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Analysis of the development model for the microteaching laboratory to effectively train qualified teachers

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Abstract: This study aims to develop an effective microteaching laboratory model in preparing superior prospective teachers. It was conducted through a series of stages, including needs analysis, model design, implementation, evaluation, and refinement. Seeing the fact related to the diversity of educational based study programs across faculties in university, it is often found that each of them has not made the similar or identical syntax for the microteaching course for the students. Needs analysis was conducted to understand the needs and expectations of lecturers teaching microteaching courses and prospective teachers regarding the microteaching practice experience. The design of the microteaching laboratory model involved the development of infrastructure, curriculum, guidelines, and supporting implementation procedures. The implementation of the model was carried out by involving lecturers teaching courses and prospective teachers in the implementation session of the microteaching Practice which was held in a structured manner. Evaluation was conducted to evaluate the effectiveness of the model based on predetermined criteria. Refinement was carried out to improve and enhance the model based on evaluation findings and to prepare prospective teachers well through structured simulation, reflection, and feedback experiences. The implication of this study is the importance of developing a learning model that is in accordance with the needs of prospective teachers to produce superior graduates in the education profession. The results of the study indicate that the development of a microteaching laboratory can improve the teaching skills of prospective teachers through simulation, reflection, and feedback provided in an environment that supports learning. The implication of this study is the importance of developing learning facilities and infrastructure that are in accordance with the needs of prospective teachers in developing their teaching skills.

Keywords: Model; Microteaching; Qualified; Teacher

INTRODUCTION

In the era of globalization, the need for quality educators is increasing. Many countries face challenges in recruiting and retaining competent educators due to lack of motivation, teaching skills, and quality training. The main issue is how to improve the preparation of educators to be ready to face the complex and diverse demands of education. In the midst of the industrial revolution 4.0, it is important for each country to develop innovative and relevant training models to prepare competent and adaptive

educators. Global collaboration is needed to develop best practices in preparing educators who are able to face future challenges. The Faculty of Education consists of several study programs that have their own differences and uniqueness. This encourages the need for a study to find the right and flexible microteaching laboratory model that can serve the diverse needs of the study program. It is to highlight the ways that talking about a microteaching assignment, here referred to as a "teaching demonstration," served as a salient context for student teachers to surface and negotiate ideas about what it meant to teach and be teachers (Lewis, 2020).

In the past five years, research related to the development of microteaching laboratories has produced various significant findings in preparing superior prospective teachers. These studies include the development of innovative training models, evaluation of the effectiveness of microteaching laboratories, and identification of factors that influence the quality of educator preparation through microteaching experiences. Some studies emphasize the importance of technology integration in microteaching experiences, while others highlight the role of self-reflection and feedback in improving teaching skills. Microteaching emphasized the mastery of discrete pedagogical skills (Cavanaugh, 2022; Cruickshank & Metcalf, 1993; Huber & Ward, 1969). In addition, there are also studies that focus on developing microteaching curricula that are relevant to the needs of the education job market. The results of these studies provide valuable insights into designing and implementing effective microteaching laboratories to prepare competent and adaptive prospective teachers in today's dynamic education era.

Although microteaching laboratories have become an important part of prospective teacher preparation, there are still shortcomings in developing models that can effectively meet the increasingly complex and dynamic demands of education. Some microteaching laboratory models may not fully take into account technological developments and actual needs in teaching, which can impact the quality of prospective teacher preparation. The development of reflective practices and pedagogical skills such as task design, interaction with students, and responsiveness to classroom (Cavanaugh, 2022; Karlstrom & Hamza, 2019; Kavanagh et al., 2020; Maguire, 2023; Mikulec & Hamann, 2020). Therefore, further research is needed to identify key factors that influence the effectiveness of microteaching laboratories in preparing superior prospective teachers. This study has originality in developing a microteaching laboratory model that includes aspects of technology, evolving educational needs, and prospective teacher expectations. The designed model is expected to provide a structured and in-depth learning experience for prospective teachers, as well as provide constructive feedback to improve their teaching skills. The research questions that arise from the title "Development of microteaching laboratories to prepare superior prospective teachers" include how to develop an effective microteaching laboratory model in accordance with the needs of developing education and ever-advancing technology. In addition, this study also aims to identify key factors that influence the effectiveness of microteaching laboratories in preparing prospective teachers who are able to face increasingly complex educational demands.

