Pedagogical and professional physics teacher training: why hybrid learning is important?

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Abstract. Teacher professional development is inseparable from the process of increasing teacher competency that can be trained through training activities. Training held to improve the pedagogic and professional competence of physics teachers both by the training organizers and the deliberation of subject teachers is generally still conducted face-to-face, even though the teacher has limited time and place in following it. This happens because the teacher also has to carry out his main task of teaching, so we need a training strategy that can be accessed by teachers anywhere and anytime. The purpose of this study is to find out the reasons why in the process of developing pedagogic and professional teachers need learning strategies that are based on hybrid learning. This research method is descriptive qualitative using data collection techniques in the form of interviews, documentation studies, and questionnaires for teacher needs in the implementation of training. The results obtained based on interviews with the training providers showed that the implementation of the pedagogical and professional teacher improvement training was still conducted face-to-face. Meanwhile, the results of the questionnaire distributed to 45 physics teachers showed that most of the teachers stated that they needed training to improve pedagogic and professional competencies, which facilitated the teacher's training in the form of combining face-to-face and online. This can be done by implementing a hybrid learning training strategy, because in hybrid learning we can combine face-to-face and online training.

1. Introduction

Teachers as learning agents are required to continuously improve their professionalism through various efforts including through training, scientific writing activities, and other professional activities. This process is carried out by developing teacher competencies which are carried out according to need, gradually, and continuously to improve their professionalism. Teacher professional development must be done based on the needs of the teacher concerned. The need in question is the need to achieve and / or improve competence above the teacher professional competency standard [1]. Teacher competency development can be done by teachers able to achieve and / or improve teacher competencies which include: personality, social, pedagogical and professional competencies. The importance of improving schools, increasing teacher quality, and improving the quality of student learning has led to a
concentrated concern with professional development of teachers as one important way of achieving these [2].

The last decade brought real changes in social and cultural life with the development of information and communication technology. Most of the people in the world have internet access, which can have a direct impact on education [3]. The world of education is never free from this change. The purpose of education in offsetting the advancement of technology must be to balance the ability of teachers with the use of innovations from information and communication technology that will increase efficiency. Ally et.al stated to equip their students with 21st-century technology skills, teachers need to develop their own skills so they can engage and then coach their students through meaningful learning in all content areas including technonologies [4].

Teacher professional development according to UNESCO with the development of mobile technology has the potential to influence education in ways that cannot be done by other technologies. Teacher professional development requires educational blogs, learning media, conferences and educational workshops all featuring technology-based learning. The integration of technology and effective professional development practices of teachers, adapting and modifying models can increase the flexibility, portability and functions offered by technology and mobile devices, one of which is in the form of blended learning or hybrid learning [5].

Hybrid learning offers E-learning has in general four major modalities which provide diverse opportunities for users. Some of the modalities were Individualized self-paced e-learning online: refers to situations where an individual learner is accessing learning resources such as a database or e-courses online content or lessons via an Intranet or the Internet. Group-based e-learning synchronously: refers to situations where groups of learners are working together in real time via an Intranet or the Internet. Group-based e-learning asynchronously: refers to situations where groups of learners are working over an Intranet or the Internet where exchanges among participants occur with a time delay with typical examples of these types of activities including on-line discussions via electronic mailing lists and text-based conferencing with in learning management systems. And individualized self-faced e-learning offline: refers to situations where an individual learner is using learning [6].

One of the hybrid learning applications is a study conducted by Macia that shows the results of the implementation of training in order to develop pedagogical and professional skills of teachers in the use of mobile phones by utilizing Wikipedia features, email group features, social media features such as Twitter, Facebook, live journals, e-learning features and LMS features such as moodle and sakai 2.0 [7].

Teacher training and pedagogical development must also follow the needs of teachers both from the time and place of implementation, school needs, involving active participation of teachers, long-term (sustainable) and by instructors who are experts and take advantage of technology so as to facilitate teachers in accessing research [8]. This is because by andragogy of adults, a teacher in improving his professionalism according to his needs by choosing the type of learning that requires ease of time, place and ease of accessing material. This is reinforced by Jarvis that adults need self-directed learning in developing their knowledge [9].

2. Methods
The research method used in this research is descriptive qualitative using data collection techniques in the form of interviews with 2 sources of teacher training providers in P4TK and the MGMP chair of physics teachers, documentation studies through the review of devices commonly used in training activities, and the distribution of teacher needs questionnaires consisting of the 15 statements in the implementation of the training which were filled by 45 physics teachers.

