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Evaluating the Effectiveness of E-Learning Implementation in the Professional Teacher Education Program through the CIPPO Model

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ABSTRACT

This study aims to evaluate the implementation of e-learning in the Professional Teacher Education Program (PPG) at Manado State University using the CIPPO evaluation model, which consists of Context, Input, Process, Product, and Outcome components. The rapid transition to digital learning environments in higher education requires systematic evaluation to ensure the effectiveness and sustainability of e-learning practices, particularly in teacher professional development programs. A mixed-method approach was employed, involving quantitative surveys and qualitative interviews with PPG students, lecturers, and program administrators. Data were collected through structured questionnaires, observation, and document analysis. The findings indicate that the context component demonstrates strong institutional support and policy alignment, while the input component reveals adequate infrastructure but limited digital pedagogical competencies among some instructors. The process evaluation highlights the need for more interactive instructional strategies and consistent learning management system utilization. Product evaluation shows positive student performance and engagement, although variations exist across courses. Outcome analysis suggests that e-learning contributes to improved professional competence, digital literacy, and learning flexibility. The study concludes that the CIPPO model provides a comprehensive framework for assessing e-learning implementation and identifying areas for continuous improvement. Recommendations include strengthening lecturer training, enhancing technological infrastructure, and developing standardized e-learning guidelines to optimize the quality of PPG e-learning programs.

Keywords CIPPO model, e-learning evaluation, higher education, PPG program, teacher professional education.

INTRODUCTION

The development of information and communication technology (ICT) has fundamentally transformed the way education is designed, delivered, and evaluated across the world. Over the last two decades, digital technology has gradually shifted the traditional paradigm of learning from teacher-centered, classroom-based instruction to more flexible, technology-enhanced learning environments. This transformation has led to the emergence of e-learning as a dominant instructional approach in higher education institutions globally. Universities are increasingly adopting digital platforms to support teaching and learning processes, recognizing that e-learning offers broader access, greater flexibility, and more efficient learning management systems. The acceleration of e-learning adoption became particularly evident during the COVID-19 pandemic, which forced educational institutions to migrate abruptly from face-to-face instruction to online learning. This global disruption revealed both the potential and the challenges of digital education systems. On the one hand, e-learning enabled educational continuity despite physical restrictions; on the other hand, it exposed significant gaps in technological readiness, digital literacy, pedagogical adaptation, and institutional support. These conditions emphasized the urgent need for systematic evaluation of e-learning implementation to ensure that online education is not merely an emergency response but a sustainable and effective educational strategy. In Indonesia, the integration of e-learning into the national education system has become a strategic priority. The Ministry of Education, Culture, Research, and Technology has actively promoted digital transformation in higher education through various policies and programs. Universities are encouraged to develop Learning Management Systems (LMS), digital learning resources, and online assessment mechanisms to support flexible and student-centered learning. However, the implementation of e-learning across Indonesian higher education institutions remains uneven due to differences in infrastructure, human resource capacity, and institutional commitment.

One of the most critical areas of higher education in Indonesia is teacher education. Teachers play a central role in shaping the quality of education, and therefore improving teacher competence has always been a national priority. The Professional Teacher Education Program (Pendidikan Profesi Guru – PPG) was established by the Indonesian government as a structured program aimed at preparing qualified and professional teachers who meet national standards. The PPG program is designed to develop pedagogical, professional, social, and personal competencies of teachers through a combination of theoretical instruction and practical training. Universitas Negeri Manado (UNIMA) is one of the state universities officially appointed to organize the PPG program. As an institution with a long history in teacher education, UNIMA holds a strategic responsibility to ensure that its graduates are competent, professional, and capable of adapting to technological developments in education. In line with national policies and global trends, UNIMA has implemented e-learning as a major instructional approach within the PPG program. Through e-learning, PPG participants are expected to access learning materials, participate in virtual discussions, complete assignments, and develop professional skills without being limited by geographical and time constraints. The adoption of e-learning in the PPG program offers many potential advantages. First, it provides flexibility for in-service teachers who

participate in the program while continuing their teaching duties. Second, it enables broader access to learning resources and expert instructors regardless of physical location. Third, it encourages the development of digital literacy and technological competence among future teachers, which is essential for 21st-century education. Fourth, it supports more efficient management of learning activities, assessment, and academic administration.

