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Website-Based Experiential Learning Cycle Training Management Model to Enhance Professional Competence of Biology Teachers in MGMP South Jakarta

Mashudi Alamsyah, Sri Setyaningsih, Soewarto Hardhienata
Universitas Pakuan, Indonesia
Email: mashudi.alamsyah@gmail.com, sri_setya@unpak.ac.id, soewartohardhienata@unpak.ac.id

ABSTRACT

The rapid evolution of curricula and educational technologies demands continuous enhancement of teachers' professional competence. Biology teachers, in particular, are expected not only to master subject matter but also to facilitate innovative, student-centered learning. However, many face challenges in implementing experiential learning due to limited training opportunities and a lack of supportive media. Conventional training models are often inflexible and fail to promote deep mastery of content. Thus, this study aims to develop a digital platform-based experiential learning cycle training model to foster sustainable and flexible professional development for teachers. The research approach used is Research and Development (R&D), employing interview techniques and declassification analysis for data collection. Based on theoretical studies, regulatory reviews, and field needs analysis, a website-based experiential learning cycle training model was developed and packaged into an application called LearnPress. This model aligns with experiential learning concepts and teacher competency strengthening policies. Validation results from material experts showed the training content was excellent in supporting biology material mastery, while media experts confirmed the feasibility of the website's display, navigation, and interactivity as a digital learning medium. Effectiveness tests across various scales indicate that LearnPress is highly effective and contributes positively to improving teachers' professional competence.

Keywords: Training Management, Experiential Learning Cycle, Website, Professional, Biology Teacher

INTRODUCTION

The times are increasingly evolving with advances in various aspects, especially technological and communication aspects, which foster diverse functions applicable in daily life. The use of technology, increasingly advancing day by day, adapts to human needs in performing daily activities. Alongside these developments, education is one of the key sectors expected to prepare quality human resources capable of competing globally amid various information technology advancements.

Education is dynamic and will continuously change alongside the development of science and technology. In this era of the industrial revolution 4.0, the rapid advancements in science and technology, accompanied by numerous innovations and discoveries, have significantly impacted human life. Services have become faster, more efficient, and offer wider connectivity via online systems. This evolution also affects the educational process, which will keep changing with a focus on efforts to improve education quality. Education greatly determines the progress level and quality of a nation. A developed nation always has good education, which is inseparable from the quality of capable teachers. Therefore, educators are a crucial factor in education quality and national progress.

Teachers' knowledge and skills should evolve according to developments in science, technology, and societal needs. These advancements require teachers to engage in learning through various sources. Training addresses filling gaps in knowledge, skills, and attitudes according to job demands. Training management encompasses planning, organizing, implementing, and evaluating training.

Teachers' professional competence is an essential competency for every teacher at the educational level. According to the Law of the Republic of Indonesia Number 14 of 2005 concerning teachers and lecturers, required competencies include pedagogic, personality, social, and professional competences obtained through professional education. A professional teacher is capable of managing themselves in daily duties. Competent teachers can create effective learning environments and perform tasks optimally to achieve student learning outcomes and overall education quality.

The condition of teacher competence in Indonesia is not yet optimal. National data from the Teacher Competency Test (UKG) shows the national average UKG score in 2022 reached only 54.05, still below the minimum standard of 55. In 2021, the average score was 50.64. Ironically, civil servant teachers scored lower than permanent teachers in private schools (Ministry of Education and Culture). This situation clearly requires appropriate solutions.

Teaching is a profession requiring special skills. Although often performed by those outside the education field, it should be restricted to qualified personnel to avoid professional contamination. Teachers' duties and roles extend beyond society; they are strategic components bearing significant roles in national progress. Teachers can fulfill responsibilities only if equipped with necessary competences, each comprising smaller, specialized competencies.