In recent years, research on the development of microteaching laboratories to prepare prospective teachers has shown significant progress. This research aims to improve the quality of teacher preparation by developing effective microteaching laboratory models that are relevant to the evolving demands of education. Several recent studies

have explored various aspects of the development of this model, including technology integration, instructional strategies, and effectiveness evaluation. Allen (1966) developed microteaching at Stanford University in the 1960s for the advancement of teaching behaviors, instructional activities, and so on. Microteaching, which Allen defines as "a reduction in teaching encounters in class size and time," generally involves six steps: planning, teaching, feedback, replanning, reteaching, and refeeding (Saban & Coklar, 2013). The format has long been recognized as one of the best ways to train pre- and post-service teachers and can be used for all types and stages of professional development. Furthermore, Hattie (2009) conducted a review of microteaching in the Visible Learning project and mentioned this technique as one of the most effective ways to improve student learning outcomes. One important aspect in the development of microteaching laboratories is the integration of technology. Research has shown that the use of technology, such as videotaped lessons, computer-based simulations, and online platforms, can enhance the microteaching experience and provide more timely and in-depth feedback to prospective teachers. Technology also allows for easier access and flexibility in conducting microteaching sessions. Due to the COVID-19 pandemic, microteaching, which usually relies on face-to-face interactions, has now become increasingly difficult. must be adapted to web-based activities. Since 2012, known as "The Year of the MOOC," there have been several attempts to incorporate digital technology into microteaching to implement technology-enhanced learning or implement online microteaching. Even before the COVID-19 pandemic, Kusmawan (2017) proposed the practice of microteaching in teacher education using online media.

In addition, innovative learning strategies are also a focus of research. Several studies have explored the use of active, collaborative, and problem-based learning methods in the context of microteaching. It was found that the use of participatory learning strategies can increase the engagement of pre-service teachers and help them develop teaching skills more effectively. During synchronous online practice, participants participate together in microteaching and feedback simultaneously. Commonly used solutions for this purpose include video communication platforms such as Zoom, Skype, or Microsoft Teams (Arifmiboy et al., 2017; Fitriani & Suryani, 2022; Kokkinos, 2022; Sumardi & Nugrahani., 2021). Assessment for microteaching classes usually involves real-time online conversations and verbal feedback using a specific system. Written feedback is provided when using asynchronous-based tools/media. Virtual Reality (VR) systems have recently been incorporated into microteaching. Connecting Microsoft Kinect to the Open Simulator platform allows for real-time viewing of pre-service instructors' physical movements and gestures in a Virtual Reality environment. In addition, microteaching sessions conducted in a Virtual Reality environment can be displayed in 360-degree movies, so that pre-service teachers can review and experience their teaching techniques in a Virtual Reality environment. During the simulation-based virtual room activities, pre-service teachers can instruct students in a simulated virtual avatar format.

Evaluation of the effectiveness of the microteaching laboratory is also an important part of this research. Research has identified various evaluation methods, including direct observation, video analysis, and participant assessment, to measure the impact of the microteaching experience on the teaching skills of pre-service teachers. This evaluation allows for continuous refinement of the developed microteaching laboratory model.

Although much progress has been made in this research, there are still some shortcomings that need to be addressed. One is the need for further research on the long-term effectiveness of the microteaching laboratory model in preparing preservice teachers. In addition, further research is needed to identify factors that influence the implementation and adoption of this model across educational contexts. Asynchronous online practice provides a flexible learning environment that allows learners to participate from multiple locations across time zones. Microteaching videos are often used in this teaching scenario. Pre-service educators film microteaching sessions in the classroom, at home, or at their workplace using tools such as Zoom, Loom, or a video camera. The tool contains the numbers 10, 16, and 45. Camtasia Studio is one of the video editing tools that can improve the quality of the video. The video is recorded and then published to an online platform such as YouTube or a learning management system (LMS) to be shared with students and colleagues. Asynchronous online feedback requires peer assessment conducted through discussion forums and assessment sheets. Discussion forums can be created using online technologies including social networking services (SNS) and Learning Management Systems (LMS) such as WhatsApp, Facebook, Moodle LMS, Google Classroom, and Edmodo (Arifmiboy et al., 2017; Fitriani & Suryani, 2022; Lin et al., 2018; Yesilçinar & Sata, 2021). Google Forms, Google Sheets, and Microsoft Forms are used to create assessment sheets, and can be easily adapted for both online and face-to-face synchronous settings. Video Ant, a web-based tool, allows microteaching participants to annotate and comment on videos. Written feedback techniques are available, but there is also the option to create feedback films using picture-in-picture screencast software and deliver asynchronous vocal feedback. Overall, recent research on the development of microteaching laboratories has provided valuable insights into improving the quality of teacher preparation. By continuing to develop and improve this model, it is hoped that more competent prospective teachers can be created and are ready to face the increasingly complex demands of education in the future.