3. Result and Discussion
The results of interviews with training providers to improve teacher competency include teacher self-development through functional training, one of which is the deepening of the material. The deepening of this material is needed by teachers in order to improve the quality of teacher teaching content and in
order to become a good learner teacher. The process of training the material deepening is generally done face-to-face because of the difficulty of the material being taught it requires interaction between the tutor and the trainee. The results of the study of the analysis of training needs that have been carried out by training providers as one of the institutions that have the task of developing science through various training, studies, research, and development of teaching materials try to improve the quality of teaching human resources. The results of interviews with P4Tk stated that according to Continuing Professional Development for Teachers, there were 4 competencies developed, namely Personality Competencies, Social Competencies, Pedagogical Competencies, and Professional Competencies. The activities and types of models used in teacher professional training activities are described in table 1.

| Aspect                | Type of training                                      | The strategy used                          |
|-----------------------|-------------------------------------------------------|--------------------------------------------|
| Self-development      | 1. Functional training                                | Face to face with the only model in,       |
|                       | a. Technical training                                 | combined in and on, and combined in on     |
|                       | b. Material deepening                                 |                                           |
|                       | c. Learning models                                    |                                           |
|                       | d. Laboratory Development                             |                                           |
|                       | e. Development of teaching materials                   |                                           |
|                       | 2. Collective activities (Collaboration between       |                                           |
|                       | training institutions with KKG and MGMP)              |                                           |
| Scientific Publications| 1. Research results                                   |                                           |
|                       | 2. Books and journals                                  |                                           |
| Innovation work       | 1. Appropriate technology                             |                                           |
|                       | 2. Artwork                                             |                                           |
|                       | 3. Modification of learning tools / media              |                                           |
|                       | 4. Standard questions (assessment instruments)         |                                           |

Based on table 1, there are three types of aspects of training for teachers in developing competence, pedagogic, professional, and social namely self-development, scientific publications, and innovation work with training strategies dominated by face-to-face activities with three types. The first type is called "in" ie face to face teacher training as a participant in training with direct resource persons. The second type of "in on", which is a combination of face-to-face training of teachers as trainees with direct resource persons with the assistance of the implementation of teacher learning in schools. The third type is called "in on in", which is a combination of face-to-face training of teachers as trainees with direct resource persons with mentoring implementation of teacher learning in schools and then teachers as trainees participate in face-to-face training again to evaluate the process of implementing the results of training in learning.

This is adjusted to learning according to andragogy of adults who state that its characteristics are different from children's learning. Adult use 1) Adult self-concept moves from one of being a dependent personality toward one of being a self-directed human being. 2) Adult experience becomes an increasing resource for learning. 3) Adults readiness to learn becomes oriented increasingly in developing their duties. 4) Adults have an orientation to learning with perspective changes from knowledge that is easily understood, and from one of subject-centeredness to one of problem centeredness. And 5) Adults motivation to learn is internal[10]. Drysdale's research also states that Models, strategies, and best practices were most researched, emphasizing more on the types of traditional instructors including the need for a blended course to be fast-paced, convenient, and flexible [11].
Analysis of teacher perceptions regarding expected training in order to improve pedagogic and professional competencies is presented in Table 2. The results of this analysis were obtained through a questionnaire filled with 45 physics teachers with a questionnaire consisting of 15 statements.

Table 2. Percentage of teacher perceptions of teacher professional training needs in improving pedagogic and professional competence.

| Indicator                                                                 | Perception | Percentage (%) |
|---------------------------------------------------------------------------|------------|----------------|
| 1. Training activities that have been conducted face-to-face               | 40 Yes     | 88.89          | 5 No          | 11.11 |
| 2. Training activities that have been followed so far have been in the form of lectures and questions and answers | 35 Yes     | 77.78          | 10 No         | 22.22 |
| 3. Training activities that have been followed so far have been in the form of workshops | 15 Yes     | 33.33          | 30 No         | 66.67 |
| 4. The training activities that have been followed have been online      | 4 Yes      | 8.89           | 41 No         | 91.11 |
| 5. Training activities that have been followed so far have been a combination of face-to-face with online | 3 Yes      | 6.67           | 42 No         | 93.33 |
| 6. The training activities that have been carried out so far have been held at training institutions | 37 Yes     | 82.22          | 8 No          | 17.78 |
| 7. The training activities that have been followed so far have been held at the place where you work | 30 Yes     | 66.67          | 15 No         | 33.33 |
| 8. Training activities that have been participated in so far have accommodated your time limitations | 10 Yes     | 22.22          | 35 No         | 77.78 |
| 9. Training activities that have been participated in so far can be followed by adjusting your time | 5 Yes      | 11.11          | 40 No         | 88.89 |
| 10. Training activities that have been followed so far can be followed according to where your lives | 4 Yes      | 8.89           | 41 No         | 91.11 |
| 11. The training activities that have been followed so far have made it easy to adjust to the place and time of the training that has been followed | 2 Yes      | 4.44           | 43 No         | 95.56 |
| 12. Training activities that have been followed so far provide teaching materials that can be accessed anywhere and anytime | 25 Yes     | 55.56          | 20 No         | 44.44 |
| 13. If the training is made online systems can help make it easier to adjust to your time | 35 Yes     | 77.78          | 10 No         | 22.22 |
| 14. If the training is made online system can help make it easier to adjust to your place | 39 Yes     | 86.67          | 6 No          | 13.33 |
| 15. If the training is made with a combination of face-to-face and online systems can help make it easier to adjust to your place and time | 41 Yes     | 91.11          | 4 No          | 8.89 |