Education and training management is a science field essential for individuals in education striving to produce a well-established generation. Training covers philosophical-conceptual themes—such as theories and concepts on the importance of education and training in HR development in educational institutions—and methodological-empirical aspects like designing, conducting, and evaluating training programs.

Training is one of the most crucial tools for human resource quality development, especially in today’s information era where learning organizations are widely adopted. Conducting training for organizational members is mandatory, focusing on building thinking systems, personal expertise, mental models, shared vision, and learning disciplines.

Training activities are learning efforts organized by governments, NGOs, or companies to meet organizational needs and goals. Training systematically aims to change employee work behavior, improving organizational performance. Abilities develop through training, practice, group work, and independent learning. Training enables people to acquire specific skills, and work experience enhances competency.

Pragmatically, training positively impacts individuals and organizations. As professionals, teachers must enhance their competencies by developing creative teaching materials and utilizing the latest information and communication technologies for self-development.

Preliminary studies involving field observations, documentation, and interviews with biology teachers in MGMP South Jakarta aimed to identify competency development needs. The study of 30 biology teachers revealed their awareness of the importance of professional competence improvement to adapt to the industrial revolution 4.0. Classroom learning requires

technology integration to cultivate student skills in communication, collaboration, critical thinking, problem-solving, creativity, and innovation. Teachers particularly require training in information technology-based learning media. Daryanto (2010) states that in this era of rapid scientific and technological development, teacher professionalism extends beyond student learning ability to managing information and environments to facilitate learning, including enriching learning resources and media. This aligns with Government Regulation number 74 of 2008, which mandates functional competence in communication and information technology for teachers.

Multimedia technology holds great potential to transform how individuals learn, obtain, and process information. It offers educators opportunities to develop learning techniques for maximum results and helps students quickly and efficiently absorb information. Thus, multimedia presence in learning is highly beneficial.

Studies on teacher training management models to enhance professional competence show positive results. Research by Wismiarti et al. (2019) indicates that training improves teacher competence, especially in preparing lesson plans tailored to 21st-century needs. The training employed on-the-job learning by pairing more competent teachers (with higher UKG scores from developed areas) called partner teachers 1 with less competent teachers (with lower UKG scores from disadvantaged areas) called partner teachers 2. Yolanda & Tumin (2024) found participation in varied training and programs such as MGMP, workshops, dual skills, and supervision development fostered pedagogical, professional, and personality competence among SMA Muhammadiyah 3 Yogyakarta staff. Nguyen (2020) demonstrated that the CIPO model (Context-Input-Process-Output) in in-service training enhanced teacher competence.

Iqbal et al. (2021) developed a teacher training management model based on group dynamics theory, using dynamic driving, static condensation, and norm constraint mechanisms to stimulate internal psychological tension, maintain cooperative learning atmospheres, and ensure learning efficiency. Rusyadi et al. (2019) reported that two schools had yet to achieve good teacher professionalism levels via descriptive qualitative management research.

Given these findings, developing a training program that improves training quality and effectiveness is necessary. The program must meet participants' competency needs. A clear training management cycle is essential to achieve teacher competence improvement. Experiential learning cycles—a professional experience-based cycle with stages of concrete experience, reflective observation, abstract conceptualization, and active experimentation (Mughal & Zafar, 2011; Widiastuti & Budiyanto, 2018; Gordon, 2022)—can provide an effective framework.

Moreover, leveraging technological and communication advancements in training extends beyond presentation software to online-based programs such as websites. A website comprises pages containing digital information—text, images, animations—accessible worldwide via the internet (Kinaswara et al., 2019 ; Sidik, 2019 ; Arthalia & Prasetyo, 2021).

Website utilization significantly impacts training implementation. Training system design models offer systematic processes in learning or training development regarding processes and material aligned with needs to achieve goals. The intended product is a training management system for website-based biology teacher training. Addressing the above issues requires developing an information technology training model via the internet website media for biology teachers in South Jakarta. The website will feature interactive practicum training integrated

with websites and mobile applications, providing ease of use and access anytime and anywhere, both online and offline. Biology content will integrate simulations, animations, and learning videos to support participants.

