vegetable gravy with salt before the water boils or when the water boils? For example, if you dry black and white clothes, which clothes dry quickly? Moreover, there are many more examples of science concepts in everyday life.

From the description of 7 principles of sustainable teacher professional development, 4 critical dimensions of shareholder value, 3 steps of the backcasting process, characteristics of professionalism programs according to several experts, 7 elements of effective professional development according to Hammond (2013), and the 3 NSDC standards above are the basis for the development of the Innovation House program and has been fulfilled. The program is designed to improve teacher competence from adapting lesson plans to developing lesson plans collaboratively in groups according to principles, dimensions, backcasting, characteristics, elements of effectiveness and NSDC standards.

Implementation

At this stage, teachers are ready to use the Innovation House program system. The activities carried out in this stage are preparing and marketing it to the target teachers (socialization or promotion of the presence of the Innovation House). The requirements for participating in the activities at the Innovation House are teachers who have innovated and been creative in developing lesson plans and enrolled in the google form link that has been provided by attaching the innovative lesson plans as proof of having

developed the lesson plans. Teachers who receive an email notification "accepted as a part of the Innovation House" are entitled to participate in the Innovation House Program (4 phases of the program) and post-program activities (providing a 'ask the teacher' platform and learning logs). 13 teachers have used the Innovation House platform spread over 4 districts/cities and 9 schools consisting of 6 junior high schools and 3 high schools. After participating in activities at the RPP Innovation House, the teachers experienced increased quality regarding RPP content. The learning objectives were written (81%), the learning steps were presented in sequence (77%), the learning steps were carried out to achieve the learning objectives (79%), clarity of learning methods (83%), and the assessment used is following the measurement of achievement of learning objectives (81%), and an assessment rubric is available (81%). On average, 80% of the lesson plans made by the teacher were following the content and construct of the lesson plans, while at the beginning of the program, where the teachers collected the lesson plans they had made, an average of 56% were found following the content and construct of the lesson plans. Obtained N-gain of 0.5 with a moderate increase category.

Evaluation

The evaluation carried out in this study was to measure the Innovation House Program's effectiveness in improving teachers' ability to develop innovative lesson plans (teacher developer competence). On average, 80% of the teacher's lesson plans are based on the content and construct. Based on Table 4, the percentage of 80% informs that the effectiveness of the improvement is in the effective category, meaning that the Innovation House Program effectively increases teacher participants' competence in developing lesson plans. The next indicator to measure the Innovation House Program's effectiveness is the participant's response to program activities. A questionnaire was distributed to the teachers participating in the program to find out the teacher's responses to the Innovation House Program. This questionnaire is available online and can be accessed online on the Innovation House website. The response of the teacher participants during the program was 'awe-inspiring' and gave a 'positive response' based on the attitude scale instrument. Thus, it can be concluded that the Innovation House can improve the competence of developer teachers in making innovative lesson plans.

CONCLUSION

A method for improving the competence of developer teachers has been developed by developing a forum for teachers to innovate, collaborate, reflect, solve problems and make decisions. This forum is called the Innovation House programs. The Innovation House program has been developed with the validation criteria of 'Very Good' based on expert judgment. The program has been implemented for science teachers who have been declared 'accepted' to join the program after registering by attaching a lesson plan developed by the teacher as a registration requirement. On average, 80% of the lesson plans that teachers make after joining the program follow the standard content and constructs of the lesson plans, while at the beginning of the program, the lesson plans that teachers collect only have an average value of 56% of the content and construct standards. This increase is indicated by the N-gain value of 0.5 in the medium category. Thus, the Innovation House Program effectively increases teacher competence in making Innovative RPP based on an average assessment of 80% of the content and constructs of the teacher participants' lesson plans. From the aspect of teacher-participant responses during the program, it was 'imposing' and gave a 'positive response' based on the attitude scale instrument. The Innovation House is effective in increasing the competence of developer teachers in making lesson plans,

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