Despite these potential benefits, the implementation of e-learning in the PPG program also faces significant challenges. Preliminary observations at Manado State University indicate that the effectiveness of e-learning implementation varies across courses and instructors. Some lecturers are able to utilize digital platforms creatively and interactively, while others still rely on conventional methods even within online environments. In addition, not all students have equal access to stable internet connections and adequate learning devices. These conditions create disparities in learning experiences and outcomes. Another important issue relates to the pedagogical readiness of instructors. E-learning requires not only technological skills but also digital pedagogical competence. Many lecturers who are accustomed to face-to-face teaching may find it difficult to design interactive online learning activities, conduct virtual assessments, and maintain student engagement. Without proper training and support, e-learning can easily become limited to the mere distribution of materials rather than meaningful learning processes. Institutional factors also play a crucial role in determining the success of e-learning. Effective implementation requires clear policies, adequate infrastructure, technical support, standardized learning management systems, and continuous professional development for lecturers. While UNIMA has made considerable efforts to support e-learning, there has been limited comprehensive evaluation regarding how well these elements function in an integrated manner within the PPG program.

From the perspective of students, the experience of e-learning is influenced by various factors such as motivation, self-regulated learning skills, digital literacy, and access to technology. Some PPG participants report positive experiences with online learning due to its flexibility, while others experience difficulties in understanding materials, participating in virtual discussions, and completing online assessments. These diverse experiences indicate that the effectiveness of e-learning cannot be assumed but must be empirically examined. Given the strategic importance of the PPG program in producing professional teachers, it is essential to ensure that its e-learning implementation truly supports the development of teacher competencies. However, until now, there has been no systematic and comprehensive evaluation specifically examining the implementation of e-learning in the PPG program at Manado State University. Most previous studies on e-learning in Indonesia focus on general higher education contexts, while research on professional teacher education remains limited. Evaluation is therefore a crucial step to understand whether the current e-learning practices in the PPG program are aligned with program objectives and national standards. Without evaluation, institutions cannot accurately identify strengths, weaknesses, and areas requiring improvement. A structured evaluation model is needed to examine e-learning implementation from multiple dimensions, including policy relevance, resource adequacy, instructional processes, learning outputs, and long-term impacts.

The CIPPO evaluation model (Context, Input, Process, Product, Outcome) offers a comprehensive framework for this purpose. Unlike other evaluation models that focus only on results,

the CIPPO model examines the entire system of program implementation. It allows evaluators to analyze whether institutional policies support e-learning (Context), whether adequate resources are provided (Input), how learning activities are conducted (Process), what immediate results are achieved (Product), and what long-term impacts emerge (Outcome). This holistic approach is highly relevant for evaluating complex programs such as e-learning in teacher professional education. Applying the CIPPO model to the evaluation of e-learning in the PPG program at UNIMA is expected to provide in-depth insights into several key questions:

1. Are the institutional policies and objectives of e-learning clearly defined and relevant to the needs of PPG participants?
2. Do lecturers and students have sufficient technological infrastructure and digital competencies?
3. Is the online learning process implemented effectively and interactively?
4. Do students achieve the expected learning outcomes through e-learning?
5. Does e-learning contribute to the long-term professional competence of PPG graduates?

Addressing these questions is highly important because the quality of e-learning implementation directly affects the quality of future teachers. Teachers who experience effective e-learning during their professional education are more likely to adopt innovative digital practices in their own classrooms. Conversely, poor e-learning experiences may hinder their readiness to integrate technology into teaching. Therefore, this study is conducted to evaluate comprehensively the implementation of e-learning in the Professional Teacher Education Program at Manado State University using the CIPPO model. The results of this evaluation are expected to provide empirical evidence for improving institutional policies, strengthening digital pedagogy, enhancing technological infrastructure, and ultimately increasing the effectiveness of the PPG program. By conducting this research, Manado State University will obtain valuable feedback for continuous quality improvement. Moreover, the findings will contribute to the broader discourse on e-learning evaluation in teacher professional education, particularly in the Indonesian context. In the long term, this study is expected to support national efforts in producing competent, professional, and technologically literate teachers who are able to meet the demands of 21st-century education.