Conventional training methods have proven inflexible and ineffective for deep mastery or practical knowledge application. Hence, a critical need exists for an experiential and technology-based training model enabling flexible, sustainable, interactive professional development. This research aims to develop a website-based experiential learning cycle training management model to enhance professional competence of biology teachers in MGMP South Jakarta. Implemented via the LearnPress platform, the model integrates experiential learning stages—concrete experience, reflective observation, abstract conceptualization, and active experimentation—within an accessible digital environment. The research benefits teachers by offering a structured, accessible, practical means to improve pedagogical, personality, social, and professional competencies. For educational institutions, it provides a sustainable, scalable teacher training model aligned with national standards and 21st-century learning demands. Furthermore, this study contributes to educational technology by demonstrating effective digital platform use in supporting experiential and continuous professional development, ultimately fostering a lifelong learning culture among educators and enhancing overall education quality.

METHOD

The research approach used was the Research and Development (R&D) method, which involves systematic steps to develop and validate new products or models aimed at producing effective solutions. This process is generally more complex and time-consuming (Rustamana et al., 2024; Waruwu, 2024).

The research was conducted at MGMP Biology South Jakarta, which has 124 biology teachers from public and private schools. The product development phase took place at the Graduate School of Pakuan University in Bogor City, West Java.

Data collection techniques in the three stages of the research and development—preliminary study, model development, and validation test—included interviews and document analysis. The analysis method supported the achievement of the research goals, specifically the development of the website-based experiential learning cycle training management model.

RESULTS AND DISCUSSION

The research uses the Research and Development (R&D) model developed by Borg and Gall. The steps are as follows (1) needs analysis, (2) planning, (3) initial product development, (4) small-scale trials, (5) product revisions, (6) follow-up trials, (7) final model revisions, (8) field trials, (9) final product refinement, and (10) dissemination and implementation. The results of the research from each step are described as follows.

1. Needs Analysis

Preliminary study analysis/situational analysis begins with evaluating the relevant literature. The regulatory review of teachers' professional competence is:

a. Law No. 14 of 2005 concerning teachers and lecturers in Article 10 paragraph (1) states that teachers' competencies include pedagogic, personality, social, and professional competencies.

b. Government Regulation (PP) Number 19 of 2017 concerning Amendments to Government Regulation No. 74 of 2008 concerning Teachers. This PP regulates the development of teachers' careers and competencies, including performance assessments, rank levels, and continuous professional development (PKB) activities.
c. Regulation of the Minister of National Education (Permendiknas) Number 16 of 2007 concerning Academic Qualification Standards and Teacher Competencies.
d. Regulation of the Minister of Education and Culture (Permendikbud) Number 137 of 2014 concerning National Standards for Early, Primary, and Secondary Childhood Education.
e. Regulation of the Minister of PAN-RB Number 16 of 2009 concerning Functional Positions of Teachers and Their Credit Scores. This regulation stipulates that the development of teachers' professional competencies is one of the main elements of activities that are assessed in promotions and positions and provides credit weight for activities such as making teaching materials, scientific papers, training, and self-development.

Based on the regulations mentioned above, it can be concluded that the synthesis of teachers' professional competencies is an important skill and ability that teachers need in the form of pedagogical, personality, professional, and dosial competencies to fulfill their responsibilities in providing effective teaching. The indicators consist of: 1) pedagogical competence, 2) personality competence, 3) professional competence, and 4) social competence. This regulation consistently emphasizes the importance of improving teacher professionalism in order to create a sustainable education ecosystem.

Furthermore, after conducting a needs analysis in the form of literature studies, previous research results and regulations, then the researcher conducted a preliminary study which was carried out by conducting a pre-test of teachers' professional competence on 30 respondents, namely Biology teachers who are members of the South Jakarta Biology MGMP.