METHOD

Research Method

The method used in this study is a development study using a design and development (D & D) research design. It has the focus on the study consisting of front-end analysis, planning, production, and/or evaluation (Richey & Klein, 2009). The study will begin with an in-depth analysis of the needs and expectations of lecturers teaching teaching practice courses and prospective teachers regarding the experience of microteaching practice.

Research Subject

In order to gain or collect the related data with the research goals, it involved all of the microteaching course lecturers in the study programs affiliated to faculty of educational science, Universitas Pendidikan Indonesia in a number of 33 lecturers. It covered all of the lecturers across study programs which include microteaching as the general course within their curriculum structure.

Time & Location

The research was conducted in the Faculty of Educational Science, Universitas Pendidikan Indonesia located in Jl. Setiabudhi No. 229, Isola, Sukasari, Kota Bandung, Jawa Barat 40154. It was done for 4 months of the whole process of research from April-July 2024.

Data Collection Technique

Data collection in this study was carried out through surveys, interviews, literature reviews, and in-depth discussions with experts and practitioners in the field of learning practice. This was done to thoroughly understand the challenges faced by lecturers teaching teaching practice courses and prospective teachers as a requirement needed to prepare prospective educators well.

Data Analysis Technique

Based on the results of the needs analysis, a microteaching laboratory model will be designed by considering the laboratory infrastructure, microteaching curriculum, utilization guidelines, and procedures for implementing practices in the microteaching lab. After the design is complete, the model will be implemented in the microteaching laboratory environment of the Faculty of Educational Science, UPI Bandung. The lecturers and prospective teachers will be involved in the implementation session of this microteaching practice which is guided according to the designed model. Evaluation of the effectiveness of the model will be carried out through observation, interviews, assessment of prospective teacher performance, and analysis of student learning outcomes. The evaluation will also involve feedback from participants and observers as well as experts in related fields. Based on the evaluation findings, the microteaching laboratory model will be refined, and the results and findings of the research will be disseminated to stakeholders in education. This dissemination can be done through journal publications, conference presentations, or training for teachers. By following this method, it is hoped that the research can produce an effective and relevant microteaching laboratory model to prepare superior prospective teachers.

RESULTS AND DISCUSSION

Result

Model Development Stages

Needs Analysis: The initial stage of the study focused on a comprehensive analysis of the needs and expectations of microteaching lecturers and prospective teachers related to the expected characteristics of the microteaching lab. Data collection at this stage included surveys, interviews, focus group discussions and literature reviews to thoroughly understand the challenges faced by lecturers and prospective teachers and the requirements needed to prepare them well. The stages of the framework mentioned above can be seen on the Figure 1.

