# Implementation of Learning Innovations to Improve Teacher Competence in Professional Certificate Programs for In-Service Teachers

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# Implementation of Learning Innovations to Improve Teacher Competence in Professional Certificate Programs for In-Service Teachers

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Teacher Professional Education is one of the education program to improve teacher competence in getting professional teacher certificates. This study aims to implement learning innovations to improve teacher competence in teacher certification programs for in-service teachers through collaboration with local governments. The study was conducted with the involvement of 2,477 teachers who are actively teaching in schools across North Sumatera, Indonesia. Learning innovation was done through the provision of innovative teaching materials and learning scenario settings. Innovative teaching materials in the field of study and pedagogy are systematically developed to increase knowledge and are compatible with blended learning. The blended learning is set as a combination of online learning, workshops, and teaching practices to equip the teachers with new knowledge and skills. The teaching materials developed have proven to be very effective in facilitating teachers to learn actively and in the end increase their knowledge and skills as professional teachers.

Keywords: learning innovation, teacher competence, professional teacher certificates, in-service teachers, university collaboration

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## INTRODUCTION

The improvement of teacher competency, especially for the teachers who are actively teaching at school for a long time is crucial to refresh them with the latest knowledge, to provide them access to lecturers as competent persons and to open the opportunities in using modern facilities and infrastructures in the universities (Harju & Niemi 2020; Chalkiadaki 2018). The latest knowledge and learning process in tertiary institutions that are developed through research can be transmitted to the teachers through formal education such as professional education (Karim, Shahed, Mohamed, Rahman & Ismail 2019). The Teacher Professional Education (TPE) in Indonesia is a formal education program to prepare professional teachers. This program is conducted for two semesters after graduating from a bachelor or diploma degree. There are two types of professional education in Indonesia, namely the Pre-service TPE program for the fresh graduates who have not been appointed as teachers, and TPE in Position for active teachers who do not have a professional educator certificate. The Pre-service TPE is an education program arranged by the Minister of Education Indonesia for graduates with a bachelor's or diploma degree (Permendikbud 87 2013). The TPE in Position in Indonesia is a substitute for the teaching certificate, which is applied as one of the requirements in becoming a professional teacher in accordance with the Law number 14 of 2005 concerning Teachers and Lecturers (UU 14 2005). The TPE program is implemented in stages to produce professional teachers and certified educators. This certification program have been started in 2007 until 2017 for teachers in position that is obtained through Teacher Professional Education and Training (TPET) (Permendikbud 18 2007; Permendikbud 5 2012). The TPET program is carried out for nine working days (90 hours of study) to get an educator professional certificate with assumptions that they already engage and have experience as teachers in schools. At the same time, there has also been a selective piloting of the Teacher Professional Education project for young teachers in several Study Programs that run for two semesters at selected tertiary institutions. Since 2018, the TPE program is carried out as a teacher certification program for teachers who have been appointed before 2015, and the program has been conducted for six months (Permendikbud 37 2017). This certificate is compulsory for the teachers in Indonesia. Certified teachers are entitled to get additional income attached to their duties and responsibilities as a professional teacher. Improvements are always made in the learning process to improve the teachers' competency and to keep the teaching schedule in school uninterrupted when the teacher attends the program. Therefore, a good collaboration between the universities and local governments is one of the key elements to support successful effort of increasing teachers' competency.

Learning innovation is very important for teachers and prospective teachers to guide them to be and master the latest learning technology. This learning innovation must also be a skill for the preservice teacher and teacher in position so that they can serve learning according to the level of student development. Various innovations have been applied in education. In general, innovation is directed to make learning more effective and efficient, make it easier for students to learn, draw students closer to learning resources that can be accessed at any time without being limited by space and time,

motivate students to learn actively to improve learning outcomes, and also give the impression of learning longer remembered by students (Kwangmuang, Jarutkamolpong, Sangboonraung & Daungtod 2021; Nainggolan, Hutabarat, Situmorang & Sitorus 2020; Purba, Situmorang & Silaban 2019). The u of information technology has dominated learning innovation, namely through the use of media and multimedia, e-learning, blended learning, and other forms in accordance with the availability of software that helps students to learn (Yu, Zhang & Zou, 2021; Abdulrahaman et al., 2020; Regmi & Jones 2020; Yin & Yuan 2021; Alammary 2019). These learning innovations have been proven to help students in achieving the desired compe cies (Situmorang, et al. 2018; Yeigh & Lynch 2017; Phillips, Forbes & Duke, 2013). Thus, this learning innovation is very appropriate to be applied to improve the competency of teacher candidates and teachers.

Collaboration programs in tertiary institutions have become an indispensable component in bridging the role of university and stakeholder partners to increase the institutional progress and productivity (Pasetto, Barreiros, Corrêa & Freudenheim 2021; Howell, Rintamaa, Faulkner and DiCicco 2019; Zhou, Tijssen & Leydesdorff 2016). Mutual cooperation will be established for the common interest so a strategy is needed to integrate the interests of each institution into a common interest (Li & Fang 2019; Hillerbrand & Werker 2019). Good collaboration is also the key to success in producing innovative products (Morrison 17; Inoue & Liu 2015). The collaboration activities are also found very effective in improving the quality of education, including the improvement of the quality of teachers (Sorensen, Twidle & Childs, 2014). Factors such as external, partners, excellence, community relations within the organization, and the desire to serve greatly affect the success of the cooperation. These are needed to be maintained carefully for the goals to be optimally achieved.

Efforts to improve teacher competency in Indonesia have been carried out to produce certified professional teachers for elementary to high school teachers (Situmorang, Gultom, Hamid, Panjaitan & Ritonga 2018). Teachers who teach in schools in Indonesia already have undergraduate academic degrees in the appropriate fields. However, the reality shows that there are still many teachers who are appointed as permanent teachers who do not yet have an educator certificate. Having an educator certificate for teachers can be used as formal evidence of the quality and feasibility of teachers in teaching and managing classrooms (Sevimli-Celik & Johnson 2016; Churchward & Willis 2019). The teachers must attend professional education programs to get the certificate that is designed through collaboration so as not to interfere with the teaching and learning process in schools. The problem faced by local governments is that the limited number of teachers teaching in schools has allowed teachers who do not have an educator certificate to teach in the classroom. This limitation also makes it difficult for teachers to leave school to attend full-time professional education at universities. The geographical conditions of some remote eas, the distance from the university location, and limited facilities are also barriers for teachers to participate in teacher pro ional education. To overcome the problems above, a strategy is needed to improve the knowledge and skills of teachers without having to leave the task of teaching at school, namely through learning innovation. Thus, learning innovations are needed to improve teacher

competency in meeting professional teaching standards. Learning innovation is also needed to adjust learning activities with the needs of students in accordance with technological advancements (Sinaga, Situmorang & Hutabarat 2019). The innovations can be done through the selection of strategies and methods in teaching, the application of learning models, the use of media and multimedia, the provision of alternative learning facilities, and the creation of a good atmosphere of teaching and learning to facilitate the teaching is more meaningful, enjoyable, and increases the learning motivation (Rizki, Hernando, Situmorang & Tarigan, 2020; Lee, Lin & Kang 2015). One of the learning innovations that needs attention is to teach the teachers to gain competence as professional teachers, as it is the main case found in Indonesia (Situmorang et al. 2018). Universitas Negeri Medan with its excellence in the field of education is a very strategic institution in the position to improve the competence of school teachers in North Sumatera Indonesia concerning knowledge and pedagogy. Improving teachers' competency can be carried out through collaboration between the university and local governments. This study aims to implement innovative learning to improve teacher competence in the Teacher Certification Program for teachers who are already teaching in schools in districts and cities, which is carried out in collaboration with local government partners. The local government plays a role in sending teachers in their respective regions to Universitas Negeri Medan to get professional educator certificates, and their effectiveness is evaluated for the sustainability of the collaboration.