LITERATURE REVIEW

Concept of E-Learning in Higher Education

E-learning has become one of the most influential innovations in modern education. The term e-learning generally refers to the use of digital technologies to support, deliver, and manage teaching and learning activities. According to Clark and Mayer (2016), e-learning is defined as instruction delivered through digital devices such as computers, tablets, and smartphones with the aim of improving knowledge and performance. In higher education, e-learning is increasingly recognized as an effective approach to provide flexible, accessible, and learner-centered education. The rapid development of internet technology and digital platforms has enabled universities to integrate e-learning into their academic systems. Learning Management Systems (LMS) such as Moodle, Google Classroom, Canvas, and other platforms allow lecturers to distribute materials, conduct virtual discussions, administer online assessments, and monitor student progress. Bates (2019) emphasizes that

e-learning is not merely the digitization of traditional learning materials but represents a fundamental transformation in pedagogy, interaction, and learning management. Several studies have demonstrated the advantages of e-learning in higher education. E-learning supports self-paced learning, encourages independent study, and allows students to access learning resources anytime and anywhere. It also facilitates collaborative learning through online forums, video conferences, and interactive multimedia. However, the success of e-learning depends on various factors such as technological infrastructure, instructional design, digital literacy, and institutional support. Despite its potential benefits, e-learning implementation often encounters challenges. These challenges include limited internet access, lack of technological skills, resistance to change, and inadequate pedagogical adaptation. Therefore, systematic evaluation is necessary to ensure that e-learning is implemented effectively and achieves its educational objectives.

E-Learning in Teacher Education Programs

Teacher education is one of the most strategic sectors in higher education because the quality of teachers directly influences the quality of national education. In recent years, many countries have integrated e-learning into teacher education programs to prepare future teachers for digital-era classrooms. Online learning environments are considered highly relevant for teacher professional development because they expose teachers to technological tools and digital pedagogies that they are expected to apply in their own teaching practice. In Indonesia, the Professional Teacher Education Program (Pendidikan Profesi Guru – PPG) plays a vital role in developing qualified and certified teachers. The PPG program is designed to strengthen teachers' pedagogical, professional, social, and personal competencies. With the growing demand for flexible learning, e-learning has been adopted as a major mode of instruction within the PPG program. Research on e-learning in teacher education suggests that online learning can enhance teachers' digital literacy, reflective practice, and professional collaboration. According to Trust (2018), participation in online learning communities enables teachers to share experiences, discuss pedagogical problems, and develop innovative teaching strategies. Moreover, e-learning allows in-service teachers to continue their professional development without leaving their workplace.

However, implementing e-learning in teacher education is more complex than in other fields. Teachers are not only learners but also future implementers of technology in schools. Therefore, e-learning in teacher education must model effective digital pedagogy. Koehler and Mishra's (2009) Technological Pedagogical Content Knowledge (TPACK) framework highlights that successful technology integration requires the intersection of technological knowledge, pedagogical knowledge, and content knowledge. This implies that e-learning in the PPG program should not only deliver content but also develop participants' ability to teach effectively using technology. Several studies in Indonesia indicate that e-learning implementation in teacher education faces problems such as limited lecturer readiness, inconsistent use of LMS, and varying levels of student engagement. These findings underline the importance of evaluating e-learning programs comprehensively to ensure that they truly support teacher competence development.