Based on the results of the pre-test of teachers' professional abilities mentioned above, it is known that the average achievement of teachers' pedagogical competence is 75.33; Personality competency achievement is 68.67, professional competency achievement is 61.33, and social competency achievement is 70.00. This condition shows that the professional competence of teachers is not optimal. For this reason, the researcher felt challenged to formulate a website-based Experiential Learning Cycle (ELC) training model. This training model was prepared using the Research and Development (RnD) research model and it is hoped that this training model will help improve the professional competence of teachers.

2. Planning

At this planning stage, the researcher communicates with the promoter related to the determination of the objectives of model development, the determination of the people involved, and the determination of the form of the feasibility test. The main purpose of creating a Website-based Experiential Learning Cycle training model using LearnPress is to improve the professional competence of teachers.

3. Early Product Development

The initial product draft development stage on the Borg and Gall model is a crucial step that bridges conceptual design and practical implementation. At this stage, the researchers began to design an initial draft of an ELC-based training model that was integrated into a website-based digital platform using LearnPress.

At this stage, the activities carried out include: a. Planning for the presentation of teachers' professional competency materials; b. Preparation of designs on website-based training media; c. Creation of webiste-based applications related to teachers' professional competence; d. Conduct feasibility evaluation through expert judgement by way of FGD according to the instrument that has been determined by the expert.

a. Planning for the Presentation of Teacher Professional Competency Materials

The materials developed for teachers' professional competence consist of: 1) pedagogical competence, 2) personality competence, 3) professional competence, and 4) social competence. First, the material is developed in the module and then will be developed in the Website media.

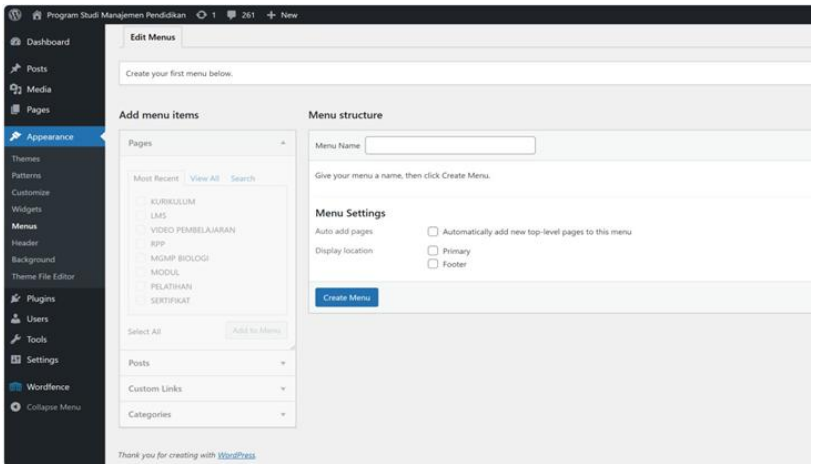

Figure 1.

b. Design Preparation on Website-Based Training Media

The software used in application development is LearnPress. The preparation of the design is by compiling a framework consisting of registration, pre-test in the form of quizzes, scores, materials, post tests.