## METHOD

### Location and research object

The study was conducted in North Sumatra, Indonesia by involving the teachers, lecturers, and regional government collaborative partners under a set of memorandums of understanding (MoU) and letter of agreements (MoA) in the field of education. The object of the research is the teachers from partner regions that do not own teacher professional certificates. They were trained to become certified professional teachers through Professional Teacher Education. Evaluation of the effectiveness of the implementation of cooperation is also one of the targets in research to ensure mutually beneficial and sustainable cooperation in the context of improving the quality of education.

### Population and research samples

The population in this study consists of (1) Teachers in various fields of study who have been teaching for at least five years in elementary schools, secondary schools, vocational schools, and are graduated from bachelor or/and diploma degree, (2) Certified professional lecturers and experienced teachers who take parts in developing innovative learning materials and become supervisors in improving teacher competency, and (3) Local governments employing teachers in districts and cities in North Sumatra, Indonesia. A total of 2,477 teachers were involved in this study. The distribution of the study sample by gender and age range is summarized in Table 1. The sample was chosen by the collaborative partner purposively, the lecturers were assigned by the

university leader, and the professional teachers were assigned by the school principals. The research ethics established by the university for this type of social science research have been fulfilled. Respondents were notified beforehand about their participation in the research sample and were given the freedom to withdraw at any time.

Table 1
Distribution of samples based on gender and age for the implementation of learning innovations in teacher professional education

| No | Study program | Gender | | | Age range (years) | | | |
|---|---|---|---|---|---|---|---|---|
| | | Male | Female | Total | 30-40 | 41-50 | 51-60 | Total |
| 1 | 8 Study Programs | 136 | 356 | 492 | 65 | 310 | 117 | 492 |
| 2 | 6 Study Programs | 87 | 288 | 375 | 80 | 232 | 63 | 375 |
| 3 | 11 Study Programs | 188 | 236 | 424 | 105 | 249 | 70 | 424 |
| 4 | 18 Study Programs | 158 | 408 | 566 | 104 | 356 | 106 | 566 |
| 5 | 7 Study Programs | 95 | 281 | 376 | 110 | 217 | 49 | 376 |
| 6 | 4 Study Programs | 125 | 119 | 244 | 75 | 125 | 44 | 244 |
| | Total 54 Study Programs | 789 | 1,688 | 2,477 | 539 | 1,489 | 449 | 2,477 |
| | Percentage (%) | 32 | 68 | 100 | 22 | 60 | 18 | 100 |

**Research Procedures**

The study was conducted in two parts, namely an innovating the stages of learning in the TPE, and the satisfaction survey of the implemented cooperation. Learning innovations carried out were started from the development of innovative learning materials in the form of learning modules for the field of subject matters and pedagogy in accordance with the needs of students and implementing innovative learning in teacher professional education programs. Evaluation of the implementation of collaboration activities was carried out through a survey. Each of these components is briefly explained below.

***Development of innovative learning material***

Innovative learning materials that are complete and standard in accordance with the National Curriculum in each field of study are provided by a team of professional lecturers at Universitas Negeri Medan. The team is selected and assigned by the Head of Study Program to develop and package innovative teaching materials in accordance with the characteristics of the field of science, subjects, and levels of the teachers that take part in the program. Guidelines for the preparation of innovative learning packages and the criteria that must be fulfilled in learning resources have been given by the research team to lecturers who compiled teaching materials to achieve the competency targets set in this study. Teaching material is packaged in the form of lesson modules that have advanced, in-depth and complete study materials, supplemented with mini projects, sample questions and solutions, drill questions and answer keys, and the hyperlinks of relevant and trusted learning resources. The learning package is equipped with media and multimedia, general guidelines for the use of learning resources, and help facilities. Innovative teaching materials, in the form of learning packages, are prepared to be compatible with the website, are packaged interesting, and made easy to read according to the development of teachers. Innovative learning materials resulting from the development are also available in the form of softcopy for offline learning for teachers who have difficulty accessing teaching materials online.

***Research instruments***

The research instrument used to obtain research data consisted of learning evaluation, performance test, and questionnaire. The learning evaluation used in this study is of national standard and adapted to the characteristics of the field of study. Questions for standard evaluation are prepared and standardized by a national team of experts appointed by the ministry of education, intended to measure mastery of knowledge in the field of study and learning pedagogy as standard criteria for professional teachers. Evaluation questions are arranged in the form of multiple choice as many as 75-100 questions (adjusted based on the characteristics of the field of study) which will be done for 180 minutes time. Performance tests are used to measure the skills of teachers in the teaching and learning process starting from the preparation of learning tools and the implementation of learning. The standard set of questionnaires was used to evaluate the implementation of cooperation in the implementation of teacher professional education.

***Teaching and learning activities in professional education***

Teaching and learning activities in Teacher Professional Education for students who have been appointed as permanent teachers at school are carried out through blended learning. The learning is set as a combination of online learning, workshops, and teaching practices to equip teachers with new knowledge and skills. The stages of learning programs done in three stages as illustrated in Figure 1.

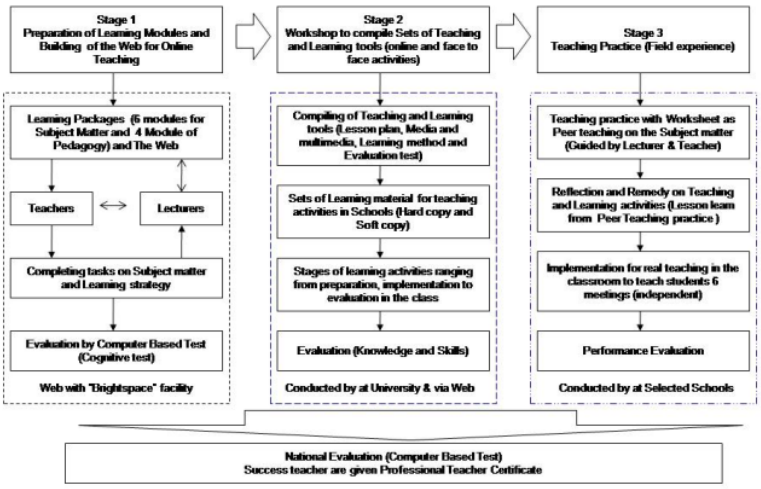


Figure 1
Stages of learning in the teacher professional education program consisted of Online learning to improve knowledge and pedagogy, workshops to train teachers to provide learning tools and implementation of teaching practice in the classroom