Table 2 shows, the first indicator of the training strategy is dominated by face-to-face. Though in theory the teacher as an adult learner needs a learning strategy that can adjust the situation and conditions. Circumstances that can be accessed in the midst of his main duties as an educator but do not
forget the increase in knowledge, information society, and lifelong learning with technology as technology advances and advances in civilization [12]. This type of training is still dominated by lectures, discussions and workshops based on the second and third statements. This training method is in accordance with the needs of teachers, because teachers as adults should understand the essential values in the capital of human experience. They should be familiar with the heritage of knowledge, the great ideas, the great traditions, of the world in which they live. They should understand and respect the values that bind men together [13].

The fourth and fifth statements show that training activities are still rarely carried out with online systems. Though teachers have limitations in time and place. They need learning that can be accessed quickly, flexibly, and can be carried anywhere, meaning that there is a need for teachers to get training strategies that can be accessed at any time anywhere. This is in line with what Keengwe stated that the use of digital media can help individual informal learning and transform it into collective knowledge ready to use for novice teaching and the process of knowledge maturing requires bottom-up knowledge sharing activities and top-down guidance towards shared goals [14]. The issue of time and place of training is also an obstacle, seen from the sixth to eleventh statements as to the reason that the majority of the training organizers provide little time. The twelfth statement states that teaching materials can already be accessed easily because they are provided offline and online. This shows that the ease of access to teaching materials has been provided by the organizer. Ease of accessing teaching materials is an important part because according to Srisawasdi evaluation of a technology-integrated pedagogy module of mobile laboratory learning in science on pre-service science teachers have been improved their technology knowledge, technology and pedagogical knowledge, technology, content knowledge and technology and pedagogical content knowledge after interacting with the module, so it can impact their pedagogical and professional competencies [15].

The thirteenth to fifteenth statements are the expectations of teachers that the training strategy can be done online as an alternative to bridge the time and place difficulties and the needs of teachers as adult learners. Even better if the training strategy combines face-to-face with online systems, which we often refer to as hybrid learning. This is because this century has provided new alternatives for teaching of education, where technologies are a cornerstone, can add motivation and can create new spaces for a playful work with pre-service teachers. [16]. Ho also reinforced that the success of blended learning models that is access, flexibility, cost effectiveness, improving interaction, formation of teacher networks and involving of administrators, instructors and school leaders [17].

Hybrid learning has also been successful in providing increased teacher competency in learning, as has been done by Rogers and Twiddle, the use of ICT can improve the ability of teachers for operating the computer and software, procedurally able to improve strategic skills for performing activities in ways that benefit teaching and learning, and pedagogically, teaching approaches which benefit learning [18]. In addition, Sung also stated that mobile devices can enhance educational effects, the actual impact of mobile learning programs needs to be enhanced by longer intervention durations, closer integration of technology and the curriculum, and further assessment of higher-level skills [19]. Chiu added that learning by utilizing hybrid learning can also provide implications for implementing professional teacher teaching and learning programs, which programs should be tailored to the different subject teachers in a school, and focus on how to use mobile devices to deliver teaching goals and practical offers teaching experience changes some teacher's beliefs and anxiety, so the competence of teachers practical teaching increases [20].

4. Conclusion
The results showed that the type of training provided for teachers to improve pedagogical competence and professionalism was still dominated by face-to-face training. Evaluation of teacher needs in the implementation of pedagogic training and professionalism requires training strategies that can be accessed easily and are not time dependent, so that teachers have the opportunity to improve their competence anywhere and at any time and continue to get assistance from instructors or resource persons in the form of hybrid learning strategies.
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