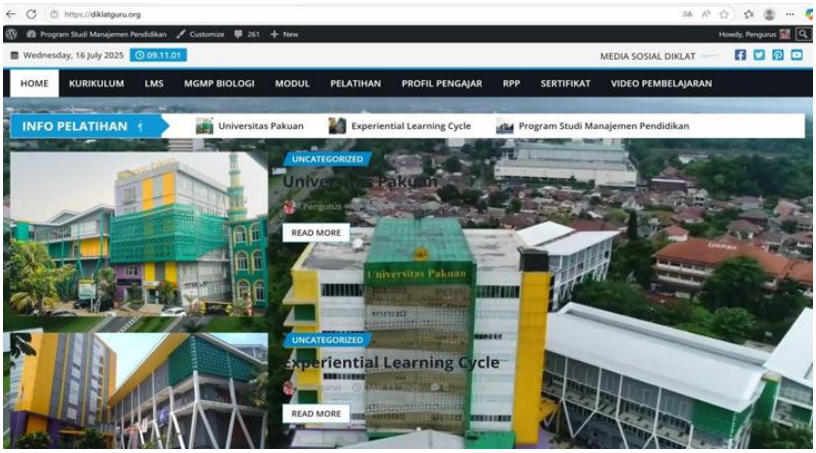

Figure 2. Initial Website Display

c. Creation of Web-Based Applications related to Teachers' Professional Competencies

From the media design that has been made, the next step is to create a website-based application using *LearnPress* for teacher professional competence. Here's what the application looks like:

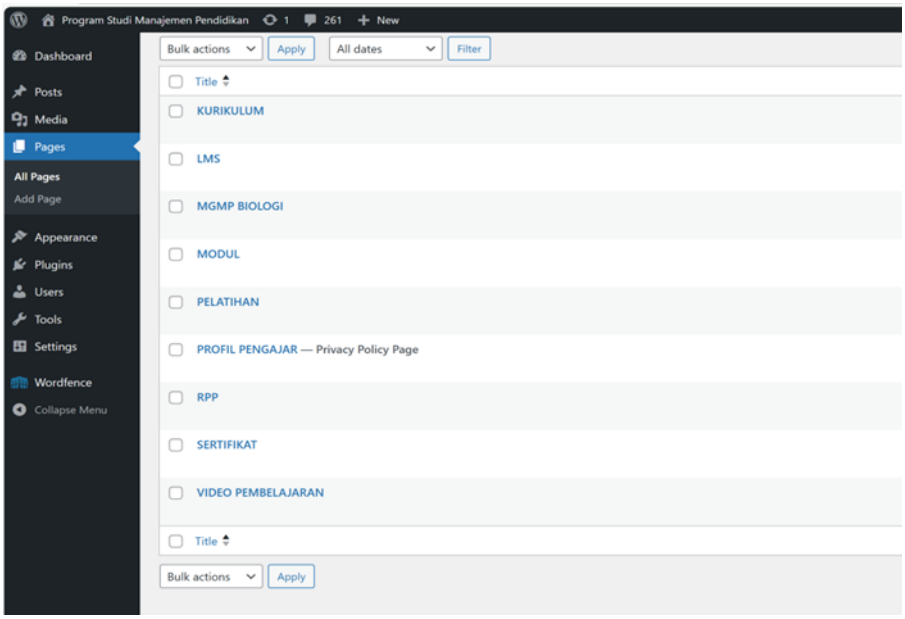

Figure 3. LearnPress Display

d. Conducting Feasibility Evaluation Through Expert Judgement by FGD According to the Instrument That Has Been Determined by the Expert

Validation aims to consult about the developed media to experts (material experts and media experts). Validation is carried out by filling out the instrument sheet associated with the expert. Meanwhile, the media expert validators consisted of 5 people who had expertise in the field of IT at Pakuan University and Indraprasta University PGRI

Discussion

This research has succeeded in developing a Website-based Experiential Learning Cycle (ELC) Training Management Model to improve the professional competence of MGMP South Jakarta Biology teachers. The model is developed through a Research and Development (R&D) approach by adapting Borg and Gall's steps which include needs analysis, planning, initial product development, small-scale trials, product revisions, follow-up trials, final model revisions, field trials, final product refinements, and dissemination and implementation. This model is designed to answer teachers' needs for flexible, interactive, and experiential training, in line with the demands of the digital age and the Independent Curriculum that emphasizes contextual learning and continuous professional development.