The first stage is online learning, the second stage is online and face-to-face workshops, and the third stage is the implementation of teaching practical experience (real teaching) in the classroom. Online teaching was set with the intention of not to intrude the teaching schedule at school. The enrichment of knowledge was carried out online in the first stage to increase teacher's knowledge on the subject matter and pedagogy by using of sets of innovative learning modules for 2 months (equivalent to 10-semester credits). Improvement of the teacher knowledge is focused on specialization to master the teacher on the advanced subject matter and pedagogy at university level related to Study Program to achieve high competence as a professional teacher. Workshop activities were conducted online in the second stage for one month (equivalent to 3-semester credits), followed by three weeks full-time face to face teaching and learning with their lecturers in campus (equivalent to 5-semester credits). Teaching practice in the class was carried out in the third phase for three weeks (equivalent to 6-semester credits). An evaluation was carried out for each stage, and the teachers must be able to pass a stage as the prerequisite for continuing to the next stage for the whole program. The national final examination was conducted through a computer-based test (CBT), and teachers who succeed at the set score were given an educator certificate as a professional teacher.

The learning activities in the first stage were focused on the enrichment of knowledge in the subject matter taught in school. The teachers were asked to complete the given tasks in the module packages, including the mini-projects, under the guidance of professional lecturers by using an online application called Brightspace (https://ppgspada.brightspace.com/d2l/login). The program was conducted for three months to complete the subject matter in professionalism and another one month for pedagogy. At this stage, the teachers were learning independently to increase their knowledge yet they were given free access to an online discussion with the lecturers to ensure all the required competencies were achieved. The first final evaluation to measure their knowledge was done online. Passing the first stage is a prerequisite condition to continue to the next stage. The second stage of learning was carried out through a combination of online workshops and face-to-face teaching on campus for three weeks. The activity to compile learning tools are specify on the skills to prepare teaching and learning packages such as learning module or book chapter suited to students development, to design relevant teaching media and multimedia, to choose relevant teaching method and strategy. At this stage, the teachers were clustered into study groups according to their field of study and each workshop session is facilitated by two professional lecturers (for 30 teachers). The teachers were assigned to complete the tasks given in the learning device. There are sets of output that must be completed included learning plans for one semester and a set of teaching materials accompanied by appropriate learning methods, models and media, and evaluation of learning outcomes that were validated by the lecturers. At the end of the second stage, a comprehension test was carried out as a requirement for continuing to the third stage of learning. The test schedule was set by the examination committee by involving independent reviewers assigned by the university. The third stage is teaching practice or field experience in schools. At this stage, the teachers implemented the subject matter and learning tools gained from the workshops. Teaching practice (peer teaching and independent-teaching)

was carried out under the guidance of lecturers and tutors for three weeks. Each meeting was evaluated by mentors of experienced teachers and lecturers to ensure the preparation, implementation and evaluation of learning were done successfully. Suggestions and inputs are provided by the supervisors on the suitability of the topic being taught, the learning tools that are provided, the implementation of teaching practices, and learning activities. Consultation is always carried out for continuous improvement in the implementation of learning. The performance test was carried out at the end of stage three to assess the level of professionalism of the teacher. Success in this phase became the prerequisite for taking the final exam. The last phase of the program was an online national comprehensive examination using a computer-based test (CBT) after completing previous three stages. The pass from national examination is a criterion for obtaining a professional educator certificate. Teachers who do not pass the national examination were still given the opportunity to have a national examination for six times in two years to provide an opportunity for teachers to review their knowledge, to repeat all the materials that have been studied previously in order to pass the criteria score on the passing grade in the online national examination provided by the Ministry of Education and Culture of Indonesia

***Evaluation of University collaboration activities***

An implementation evaluation of the collaborative activities between the university and local governments was conducted through a survey by using a standard questionnaire compiled by the research team following the procedures described in the references (Direko & Davhana-Maselesele 2017; Situmorang, Sitorus, Hutabarat & Situmorang 2015; Martinson, Thrush & Crain 2013). Questionnaires are distributed online to the partners by using the link from the university website (https://www.unimed.ac.id/kerjasama/). Respondents were asked to provide opinions on the cooperation program carried out and at the same time, asking for input to improve cooperation management. The effectiveness of the collaborative activities in helping partners to solve problems was the target of the results of this study

**Data Collection and Analysis**

Research data is consists of participation of teachers in teaching and learning activities, level of success students in completing the stages of learning activities based on the assessment of learning outcomes until becoming a professional teacher. Other data is the opinion of respondents through a questionnaire that is converted into quantitative data based on scale. The level of success of teachers in participating in each stage of learning is determined based on the ability of teachers to pass a score on each of the specified tests. Learning outcomes consist of scores from evaluating learning outcomes and performance assessment. Evaluation of learning outcomes is carried out using standard tests that are nationally provided and is conducted via CBT. Performance assessment is determined based on the teacher's success in meeting the graduation criteria through tests of knowledge and skills in the preparation of learning tools and teaching practice. Data related to the respondents' opinions were obtained using a standard questionnaire

and the conversion of qualitative data into quantitative was carried out using a Lickert scale and presented in the form of results tables.

## FINDINGS

### Learning Innovation for Teacher Professional Education Program

Learning innovations are carried out to provide learning resources and implementation of the teaching material to improve teacher competency through Teacher Education program in Indonesia. Teaching materials have been developed and standardized by a team of expert lecturers at the university. Innovative teaching material have been comprehensively developed containing subject topics according to the level of the education unit and the type of relevant teaching material. A description of the innovative teaching materials resulting from the development is shown in Table 2.

Table 2
Description of innovative teaching materials in the Teacher Professional Education course

| No | Teaching Materials | Components of innovations made in teaching materials |
|---|---|---|
| 1 | Competency Standards | - List of competence targets to be achieved after completing the learning package |
| 2 | Teaching material for the Field of Study and learning activities | - Teaching material relevant to the subject areas, compiled consists of the components: Introduction, contents of advanced teaching materials and contextual applications, mini projects, discovery and implementation guidelines, examples of questions and solutions, practice questions and answer keys, hyperlinks to relevant learning resources.<br>- Teaching and learning activities in the field of study are consist of instructions for implementing active learning (mini projects and discoveries relevant to the subject), to facilitate students in problem solving which promote analysis, synthesis, and evaluation of the learning content, so as to create opportunities for deeper learning. |
| 3 | Teaching material in the field of pedagogy and learning activities | - Teaching material for the field of pedagogy was developed consisting of an introduction, complete contents of advanced pedagogical material, and scenarios for teaching in the classroom. Learning tools are equipped with a learning plan and stages, relevant media and multimedia, and hyperlinks to relevant learning resources for further learning.<br>- Learning activities consist of giving assignments to make learning tools, introducing relevant software to facilitate students in making instructional media, and assigning assessment rubrics. |
| 4 | Supplements | - Innovative teaching materials are equipped with examples of learning tools, including the form of a one-time lesson plan, sample project and discovery packages, a collection of learning videos, learning observation sheets for teachers, report formats, assignment assessment rubrics and reports, and hyperlinks to download learning support software. |

The teaching materials consist of the contents of the subject matter, examples of questions and discussions of problem-solving, practice questions and answer keys. Teaching material is also equipped with illustrations, media and multimedia which are arranged systematically, and finally compiled in the form of an electronic flipbook. The same procedure has also been carried out to develop teaching materials for the field of pedagogy. These innovative teaching material packages have fulfilled the requirements

to be used in blended learning in accordance with the learning stages that have been set in the professional education program.