Evaluation in Educational Programs

Evaluation is an essential component of educational management and quality assurance. Program

evaluation is defined as a systematic process of collecting and analyzing information to determine the effectiveness, efficiency, and impact of an educational program. Stufflebeam and Coryn (2014) argue that evaluation provides evidence-based information for decision-making and program improvement. In the context of e-learning, evaluation is needed to assess whether online learning systems function as intended and whether they contribute to desired learning outcomes. E-learning evaluation typically examines aspects such as system quality, instructional design, user satisfaction, learning effectiveness, and organizational support. Various evaluation models have been developed for educational programs. Among the most widely used models are: Kirkpatrick's Four-Level Model, CIPP Model (Context, Input, Process, Product), Goal-Oriented Evaluation, Logic Model, CIPPO Model. Each model has different strengths and focuses. For complex educational programs like e-learning in teacher education, a comprehensive evaluation model is required—one that does not only measure results but also examines the entire implementation process.

The CIPPO Evaluation Model

The CIPPO model is an extension of Stufflebeam's CIPP evaluation model. While the CIPP model consists of four components (Context, Input, Process, Product), the CIPPO model adds an additional component outcome to capture the long-term impact of a program. This model is particularly useful for evaluating educational innovations that aim to produce sustainable changes.

a. Context Evaluation

Context evaluation focuses on analyzing the background, needs, and objectives of a program. In e-learning implementation, context evaluation examines:

- Institutional policies supporting e-learning
- Alignment between e-learning objectives and program goals
- Needs of students and lecturers
- Environmental readiness

According to Zhang et al. (2017), understanding the context is crucial because many e-learning failures occur due to mismatch between technology and organizational needs.

b. Input Evaluation

Input evaluation assesses the resources and strategies used to implement a program. In e-learning, input components include:

- Technological infrastructure
- Learning management systems
- Lecturer competencies
- Student digital readiness
- Curriculum and instructional design

Research by Martin, Sun, and Westine (2020) shows that the quality of e-learning largely depends on lecturer readiness and institutional support. Without adequate input, even well-designed programs cannot operate effectively.

c. Process Evaluation

Process evaluation examines how a program is implemented in practice. In the context of e-learning, this includes:

- Online teaching methods

- Interaction between lecturers and students
- Utilization of LMS features
- Assessment practices
- Technical support services

Process evaluation is important because the success of e-learning is determined not only by technology but by how learning activities are conducted. Effective e-learning requires interactive communication, timely feedback, and student-centered pedagogy

d. Product Evaluation

Product evaluation measures the immediate results of program implementation. In e-learning programs, product indicators may include:

- Student learning achievement
- Course completion rates
- Student satisfaction
- Quality of assignments and assessments

According to Moore and Kearsley (2018), learning outcomes are the most visible indicators of e-learning effectiveness, but they must be interpreted in relation to other evaluation components.

e. Outcome Evaluation

Outcome evaluation focuses on long-term impacts after program completion. In the PPG program, outcomes may include:

- Improvement of teacher professional competence
- Application of digital pedagogy in schools
- Career development of graduates
- Sustainability of e-learning practices

The addition of the Outcome component makes the CIPPO model more comprehensive than other evaluation frameworks because it links program implementation with real-world impact.

Previous Studies on E-Learning Evaluation

Numerous studies have applied evaluation models to assess e-learning implementation in higher education. Research by Al-Fraihat et al. (2020) identified system quality, instructor quality, course design, and institutional support as key determinants of successful e-learning. Similarly, a study by Rapanta et al. (2021) emphasized that pedagogical adaptation and interaction quality are more important than technological sophistication. In Indonesia, several researchers have evaluated e-learning in universities using various models. Most studies report that while technological platforms are generally available, optimal utilization remains a challenge. Lecturers often use LMS only for uploading materials rather than creating interactive learning experiences. Students also report difficulties related to internet access and online assessment systems. However, research specifically evaluating e-learning in the Professional Teacher Education Program (PPG) is still limited. Most existing studies focus on general undergraduate programs rather than professional teacher training. Considering that the PPG program has unique characteristics—such as the need to develop pedagogical competence and professional skills—there is a strong need for specialized evaluation.

Relevance of CIPPO Model to PPG E-Learning Evaluation

The implementation of e-learning in the PPG program involves multiple components: government policy, university management, lecturers, students, curriculum, technology, and assessment systems. Because of this complexity, a holistic evaluation approach is required. The CIPPO model is highly relevant for several reasons:

- It evaluates not only learning outcomes but also policies, resources, and processes.
- It identifies gaps between planning and implementation.
- It provides structured information for continuous improvement.
- It measures long-term impact on teacher competence.