The results of validation by subject matter experts showed an average score of 4.05 (80.97%) in the excellent category, which means that the training content is in accordance with the principles of mastery of biological material and supports the development of teachers' professional competencies. Meanwhile, the validation of media experts obtained an average score of 4.12 (82.37%), which confirms that the display, navigation, and interactivity of the website meet the eligibility criteria for digital learning media. These findings are in line with the opinion of Alessi and Trollip (2021) that effective website-based media design should consider ease of navigation, readability, and support for instructional objectives.

The response of the trainees also showed a very good category, which indicates that teachers feel helped by this training model in improving professional competence. This supports

the findings of the OECD (2021) which emphasizes the importance of technology-based learning to support teacher professionalism in the context of lifelong learning. The use of websites as the main medium allows teachers to learn flexibly without space and time limits, making it more accessible to teachers with busy teaching schedules.

This model integrates the principles of the Experiential Learning Cycle (Kolb, 2018) which consists of four stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. The use of this cycle in website-based training provides a complete learning experience, as teachers not only receive information, but also reflect, construct concepts, and implement learning outcomes in learning practice. According to Beard and Wilson (2018), experiential learning effectively improves practical skills and conceptual understanding because it involves real-life experiences that are relevant to the participant's profession.

Theoretically, the success of the development of this model is in line with training management theory which emphasizes the need for planning based on needs analysis and systematic management of the learning process (Noe, 2020). In this study, planning was carried out by involving MGMP as a teacher learning community, so that the training was more in line with the field context. This is also in line with Mulyasa's (2020) view that teacher professional development must be collaboration-based and oriented to practical needs. According to the OECD (2021), effective teacher professional development must be practice-oriented, collaboration-based, and utilize teacher communities such as MGMP to create a learning environment that supports reflection and innovation. This approach ensures that the training is not only theoretical, but relevant to field conditions.

In addition, Darling-Hammond et al., (2020) emphasized that teacher training designed based on needs analysis and integrated with the principles of continuous professional development (CPD) has a more significant impact on teaching practices and student learning outcomes. This supports the use of MGMP as a vehicle to discuss shared needs and implement experiential practices. Furthermore, Guskey & Yoon (2021) assert that effective training should be based on a systematic design that includes planning, implementation, and evaluation, so that the professional development process can be measured for its success and sustainability. Community-based approaches such as MGMP allow teachers to gain stronger social and pedagogical support.

The use of websites as training media supports the theory of e-learning design proposed by Horton (2021) that interactive and user-friendly digital platforms can increase participants' motivation and participation. The features provided in this model, such as discussion forums, interactive quizzes, and virtual experiment guides, provide teachers with opportunities to interact, share experiences, and practice the knowledge gained, making the learning process more meaningful. In line with this, Kumar Basak et al., (2021) explain that the effectiveness of web-based learning is determined by the level of interactivity, ease of navigation, and the ability of the platform to support participant collaboration. The use of discussion forums and interactive quizzes can increase active engagement and facilitate social learning.

In addition, Dhawan (2020) emphasized that e-learning designed with user-friendly principles and equipped with participatory features is able to increase participants' intrinsic motivation and strengthen knowledge retention. Features such as virtual experiment guides provide a practical experience that is in line with the principles of constructivist learning, where

participants learn through meaningful activities. Furthermore, Zhou et al. (2020) suggest that the integration of interactive components in digital platforms, including simulations or virtual experiments, can increase the depth of understanding and knowledge transfer ability to real contexts. This is in accordance with the needs of teacher training to develop practice-based professional competencies.

The improvement in teachers' professional competence resulting from this training includes a more in-depth mastery of biology materials, the ability to use technology in learning, and experiential learning design skills. This is relevant to the indicators of professional competence as stipulated in Permendiknas Number 16 of 2007, which includes mastery of material substance, the ability to utilize technology, and the application of innovative learning. Thus, this model contributes directly to the fulfillment of teacher professionalism standards.