**Implementation of Innovative Learning**

The implementation of innovative learning has been carried out in teaching to improve teacher competence and at the same time as an effort to obtain a teacher professional certificate in the professional education program. There were 2,711 teachers assigned by collaborative partners from several regencies and cities in North Sumatra Indonesia to take part in the TPE program (Table 3).

Table 3
Distribution of participants based on study groups, allocation of study programs, and graduation rates on the knowledge test using CBT

| Group Study | Study Programs | Teacher enrolled* | National test (via CBT)# | |
|---|---|---|---|---|
| | | | (*n*) | (%) |
| 1 | 8 Study Programs | 584 | 500 | 86 |
| 2 | 6 Study Programs | 430 | 377 | 88 |
| 3 | 11 Study Programs | 451 | 429 | 95 |
| 4 | 18 Study Programs | 593 | 572 | 96 |
| 5 | 7 Study Programs | 401 | 379 | 95 |
| 6 | 4 Study Programs | 252 | 244 | 97 |
| Total | | 2,711 | 2,501 | 92 |

* Participants are selected and sent by the Regional Governments to take part in the online course

#The exam passing criteria are set by the Indonesian Minister of Education

The educational implementation schedule was arranged one semester to be completed in three stages, which were adjusted to the readiness of the teachers to attend education programs without leaving their routine tasks at school at regencies and cities. The teachers were clustered in groups of Study Programs. They attended the study online and completed the given assignments in the module packages provided by the instructors. Learning activities at this stage were purposively directed to equipped the teachers in the knowledge on subject matter including the enrichment of the subject topics and learning pedagogy so that the teachers possess the adequate knowledge and skill in their own subject area. This learning material was learned online so that teachers may learned independently, be able to chose the relevant topic, adjusted themselves to the subject that is considered as difficult, and felt free to have discussions with the supervisor without constraints of the distance and time. Most of the learners were seriously involved in online learning, completed all the assignments and projects given in the module packages, and uploaded the assignments tasks and reports in a timely manner. Mastery of the learning was evaluated at the end of the teaching stage and the results are presented in Table 3. There are 92% of the teachers completed the teaching module packages well and pass the online test. In general, the teachers and lecturers were actively communicating in the online teaching program. The results of the final exam of the first stage have met the requirements for teachers to take part in the next level of education.

In the next learning phase there were 2,477 teachers (99%), who re-enrolled to continue learning the workshop which was entirely carried out at the university (Table 4). The workshop to provide learning tools was carried out at the second stage and conducted online, continued with face-to-face teaching to ensure that all learning tools are well-provided. It was focused on the preparation of lesson plan for subject topics, evaluation of the sequence on stages of teaching implementation, learning models, learning media and sets of an evaluation test. Those learning tools were provided to meet the standard in accordance with the students' development.

Table 4
Teacher graduation rates on testing the knowledge and skills to provide learning tools

| Group Study | Study Programs | Teachers re-enrolled (*n*) | First examination | | Second examination# | | Total (%) |
|---|---|---|---|---|---|---|---|
| | | | Pass* | (%) | Pass* | (%) | |
| 1 | 8 Study Programs | 492 | 232 | 47 | 260 | 53 | 100 |
| 2 | 6 Study Programs | 375 | 232 | 62 | 143 | 38 | 100 |
| 3 | 11 Study Programs | 424 | 228 | 54 | 196 | 46 | 100 |
| 4 | 18 Study Programs | 566 | 400 | 71 | 166 | 29 | 100 |
| 5 | 7 Study Programs | 376 | 294 | 78 | 82 | 22 | 100 |
| 6 | 4 Study Programs | 244 | 82 | 34 | 162 | 66 | 100 |
| Total | | 2,477 | 1,468 | 59 | 1,009 | 41 | 100 |

*The test is conducted by the University and the passing score criteria is set by the Ministry of Education and Culture of Indonesia.
# Second examination are conducted for those who do not pass the first exam after taking the remedy program

There were 2,501 teachers successfully fulfilled the requirements to participate in the second stage of the teaching, but only 2,477 teachers (92%) re-registered to attend the next learning stage. The participants who do not register may be caused by various obstacles such as health reasons and personal desires, some mentioned that they cannot leave their family to attend the second stage of learning on the university campus. Face-to-face workshops are intended to give direct input and suggestions to improve the performance of the learning tools prepared during the online works according to the given topics. At the end of the teaching program, sets of standards and good learning tools were provided to be used in the practice teaching at a later stage. Learning evaluations to measure teacher knowledge in the area of teaching preparation are carried out through performance tests, and the results are summarized in Table 4. There were 1,468 teachers (59%) who had successfully passed the first examination, and the remaining 1,009 teachers (41%) passed on the second round of examination. The remedial program is conducted on participants who do not pass the first stage of the exam until they are sure they can take the second exam. All teachers are eligible to take their learning to the next stage.

The third phase of the teaching program was carried out for teachers who passed the test in the second stage. All teachers have completed the learning tools that were required to be used in the teaching practice. Real teaching activities were utilized to implement the

knowledge gained in the two previous learning stages. The teaching practice is carried out in a classroom under the guidance of professional lecturers and teachers. The supervisors give input to the teachers after the stages of teaching practice are finished, and are used to improve themselves in the next teaching practice. The video footage obtained in the teaching practice is played back to give advice and overcome the weaknesses experienced by the teacher so they can do better in the implementation of the next independent teaching. The teaching performance test was done at the end of the third stage. Learning outcomes in the performance test are summarized in Table 5. It is known that almost all participants (99.8%) were able to complete the program according to the set score criteria so that they were entitled to attend the national examination to get an educator professional certificate.

Table 5
Teacher graduation rates in performance assessment and competency tests to get an educator professional certificate

| Group Study | Number of Study Programs | Teachers (*n*) | Performance assessment (Teachers' achievements)* | | National competence test for professional certificate (via CBT)** | |
|---|---|---|---|---|---|---|
| | | | Pass (n) | (%) | Pass (n) | (%) |
| 1 | 8 Study Programs | 492 | 488 | 99.2 | 232 | 47 |
| 2 | 6 Study Programs | 375 | 374 | 99.7 | 232 | 62 |
| 3 | 11 Study Programs | 424 | 424 | 100 | 228 | 54 |
| 4 | 18 Study Programs | 566 | 566 | 100 | 400 | 71 |
| 5 | 7 Study Programs | 376 | 375 | 99.7 | 294 | 78 |
| 6 | 4 Study Programs | 244 | 244 | 100 | 82 | 34 |
| Total | | 2,477 | 2,471 | 99.8 | 1468 | 59 |

*Performance assessment is conducted based on the teachers' achievements in the practice test and evaluation test conducted by the University.
**The exam passing criteria are set by the Ministry of Education and Culture of Indonesia.