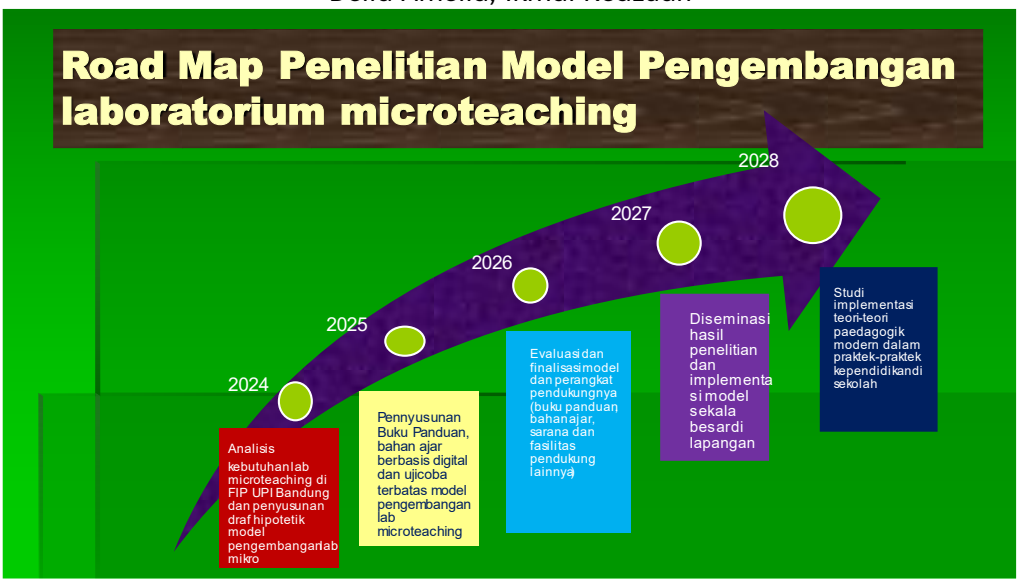

Figure 1. Roadmap for microteaching laboratory development

Based on the results of this study, a basic framework for a hypothetical model for developing a microteaching laboratory was prepared. It was obtained from the interview and focus group discussion among the microteaching lecturers during the need analysis stage as the first step. The results of the basic needs analysis of the microteaching laboratory are presented in the Table 1.

Table 1. Basic Needs of Microteaching Laboratory (Focus Group Discussion, 2024)

Aspects	Sub-aspect	Urgency
Laboratory Support Technology	Audio-Visual Systems: Equipment such as high-quality cameras, microphones, and speakers to record and play back teaching sessions.	Very needed
	Learning Management System (LMS): A digital platform for managing materials, assignments, and feedback.	Needed
	Ergonomic Furniture: Comfortable, adjustable desks and chairs for instructors and students.	Less needed
	Stationery and Demonstration Materials: Whiteboards, markers, projectors, projection screens, and other educational demonstration equipment.	Highly needed
	Supporting Resources: Access to educational literature, journals, and digital teaching materials for research and reference purposes.	Highly needed
	Safety Equipment: Safety equipment such as fire extinguishers, first aid kits, and clear safety signage.	Needed
Microteaching Room Specifications for Teaching Demonstrations (Lewis, 2020)	Size and Layout: Room large enough to accommodate small to large groups, with flexible layouts for a variety of teaching activities.	Very much needed
	Lighting and Acoustics: Adjustable lighting system	Needed
	Room Acoustics: Room acoustics designed to reduce echo and improve sound clarity.	Less needed
	Ventilation: Good ventilation for comfort during long sessions.	Very much needed

Model Design: Based on the results of the needs analysis, the next step is to design a definitive microteaching laboratory development model that is in accordance with the characteristics and uniqueness of the study program in the faculty of education. Then, the supporting facilities and infrastructure of the development model are also designed,

including the development of infrastructure, curriculum, manuals, teaching materials and implementation procedures that will create an effective microteaching practice experience that is oriented towards superior results. Furthermore, a limited trial of the implementation of the microteaching lab development model was carried out. The Table 2 presents the definitive microteaching laboratory development model based on the results of the needs analysis:

Table 2. Definitive Microteaching Laboratory Development Model Needs

Component	Description	Note
Infrastructure		
Laboratory Space	Spacious, flexible room, presentation, observation, and discussion areas available. Adjustable lighting system. Good ventilation system.	
Supporting Technology	HD camera, microphone, speaker.	
Laboratory Space	Teaching simulation software. Learning Management System (LMS) Board and writing materials, projector, projection screen.	
	Fire extinguishers, first aid kits, safety signage.	
Curriculum		
Curriculum Structure	Basic theory of microteaching, microteaching practice, reflection.	
Learning Materials		
Evaluation and Feedback	Evaluation from observers and peers.	Learning module
Guidance book		
Teaching Guide		
Implementation Guide	Teaching practice guide	Handouts and learning modules
Learning Materials		
Digital and Print Modules		
Additional Resources	Video tutorials, case studies, best practice examples.	Learning videos
Implementation Procedure		
Training Sessions	Initial training: use of available laboratories and technology.	