Another advantage of this model is its adaptive and sustainable nature, so it can be applied in a variety of teacher training contexts, not limited to biology subjects. This is in line with the results of an OECD study (2021) which recommends the integration of digital technology in the sustainable professional development of teachers to answer the challenges of the 21st century. The training website also provides flexibility for teachers to access the material at any time, which supports the concept of lifelong learning. This statement is in line with the concept of technology-based lifelong learning emphasized by UNESCO (2021), that teacher professional development must be oriented towards flexibility, accessibility, and sustainability to respond to the dynamics of globalization and the digital revolution. Technology provides opportunities to overcome space and time limitations, so that teachers can learn independently and continuously.

In addition, Kebritchi et al., (2021) affirm that adaptive training platforms allow for the differentiation of participant needs, support higher engagement, and encourage personalized learning. This is important because teachers have diverse levels of competence and development needs. According to Bao (2020), the sustainability of training through a web-based system supports lifelong learning, because it provides access to anytime-anywhere materials that are able to increase participants' independence and accountability. The adaptive advantages of this model are also in line with the recommendations of Rivera et al., (2023) who state that digital technology should be used to create training that is not only temporary, but also builds a continuous learning ecosystem.

The results also confirm the findings of previous research that experiential training is more effective than conventional methods because it provides space for teachers to experiment and reflect on their learning practices (Abdullah et al., 2022). By leveraging technology, this model not only provides a meaningful learning experience but also enhances teachers' digital skills, which is an important competency in the era of the Industrial Revolution 4.0. This statement is in line with the findings of Kurt & Yildirim (2021) who stated that experiential learning improves critical reflection skills and deep conceptual understanding because teachers are involved in an active learning cycle. The integration of technology in experiential learning reinforces this process through simulations, virtual experiments, and online interactions, so that teachers have an authentic learning experience.

In addition, Maqsood et al., (2021) emphasize that the application of technology-based experiential learning not only improves material understanding, but also develops 21st century skills, including digital literacy and problem-solving. This is in accordance with the demands of the Industrial Revolution 4.0 era, where teachers are required to master technology in learning.

Furthermore, Rahman et al., (2022) show that teacher training programs that use a digital-based experiential learning approach have a positive impact on pedagogical skills, learning innovation, and technology mastery. Thus, the incorporation of real experience and digital technology in this training model supports the comprehensive development of teachers' professional competencies.

Overall, the successful development of this Website-Based Experiential Learning Cycle Training Management Model shows that the R&D approach with the Borg and Gall model is able to produce valid, practical, and effective products. Expert assessments and excellent user responses are proof that this model can be applied as a technology-based teacher professional development strategy. In the future, this model has the potential to be widely implemented and further developed with the integration of AI-based adaptive features to support the personalization of teacher training (Sodiki & Noor, 2024; Valishamekhi et al., 2021).

CONCLUSION

The development of a website-based experiential learning cycle training model is carried out by referring to experiential learning theory, teacher professional competency regulation, and needs analysis in the field. The result is a "LearnPress" application designed to improve teachers' professional competence, particularly in the mastery of biological material. Validation by material experts showed an average score of 4.05 (80.97%) and by media experts of 4.12 (82.37%), both in the very good category. Field trials on various scales show that this application is very effective in improving teachers' professional competence, making it suitable for use as an experience-based digital training medium. For future research, this study offers several significant contributions and directions. First, the developed model can be tested and adapted for other subject teachers or in different regional contexts to evaluate its scalability and generalizability. Second, further research could explore the integration of more advanced technologies, such as artificial intelligence (AI), to provide personalized learning pathways and adaptive content recommendations based on individual teacher competency profiles. Third, longitudinal studies are needed to assess the long-term impact of this training model on teachers' classroom practices and, ultimately, on student learning outcomes. Lastly, investigating the role of online learning communities and social collaboration features within the platform could enhance understanding of how peer support and shared reflection contribute to sustainable professional development.

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