The final stage of the teaching was conducting a competency test as a requirement for teachers to obtain certificates after achieving a passing score determined by the Ministry of Education and Culture of Indonesia. National exams were carried out for all study groups by using a CBT, and the learning outcomes are summarized in Table 5. There were only 59% of the teachers successfully attained the professional certificates in this first final examination, and the graduation rates are varying (34-78%) in different study groups. The teachers who have completed the learning stages and have not passed in the national examination were given the opportunity to have a national examination six times over two years. If during those two years the national graduation criteria have not been met, the teacher must return to attend formal professional education again if only they are sent by the local government. The number of teachers who passed the second national exam is not available yet at this time.

**Evaluation of Collaboration Implementation**

Evaluation of the implementation of collaboration activities was carried out to ensure that the cooperation program ran by the two parties was in accordance with the desired

target as stated in the collaboration agreement. Partner respondents from the local government, teachers and lecturers who took part in the TPE program completed the questionnaire online. Respondents answered the questions and gave positive statements on describing the climate conditions of cooperation that had taken place at the university. Those are related to the implementation of education program including the planning, implementation, monitoring and evaluation, reporting, and following up on the findings of a monitoring. The cooperation climate included respondents' understanding of the agreed cooperation activities and the motivations underlying them are summarized in Table 6.

Table 6
Respondents' opinions on the climate of cooperation when implementing the Teacher Professional Education program ($n$ = 134)

| No | Opinions of respondents on collaboration activities | *M±Sdv* |
|---|---|---|
| 1 | Improving the quality of education is achieved through collaborative activities | 3.42±0.55 |
| 2 | Staff are motivated to carry out collaborative educational activities ranging from planning, implementing, monitoring and evaluation, reporting, and following up on evaluation findings | 3.38±0.52 |
| 3 | Stakeholders compliance with the guidelines and operational standards of cooperation in maintaining commitment and integrity | 3.51±0.50 |
| 4 | Availability of opportunities to take action to prevent events that damage the relations between the two parties that cooperate | 3.13±0.62 |
| 5 | Persistence of stakeholders in the commitment to carry out the tasks and works that have been agreed upon in cooperation activities | 3.48±0.61 |
| 6 | Establishing mutual communication between staff on the parties who collaborate | 3.28±0.64 |
| 7 | Equality of the two parties working together is fulfilled | 3.31±0.59 |
| 8 | The problems raised in collaborative activities were recorded and followed up to solve the problem | 3.28±0.62 |
| | Average | 3.35±0.58 |

*Marking criteria: 4 = very good; 3 = good; 2 = poor, and 1 = very poor

The collaboration activities have been understood by the two parties and they were working together to achieve the target goals. All components proposed in the survey showed very positive responses. However, improvements are still needed in the future so that the next collaboration will give better results. Collaboration activities between the university and the regional governments in North Sumatra were supported by professional scholars so that the final target has been achieved. The role of Universitas Negeri Medan with its own human resources and learning facilities has been proven to be very credible to implement learning innovation in the program to improve the quality of teachers (Table 6). Respondents gave very positive opinions on all education activities run by the university. This cooperation is classified as very good, where the partners provide a good perception of all components of the implementation of the cooperation (average 3.35±0.58). The university has met the standards of implementing cooperation as desired in the cooperation script and the targets stated in the work agreement have been accomplished.

## DISCUSSION

Learning innovations through the development of innovative learning materials and the setting of teaching scenarios are designed to increase teachers' knowledge to be implemented in the professional teacher education program. The program has been carried out at Universitas Negeri Medan in collaboration with the Regional Government to improve the competency of teachers who are working in several Regencies and Cities in the Province of North Sumatra Indonesia. Local governments were given the freedom to choose and send teachers to take part in professional education, with the intention to improve teacher competency to become professional educators in accordance with regional needs. The provision of innovative learning materials has been done to provide learning resources that meet the needs of teachers used in teaching via blended learning (Jowsey, Foster, Cooper-Ioelu & Jacobs 2020). It has been designed as refreshing of knowledge, enrichment of subject-matter, introducing the latest theory of pedagogy, introducing and updating learning tools according to the latest technological advances.. The developed learning materials are useful as teaching materials for knowledge enrichment and bring the learners environment in active learning. The available facilities in the learning package can guide teachers to learn independently, especially in the implementation of mini projects and discoveries, and facilitate systematic learning for in-depth learning to understand subject matter (Sinaga, Situmorang & Hutabarat 2019). An active learning process is created by using the learning resource so that to improve critical thinking skills as part of the competence of professional teachers (Sutiani, Situmorang & Silalahi 2021; Marchant, David, Rodgers & Germen, 2015).

The implementation of teaching has been designed through a combination of online learning with face-to-face teaching so that the implementation of teacher professional education does not interfere with the teaching-learning process in schools in the regions (Widodo & Riandi 2013). The results showed that the teachers could complete the learning packages. The teaching strategy is very favored by teachers so that the changes in the learning style occurred (Protsiv, Rosales-Klintz, Bwanga, Zwarenstein & Atkins 2016). Teacher participation and graduation rates in knowledge testing presented in Table 3 revealed that the teachers were very enthusiastic about using information technology in learning so that intensive communication occurs between teachers and lecturers to improve students' knowledge in the field of study and pedagogy. The teachers were able to complete the learning packages well under the guidance of professional lecturers. The availability of teaching materials that are integrated with the latest information technology brought the teachers closer to learning resources. The learning packages have been designed in such a way that the subject can be learned systematically and the topics are easily understood. The available information technology facilities motivate teachers to learn independently by utilizing learning resources to improve their competence (Goodwin & Kosnik 2013). Teacher graduation rates showed in Table 4 indicated that that teacher learning outcomes in the second phase of the teaching provided very good results, as evidence that teachers and lecturers have interacted optimally to improve skills in the field of providing learning tools. The teacher can complete all the required tasks that have been programmed in the workshop.

The teacher becomes skilled in planning learning and provides appropriate tools to be taught in the classroom (Burgess & McGregor 2018; Burgess, Roberts, van Diggele & Mellis 2017). Learning tools have successfully been compiled for one semester of teaching. The teachers can arrange teaching material systematically by integrating the media and learning strategies, and evaluation. The teacher's ability to choose learning strategies, methods, and learning media were found to be very satisfying, so it is feasible to proceed to the third stage. The third stage of the teaching innovation has succeeded in improving teaching skills, where the teachers are confident in doing practice teaching in the classroom. The knowledge and skills acquired by the teacher in the previous stages of teaching are implemented in independent teaching in the classroom. All teachers successfully carried out teaching practices in the classroom (see data table 5). These results proved that the innovations implemented in the program were effective in improving the performance and competency of the teacher in teaching practice (Aspelin and Jonsson 2019; Tuncel & Çobanoğlu 2018); Oliva, del Pozo & Franco 2016). The teachers were confident and have mastered themselves in the subject material being taught, and have adequate skill in choosing relevant teaching methods and strategies, able to handle the class well. Learning materials that are packaged when attending professional education succeed in bringing the students to learn actively at each stage of real practice teaching. Learning innovations developed in this study provide ample opportunities for teachers to learn in order to improve their competencies to become professional teachers (Keiler 2018; Zhao & Zhang 2017). The success of this learning innovation was also supported by the participation of teachers who are relatively young and highly motivated to adjust to the latest technological advancements.