Evaluation and Improvement or Finalization: After implementation, an evaluation of the effectiveness of the model is carried out and improvements (finalization) of the microteaching lab model and its supporting devices (guidebooks, teaching materials and other supporting facilities) are carried out. This includes analysis of feedback from lecturers, participants, observers, and analysis of learning outcomes. Based on the evaluation findings, the model and its supporting devices are refined and improved to increase their effectiveness.

Dissemination and Large-Scale Implementation: After the microteaching lab model has been proven effective, the next step is to disseminate the findings and model to various educational institutions and related organizations. This can involve training for teachers, providing resources, and implementation guides so that the model can be widely and sustainably adopted.

Study of the implementation of modern pedagogical theories: After the definitive microteaching lab development model has been formed, various studies are carried out related to the implementation of modern pedagogical theories in learning practices, to strengthen the implementation of the microteaching lab development model that has been formed.

Discussion

Based on the results of the study in this study, it shows that online technology-based microteaching provides its own advantages for prospective teachers who only exist in online environments. Synchronous online systems that use the latest technology, such as the Zoom video communication platform, which is widely used during the COVID-19 pandemic, and virtual reality (VR)-based metaverse learning are increasingly commonly implemented in cross-level learning processes. Online learning platforms will continue to penetrate and be widely used in primary and higher education environments after the COVID-19 pandemic (Donnelly & Fitzmaurice, 2011; Dudley, 2015; Fern´andez, 2005; Fern´andez, 2010; Handayani & Triyanto, 2022). Therefore, prospective teachers must be able to further hone their skills in adapting and improving their mastery of online technology in order to be better able to answer their needs and suit their learning environment. By incorporating the latest online technology into microteaching, each individual will be increasingly encouraged to improve their online teaching skills and strengthen their Technology Pedagogical Content Knowledge (TPACK). This will maximize their ability to obtain materials in a safe and enjoyable environment (Afdal & Spernes, 2018; Alamri & Alfayez, 2023; ´Alvarez et al., 2019; Arsal, 2014; Aspfors et al., 2021; Bahçivan, 2017).

Asynchronous online solutions offer a diverse and easy learning environment, allowing learners to participate in the microteaching process and review teaching videos and their feedback at their own convenience and from any location. In particular, the use of asynchronous online feedback through social networking sites (SNS) and learning management systems (LMS) can overcome the problems of resource limitations and time constraints faced by users. This medium offers substantial benefits for both online and face-to-face learning (Bakir, 2014; Bayrak ¨Ozmutlu, 2022; Brew & Saunders, 2020; Coenders & Verhoef, 2019; d'Alessio, 2018; Danday, 2019). On the other hand, it is also necessary to consider the values or achievements given during microteaching sessions through traditional face-to-face modes that cannot be replaced. Despite the advancements in the latest technology in motion capture systems and technology through Virtual Reality (VR), there are still obstacles in the online education environment. Carrying out the face-to-face teaching process in the classroom provides an extraordinary opportunity to improve presentation and nonverbal communication skills, including appropriate or appropriate behavior, body language, and vocal expressions, in an authentic environment. Moreover, many studies have also shown high flexibility in terms of being able to be taught using distance and technology-based methods, such as English and STEM. However, fields of study that require experiments, hands-on training, or skill development, such as sports, art, music, medicine, and manufacturing, are not suitable or appropriate for online platforms, and the choice of Education or face-to-face teaching and learning processes is very important. Therefore, the selection of online or face-to-face learning media is very important, depending on the purpose and context

of microteaching (I'Anson et al., 2003; Imaniah, 2019; Ismail, 2011; Maguire, 2023; Mergler & Tangen, 2010; Park, 2022; Utami et al., 2016; Zhou et al., 2016).

CONCLUSION

Traditional face-to-face microteaching should be modified into a practical activity for prospective teachers in web-based teaching and learning. This is because online microteaching is a new concept in prospective teacher training and in addition we must be able to find out the comparison of procedural syntax with offline microteaching. Effective microteaching methods have been reviewed, but not with online microteaching. Integration of empirical research on online microteaching, which has been growing rapidly, is urgently needed. Microteaching is difficult to implement online. Therefore, pre-service/prospective teachers must improve their mastery of online technology and microteaching skills. In addition, future studies are also needed on the hybrid microteaching approach which is very flexible by combining online and face-to-face teaching. We expect increased technological and staff support for online microteaching.

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