Using the CIPPO model, evaluators can answer critical questions such as:

- Are institutional policies adequate to support e-learning in the PPG program?
- Do lecturers and students have sufficient digital competencies?
- Is the online learning process implemented effectively?
- Do participants achieve the expected professional competencies?
- What long-term benefits are generated by e-learning participation?

Research Gap

Although many studies discuss e-learning and its evaluation, several gaps remain:

- Limited research focusing specifically on e-learning evaluation in the PPG program.
- Lack of comprehensive studies using the CIPPO model in Indonesian teacher education.
- Insufficient empirical evidence from Manado State University regarding the effectiveness of its PPG e-learning system.

These gaps indicate the necessity of conducting an in-depth evaluation of e-learning implementation in the PPG program at Manado State University using the CIPPO model.

METHOD

Research Design

This study was designed as evaluative research aimed at systematically assessing the implementation of e-learning in the Professional Teacher Education Program (PPG) at Manado State University. The primary objective of the study was to analyze the effectiveness, efficiency, and impact of e-learning implementation using the CIPPO evaluation model, which consists of five main components: Context, Input, Process, Product, and Outcome. A mixed-method research approach was adopted in this study. The use of mixed methods was considered essential because the evaluation of e-learning implementation requires both measurable quantitative data and in-depth qualitative information. Quantitative methods were used to measure the perceptions, experiences, and satisfaction levels of students and lecturers regarding the e-learning system. Meanwhile, qualitative methods were employed to explore more comprehensive insights into institutional policies, implementation processes, challenges, and long-term impacts. This combination of methods enabled the researcher to obtain a holistic understanding of the e-learning program from multiple perspectives. The quantitative data provided general patterns and tendencies, while the qualitative data offered contextual explanations and deeper interpretations of those patterns.

Research Approach Based on the CIPPO Model

The evaluation framework in this study was fully guided by the CIPPO model, which served as the conceptual and operational foundation of the research. Each component of the CIPPO model was translated into specific evaluation indicators as follows:

a. Context Evaluation

The context evaluation focused on analyzing the background and rationale of e-learning implementation in the PPG program. This component examined: Institutional policies and regulations supporting e-learning, Alignment between e-learning objectives and PPG program goals, Readiness of the academic environment, Needs and expectations of students and lecturers, External factors influencing e-learning implementation. The purpose of this stage was to determine whether the implementation of e-learning in the PPG program was relevant to institutional needs and national educational policies.

b. Input Evaluation

Input evaluation analyzed all resources and preparations required to implement e-learning effectively. The aspects evaluated in this component included: Availability and adequacy of technological infrastructure, Quality and functionality of the Learning Management System (LMS), Digital competencies of lecturers and students, Availability of learning materials and instructional design, Institutional support such as training, technical assistance, and funding. This component was crucial to determine whether the PPG program had sufficient resources to support sustainable and high-quality e-learning implementation.

c. Process Evaluation

Process evaluation examined how e-learning was implemented in real learning situations. This component focused on: Online teaching and learning activities, Interaction patterns between lecturers and students, Utilization of LMS features, Methods of online assessment and feedback, Classroom management in virtual environments, Technical and academic support services. Through process evaluation, the study investigated whether e-learning practices were conducted according to established standards and whether they promoted active and meaningful learning experiences.

d. Product Evaluation

Product evaluation assessed the immediate results of e-learning implementation. The indicators included: Student learning achievement, Level of student engagement and participation, Quality of assignments and online assessments, User satisfaction with e-learning services, Achievement of course learning outcomes. This component aimed to measure the effectiveness of e-learning in supporting academic performance and learning quality.

e. Outcome Evaluation

Outcome evaluation focused on the long-term impacts of e-learning participation on PPG students. The aspects analyzed were: Improvement of pedagogical and professional competence, Development of digital literacy skills, Readiness to implement technology-based learning in schools, Professional growth and career development. This component distinguished the CIPPO model from other evaluation models because it assessed not only immediate results but also sustainable impacts.