In the implementation of learning innovation in the program, the problem faced were many teachers did not pass the score criteria for getting educator certificates. Although the teachers were having experience in teaching, and they also have followed the program to improve their knowledge and skills on subject matter and pedagogy, the percentage of graduation is still not satisfying (Table 5). Teacher graduation rates to met the criteria for passing the competency exam as a requirement in getting an educator certificate were only 56%. This result contrasts sharply with their ability to pass from the requirements score in the previous phases where all teachers have passed the knowledge test and performance test in the first and second phases (graduation rates 100%). However, the graduation rates to obtain professional certificate by using this learning innovation (56%) is better that compared to the success of teachers in the previous year, where they were only 21% passed the national examination (Situmorang et al. 2018). In previous studies, collaboration in the implementation of teacher professional education has been carried out through the provision of materials such as curriculum development, enrichment of advanced teaching materials, preparation of learning tools, organization of teaching and learning, and classroom action research. Complete lecture materials delivered conventionally have not been successful in motivating teachers to achieve competence and standard level of knowledge as professional teachers. However, the implementation of innovative learning can increase teacher knowledge in the fields of study and pedagogy. The increasing number of teachers who pass the national exam is proof of the effectiveness of learning

innovations. Innovative learning applied in this study has succeeded in motivating teachers to achieve their competencies (Bahri, Idris, Muis, Arifuddin & Fikri 2021; Asy'ari, Ikhsan & Muhali 2019). These results proved that the implementation of learning innovation applied in this program found to be very effective in equipping the teachers with the knowledge and skills of professional teachers (Flogie, Aberšek & Pesek 2019; Caena & Redecker 2019). Learning innovation still needs to be improved to facilitate active learning in order to successfully obtain a professional teacher certificate. Ideally experienced teachers should have adequate knowledge in the field of study and pedagogy. However, this study indicate that there are still many teachers who have taught more than five years who have not passed the national exam (compare the data in Table 1 and Table 5). The findings of this study have theoretical implications, namely long teaching experience does not guarantee an increase in the quality of teachers in the field of study and pedagogy. Teacher competency improvement must be carried out on an ongoing basis through education and training, and regularly communicate the latest learning produced through research to teachers. The practical implications of this research are to convince the importance of learning innovation for in-service teachers to facilitate their independent learning to optimize their potential, and to actively utilize available learning resources to improve their competence as professional teachers.

The collaboration program between universities and local governments found to be very effective in increasing teacher competency through professional education. The survey results showed that the collaboration partners tend to be pleased with the collaboration services that have been carried out in the implementation of professional education. Local governments stated that the teachers who returned to teach in schools showed changes in their performance in mastering subject matter and teaching strategy in the classroom. The refreshment of knowledge has succeeded in motivating the teachers to become models of professional teachers in schools. This condition has an impact on the occurrence of positive interactions between fellow teachers. The transfer of knowledge and experience in teaching and learning activities also existed among the teachers (Bahous, Busher & Nabhani 2016). The presence of professional teachers has a positive impact on the school environment, both in teaching and learning activities and in school management (Banjarnahor, Hutabarat, Sibuea & Situmorang 2018). The freedom of the local government to choose teachers to take part in professional education is very helpful inequitable distribution of the availability of professional teachers in their respective regions without having to interfere with the learning process in the schools. The university is only tasked with educating teachers and not selecting prospective students. An evaluation of the implementation of the collaboration has been carried out to ensure the realization of improving the quality of education in accordance with the objectives of the cooperation program (Shernoff, Sinha, Bresslerand & Ginsburg 2017). Collaborative partners including administrators provide an excellent assessment of the implementation of professional teacher education at the university. The best services have been provided to support the collaboration activities so that the goals stated in the cooperation agreement are achieved well. The provision of competence in human resources and good university facilities makes the activities take place optimally.

Continuing collaboration is expected in the future until all teachers can obtain adequate knowledge and skills in the field of science and learning in serving students in the classroom.

## CONCLUSION

Learning innovation through the preparation of innovative teaching materials and the setting of teaching scenarios have been implemented to improve teacher competencies in the Teacher Professional Education program through university collaboration with regional governments. Innovative learning materials in the field of study and pedagogy have been well developed to meet the needs of teachers in learning. Teaching materials are arranged systematically and completely to refresh the teachers in the subject matter, deepen the knowledge in their field of study, train learners to develop learning devices and introduce teaching technology in accordance with the latest advances in digital technology. Learning activities were carried out with blended learning with the intention of not to interfere with the teaching and learning process in schools. The program is arranged into three stages: online teaching to equipped teachers with knowledge in the field of subject matter and pedagogy, workshop to equipped teachers with skills of making learning devices, and teaching practice to implements the achieved skills in real teaching. Learning innovations have empowered the teachers in subject matter, learning strategies, and teaching skills as professional teachers. The implementation of innovative learning found to be very effective in improving teacher competence and successfully increasing the number of a certified teacher. Improvement and continuous innovation has to be done to equip teachers with the knowledge and skills to be able to pass the national test to get their professional educator certificate. The learning innovations developed in this study are very useful for teachers and local governments because learning is done without disrupting teaching schedules in schools. The collaboration between the University and the local government went well in increasing teacher competency. The application of learning innovation is very appropriate because it effectively facilitates teachers to improve competence and to obtain teacher professional certificate.

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## DISCLOSURE STATEMENT

There is no potential conflict of interest was reported by the authors.

## REFERENCES

Abdulrahaman, M.D., Faruk, N., Oloyede, A.A., Surajudeen-Bakinde, N.T., Olawoyin, L.A., Mejabi, O.V., Imam-Fulani, Y.O., Fahm, A.O., & Azeez, A.L. (2020). Multimedia

tools in the teaching and learning processes: A systematic review. *Heliyon*, *6*(11), e05312. https://doi.org/10.1016/j.heliyon.2020.e05312

Alammary, A. (2019). Blended learning models for introductory programming courses: A systematic review. *PloS one*, *14*(9), e0221765. https://doi.org/10.1371/journal.pone.0221765

Aspelin, J., & Jonsson, A. (2019). Relational competence in teacher education. Concept analysis and report from a pilot study. *Teacher Development*, *23*(2), 264-283. DOI: 10.1080/13664530.2019.1570323

Asy'ari, M., Ikhsan, M., & Muhali. (2019). The Effectiveness of Inquiry Learning Model in Improving Prospective Teachers' Metacognition Knowledge and Metacognition Awareness. *International Journal of Instruction*, *12*(2), 455-470. https://doi.org/10.29333/iji.2019.12229a

Bahous, R., Busher, H., & Nabhani, M. (2016). Teachers' views of professional learning and collaboration in four urban Lebanese primary schools. *Teacher Development*, *20*(2), 197-212. DOI: 10.1080/13664530.2015.1124137

Bahri, A., Idris, I.S., Muis, H., Arifuddin, M., & Fikri, M.J.N. (2021). Blended Learning Integrated with Innovative Learning Strategy to Improve Self-Regulated Learning. *International Journal of Instruction*, *14*(1), 779-794. https://doi.org/10.29333/iji.2021.14147a

Banjarnahor, H., Hutabarat, W., Sibuea, A.M., & Situmorang, M. (2018). Job Satisfaction as a Mediator between Directive and Participatory Leadership Styles toward Organizational Commitment. *International Journal of Instruction*, *11*(4), 869-888.

Burgess, A., & McGregor, D. (2018). Peer teacher training for health professional students: a systematic review of formal programs. *BMC medical education*, *18*(1), 263. doi:10.1186/s12909-018-1356-2

Burgess, A., Roberts, C., van Diggele, C., & Mellis, C. (2017). Peer teacher training (PTT) program for health professional students: interprofessional and flipped learning. *BMC medical education*, *17*(1), 239. doi:10.1186/s12909-017-1037-6

Caena, F., & Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (DigcompeDu). *European Journal of Education 54*, 356–369. https ://doi.org/10.1111/ejed.12345

Chalkiadaki, A. (2018). A Systematic Literature Review of 21st Century Skills and Competencies in Primary Education. *International Journal of Instruction*, *11*(3), 1-16. https://doi.org/10.12973/iji.2018.1131a

Churchward, P., & Willis, J. (2019). The pursuit of teacher quality: identifying some of the multiple discourses of quality that impact the work of teacher educators. A*sia-Pacific Journal of Teacher Education*, *47*(3), 251-264. DOI: 10.1080/1359866X.2018.1555792

Direko, K.K., & Davhana-Maselesele, M. (2017). A model of collaboration between nursing education institutions in the North West Province of South Africa. *Curationis*, *40*(1), e1–e10. doi:10.4102/curationis.v40i1.1670

Flogie, A., Aberšek, B., & Pesek, I. (2019). The impact of innovative learning environments on social competences of youth. *Research in Learning Technology*, *27*. https://doi.org/10.25304/rlt.v27.2214

Goodwin, A.L. & Kosnik, C. (2013). Quality teacher educators = quality teachers? Conceptualizing essential domains of knowledge for those who teach teachers. *Teacher Development*, *17*(3), 334-346. DOI: 10.1080/13664530.2013.813766

Harju, V., & Niemi, H. (2020). Newly qualified teachers' support needs in developing professional competences: the principal's viewpoint, *Teacher Development*, *24*(1), 52-70. DOI: 10.1080/13664530.2019.1685588

Hillerbrand, R., & Werker, C. (2019). Values in University-Industry Collaborations: The Case of Academics Working at Universities of Technology. *Science and engineering ethics*, *25*(6), 1633–1656. https://doi.org/10.1007/s11948-019-00144-w

Howell, P.B., Rintamaa, M., Faulkner, S., & DiCicco, M. (2019). Cross-Institutional Collaboration: (Co)Constructing Knowledge About Teaching and Learning in the Middle-Level Classroom. *The Teacher Educator, 54*(2), 91-104, DOI: 10.1080/08878730.2018.1517850

Inoue, H., & Liu, Y.Y. (2015). Revealing the Intricate Effect of Collaboration on Innovation. *PLoS One* 10(3), e0121973. doi: 10.1371/journal.pone.0121973

Jowsey, T., Foster, G., Cooper-Ioelu, P., & Jacobs, S. (2020). Blended learning via distance in pre-registration nursing education: A scoping review. *Nurse education in practice*, *44*, 102775. https://doi.org/10.1016/j.nepr.2020.102775

Karim, A., Shahed, F.H., Mohamed, A.R., Rahman, M.M., & Ismail, S.A.M.M. (2019). Evaluation of the Teacher Education Programs in EFL Context: A Testimony of Student Teachers' Perspective. *International Journal of Instruction*, *12*(1), 127-146. https://doi.org/10.29333/iji.2019.1219a

Keiler, L.S. (2018). Teachers' roles and identities in student-centered classrooms. *International journal of STEM education*, *5*(1), 34. doi:10.1186/s40594-018-0131-6

Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools. *Heliyon*, *7*(6), e07309. https://doi.org/10.1016/j.heliyon.2021.e07309

Lee, P.C., Lin, C.T., & Kang, H.H. (2016). The influence of open innovative teaching approach toward student satisfaction: a case of Si-Men Primary School. *Qual Quant 50*(2), 491–507. https://doi.org/10.1007/s11135-015-0160-x

Li, R., & Fang, W. (2019). University-industry-government relations of the Ministry of Industry and Information Technology (MIIT) universities: The perspective of the mutual information. *PloS one*, *14*(2), e0211939. doi:10.1371/journal.pone.0211939

Marchant, G.J., David, K.A., Rodgers, D., & German, R.L. (2015). State Teacher Evaluation and Teacher Education. *The Teacher Educator, 50*(2), 89-108. DOI: 10.1080/08878730.2015.1011943

Martinson, B.C., Thrush, C.R., & Crain, A.L. (2013). Development and Validation of the Survey of Organizational Research Climate (SORC). *Sci Eng Ethics, 19*(3), 813–834. doi:10.1007/s11948-012-9410-7

Morrison, M. (2017). "A good collaboration is based on unique contributions from each side": assessing the dynamics of collaboration in stem cell science. *Life sciences, society and policy*, *13*(1), 7. https://doi.org/10.1186/s40504-017-0053-y

Nainggolan, B., Hutabarat, W., Situmorang, M., & Sitorus, M. (2020). Developing Innovative Chemistry Laboratory Workbook Integrated with Project–based Learning and Characterbased Chemistry. *International Journal of Instruction*, *13*(3), 895-908. https://doi.org/10.29333/iji.2020.13359a

Oliva, A.D., del Pozo, R.M. & Franco, E.P. (2016). Teaching competences necessary for developing key competences of primary education students in Spain: teacher assessments. *Teacher Development, 20*(1), 123-145. DOI: 10.1080/13664530.2015.1101390

Pasetto, S.C., Barreiros, J.M.P., Corrêa, U.M., & Freudenheim, A.M. (2021). Students' Perceptions of Collaborative Team Teaching and Student Achievement Motivation. *International Journal of Instruction*, *14*(1), 325-344. https://doi.org/10.29333/iji.2021.14119a

Permendikbud 18. (2007). Peraturan Menteri No 18 Tahun 2007 Tentang Sertifikasi Bagi Guru [Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 18 Year 2007 Regarding Certification for Teachers], Menteri Pendidikan dan Kebudayaan Republik Indonesia, https://guruw.wordpress.com/2007/06/16/peraturan-menteri-no-18-tahun-2007-tentang-sertifikasi-bagi-guru/