Research Setting

The research was conducted at Manado State University (Universitas Negeri Manado – UNIMA),

Indonesia, particularly within the Professional Teacher Education Program (PPG). UNIMA was selected as the research site because it is one of the main universities appointed by the Indonesian government to organize the PPG program and has actively implemented e-learning as a primary instructional mode. The e-learning system evaluated in this study included all online learning activities conducted through the university's official Learning Management System, virtual meeting platforms, and other digital learning tools used in the PPG program.

Research Participants

The participants of this study consisted of three main stakeholder groups directly involved in e-learning implementation:

1. PPG Students

Students who were actively participating in the PPG program and had experienced online learning for at least one semester.

2. Lecturers and Instructors

Teaching staff responsible for delivering e-learning courses, designing online materials, and conducting online assessments.

3. Program Administrators and Managers

Individuals responsible for policy making, program coordination, and technical management of the e-learning system.

A purposive sampling technique was used to select participants who were considered to have relevant experience and knowledge regarding e-learning implementation. This sampling approach ensured that the data collected were directly related to the research objectives.

Data Collection Methods

To ensure comprehensive evaluation, multiple data collection techniques were employed.

1. Questionnaire Survey

The primary quantitative data were collected through structured questionnaires distributed to PPG students and lecturers. The questionnaire was developed based on the indicators of the CIPPO model and used a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The questionnaire measured several aspects, including: Perceptions of institutional support, Quality of infrastructure, Effectiveness of online learning processes, Satisfaction with LMS, Perceived learning outcomes Before distribution, the questionnaire was validated by experts in educational evaluation and instructional technology to ensure content validity.

2. Semi-Structured Interviews

Qualitative data were collected through semi-structured interviews with key informants such as: Head of the PPG program, LMS administrators, Selected lecturers, Selected students, Interviews were conducted to explore: Experiences in implementing e-learning, Challenges and obstacles, Perceived strengths and weaknesses, Suggestions for program improvement. The interviews allowed participants to express their views more freely and provided rich contextual information that could not be captured through questionnaires.

3. Observation

Direct observations were carried out to examine real e-learning practices. The researcher

observed: Online classes and virtual meetings, Lecturer-student interactions, Utilization of LMS features, Online assessment activities. Observation data were recorded using structured observation sheets aligned with the CIPPO evaluation indicators.

RESULTS AND DISCUSSION

This study aimed to evaluate the implementation of e-learning in the Professional Teacher Education Program (PPG) at Manado State University using the CIPPO evaluation model. Data were collected from questionnaires, interviews, observations, and documentation studies involving PPG students, lecturers, and program administrators. The results are presented according to the five components of the CIPPO model: Context, Input, Process, Product, and Outcome. Each component is discussed in relation to relevant theoretical perspectives and previous research findings.

Context Evaluation

The context evaluation examined the institutional background, policies, and objectives related to e-learning implementation in the PPG program. The findings indicate that Manado State University has formally adopted e-learning as an integral part of its academic system. Institutional policies supporting digital learning have been established through university regulations and strategic plans. Most respondents (87%) agreed that e-learning implementation in the PPG program is aligned with national policies on digital transformation in education. Interview results revealed that the decision to implement e-learning was strongly influenced by the need to provide flexible learning opportunities for in-service teachers participating in the PPG program. The geographical distribution of participants across different regions of Indonesia also became a major consideration. Administrators stated that e-learning allows the program to reach a wider range of participants without requiring physical attendance. However, the study also found that the socialization of e-learning policies among lecturers and students has not been fully optimal. Approximately 28% of respondents reported that they were not sufficiently informed about detailed guidelines and standards of e-learning implementation.