Permendikbud 37. (2017). Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 37 Tahun 2017 Tahun 2017 Tentang Sertifikasi Bagi Guru Dalam Jabatan Yang Diangkat Sampai Dengan Akhir Tahun 2015 [Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 37 Year 2017 Regarding Certification for Teachers in Positions Appointed Until the end of 2015], Menteri Pendidikan dan Kebudayaan Republik Indonesia, https://jdih.kemdikbud.go.id/arsip/Permendikbud%20No%2037%20Tahun%202017.pdf

Permendikbud 5. (2012). Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 05 Tahun 2012 tentang Sertifikasi Guru dalam Jabatan [Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 05 Year 2012 concerning Certification of Teachers in Position], Menteri Pendidikan dan Kebudayaan Republik Indonesia, https://lldikti12.ristekdikti.go.id/2012/03/02/permendikbud-no-05-tahun-2012-tentang-sertifikasi-guru-dalam-jabatan-2.html

Permendikbud 87. (2013). Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 87 Tahun 2013 Tentang Program Pendidikan Profesi Guru Prajabatan [Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 87 Year 2013 Concerning the Pre-service Teacher Professional Education Program], Menteri Pendidikan dan Kebudayaan Republik Indonesia, https://kelembagaan.ristekdikti.go.id/wp-content/uploads/2016/11/permen_tahun2013_nomor87.pdf

Phillips, D., Forbes, H., & Duke, M., (2013). Teaching and learning innovations for postgraduate education in nursing, *Collegian, 20*(3), 145-151, https://doi.org/10.1016/j.colegn.2012.05.003.

Protsiv, M., Rosales-Klintz, S., Bwanga, F., Zwarenstein, M., & Atkins, S. (2016). Blended learning across universities in a South-North-South collaboration: a case study. *Health research policy and systems*, *14*(1), 67. doi:10.1186/s12961-016-0136-x

Purba, J., Situmorang, M., & Silaban, R. (2019). The Development and Implementation of Innovative Learning Resource with Guided Projects for the Teaching of Carboxylic Acid Topic. *Indian J of Pharmaceutical Education and Research, 53*(4), 603-612. DOI: 10.5530/ijper.53.4.121

Regmi, K., & Jones, L. (2020). A systematic review of the factors - enablers and barriers - affecting e-learning in health sciences education. *BMC medical education*, *20*(1), 91. https://doi.org/10.1186/s12909-020-02007-6

Rizki, R., Hernando, H., Situmorang, M., & Tarigan, S. (2020). The Development Of Innovative Learning Material With Project and Multimedia For Redox Titration. *PervasiveHealth: Pervasive Computing Technologies for Healthcare*, *1*, 385–393. DOI 10.4108/eai.12-10-2019.2296376

Sevimli-Celik, S., & Johnson, J.E. (2016). Teacher preparation for movement education: increasing pre-service teachers' competence for working with young children. *Asia-Pacific Journal of Teacher Education, 44*(3), 274-288. DOI: 10.1080/1359866X.2015.1079303

Shernoff, D.J., Sinha, S., Bressler, D.M., & Ginsburg, L. (2017). Assessing teacher education and professional development needs for the implementation of integrated approaches to STEM education. *International journal of STEM education*, *4*(1), 13. doi:10.1186/s40594-017-0068-1

Sinaga, M., Situmorang, M., & Hutabarat, W. (2019). Implementation of Innovative Learning Material to Improve Students Competence on Chemistry. *Indian J of Pharmaceutical Education and Research. 53*(1), 28-41. DOI: 10.5530/ijper.53.1.5

Situmorang, M., Gultom, S., Hamid, K.A, Panjaitan, A.M., & Ritonga, W. (2018). University-government collaboration model to improve school teacher competence in North Sumatra, Indonesia. *International Journal of Training Research*, *16*(3), 249-266. https://doi.org/10.1080/14480220.2018.1576324

Situmorang, M., Sinaga, M., Purba, J., Daulay, S. I., Simorangkir, M., Sitorus, M., & Sudrajat, A. (2018). Implementation of Innovative Chemistry Learning Material With

Guided Tasks to Improve Students' Competence. *Journal of Baltic Science Education, 17*(4), 535-550.

Situmorang, M., Sitorus, M., Hutabarat, W., & Situmorang, Z. (2015). The Development of Innovative Chemistry Learning Material For Bilingual Senior High School Students in Indonesia. *International Educational Studies, 8*(10), 72-85**.** doi:10.5539/ies.v8n10p72

Sorensen, P., Twidle, J., & Childs, A. (2014). Collaborative approaches in initial teacher education: lessons from approaches to developing student teachers' use of the Internet in science teaching. *Teacher Development, 18*(1), 107-123, DOI: 10.1080/13664530.2013.878378

Sutiani, A., Situmorang, M., & Silalahi, A. (2021). Implementation of an Inquiry Learning Model with Science Literacy to Improve Student Critical Thinking Skills. *International Journal of Instruction*, *14*(2), 117-138. https://doi.org/10.29333/iji.2021.1428a

Tuncel, Z. A., & Çobanoğlu, F. (2018). In-service Teacher Training: Problems of the Teachers as Learners. *International Journal of Instruction*, *11*(4), 159-174. https://doi.org/10.12973/iji.2018.11411a

UU 14. (2005). Undang-Undang Republik Indonesia Nomor 14 Tahun 2005 Tentang Guru Dan Dosen [Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers], Menteri Sekretaris Negara Bidang Perundang-Undangan, Republik Indonesia

Widodo, A., and Riandi. (2013). Dual-mode teacher professional development: challenges and re-visioning future TPD in Indonesia, *Teacher Development, 17*(3), 380-392, DOI: 10.1080/13664530.2013.813757

Yeigh, T., & Lynch, D. (2017). Reforming Initial Teacher Education: A Call for Innovation. *Australian Journal of Teacher Education, 42*(12), 112-127. http://dx.doi.org/10.14221/ajte.2017v42n12.7

Yin, B., & Yuan, C.H. (2021). Precision Teaching and Learning Performance in a Blended Learning Environment. *Frontiers in psychology*, *12*, 631125. https://doi.org/10.3389/fpsyg.2021.631125

Yu, H., Zhang, J., & Zou, R. (2021). A Motivational Mechanism Framework for Teachers' Online Informal Learning and Innovation During the COVID-19 Pandemic. *Frontiers in psychology*, *12*, 601200. https://doi.org/10.3389/fpsyg.2021.601200

Zhao, H., & Zhang, X. (2017). The Influence of Field Teaching Practice on Pre-service Teachers' Professional Identity: A Mixed Methods Study. *Frontiers in psychology*, *8*, 1264. doi:10.3389/fpsyg.2017.01264

Zhou, P., Tijssen, R., & Leydesdorff, L. (2016). University-Industry Collaboration in China and the USA: A Bibliometric Comparison. *PloS one*, *11*(11), e0165277. doi:10.1371/journal.pone.0165277

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