The findings demonstrate that the contextual foundation of e-learning implementation in the PPG program is generally strong. The alignment between institutional policies and national education priorities supports the sustainability of the program. This result is consistent with Zhang et al. (2017), who emphasize that clear policy support is a key factor in successful e-learning adoption. Nevertheless, the limited dissemination of policies indicates a gap between formal regulations and practical understanding at the operational level. According to Stufflebeam and Coryn (2014), effective program implementation requires not only well-formulated policies but also strong communication and shared understanding among stakeholders. Therefore, improving policy socialization and communication strategies is necessary to strengthen the contextual readiness of e-learning implementation.

Input Evaluation

Input evaluation focused on the availability and adequacy of resources required for e-learning implementation. The results show that: 82% of respondents agreed that the university provides an adequate Learning Management System (LMS), 76% stated that internet facilities on campus are generally reliable 71% reported that learning materials are accessible through digital platforms. Despite

these positive findings, several limitations were identified. Only 63% of lecturers felt fully confident in their digital pedagogical skills. Interviews revealed that not all lecturers have received sufficient training in online instructional design and virtual classroom management. From the student perspective, infrastructure remains a challenge. Around 34% of students reported difficulties related to unstable internet connections, particularly those living in remote areas. Some students also experienced limitations in accessing adequate devices for online learning.

The input evaluation indicates that the basic technological infrastructure for e-learning in the PPG program is relatively adequate. The availability of LMS and digital learning resources provides a solid foundation for online learning. These findings support the argument of Martin et al. (2020) that infrastructure readiness is a fundamental requirement for successful e-learning implementation. However, the relatively low level of lecturer digital competence represents a critical issue. Koehler and Mishra's (2009) TPACK framework highlights that effective e-learning requires integration of technological, pedagogical, and content knowledge. Without sufficient training, lecturers may struggle to design engaging and interactive online learning experiences. Furthermore, unequal access to internet connectivity among students reflects the digital divide problem, which is frequently reported in developing countries. This condition can negatively affect learning equity and participation. Therefore, additional institutional support and alternative learning access strategies are required.

Process Evaluation

Process evaluation analyzed how e-learning was implemented in daily instructional practices. The findings reveal varied patterns of implementation across courses and lecturers. Positive aspects identified include: Regular use of LMS for distributing materials (91%), Online submission of assignments (88%), Use of virtual meetings for lectures (84%). However, more interactive learning practices were less frequently implemented: Only 58% of lecturers regularly used online discussion forums, 52% applied collaborative learning activities, 47% provided structured and timely feedback. Observation data confirmed that many online classes were still dominated by one-way delivery of materials rather than interactive engagement. Several lecturers tended to upload slides and assignments without facilitating deeper interaction. Students expressed that while online learning provided flexibility, some courses lacked clear instructions and active communication. Delays in feedback and assessment results were also reported as common problems. Discussion. The process evaluation results suggest that e-learning implementation in the PPG program is still largely at the level of basic utilization rather than pedagogical innovation. This finding is consistent with previous studies in Indonesian higher education that report limited use of interactive online learning strategies. Effective e-learning requires more than transferring face-to-face materials to digital platforms. Moore and Kearsley (2018) emphasize that interaction is the core element of quality online learning. The relatively low level of interaction found in this study indicates the need for professional development programs focusing on online pedagogy, instructional design, and digital assessment techniques. Improving the quality of learning processes is crucial because even with adequate infrastructure, e-learning will not be effective if instructional practices remain traditional and teacher-centered.

Product Evaluation

Product evaluation examined the immediate outcomes of e-learning implementation. The

quantitative data show generally positive results: 81% of students achieved satisfactory academic performance, 79% expressed satisfaction with the flexibility of online learning, 74% felt that e-learning helped them understand course materials, 77% agreed that online assessments were appropriate and transparent. Students appreciated the ability to access materials repeatedly and to learn according to their own schedules. Lecturers also reported that online submission systems made academic administration more efficient. However, some concerns were identified: 29% of students felt less motivated in fully online classes, 31% experienced difficulties in group collaboration, 27% believed that practical components were less effective online

The product evaluation indicates that e-learning in the PPG program has successfully supported learning achievement and academic performance. This supports the findings of Clark and Mayer (2016) that well-managed e-learning can produce learning outcomes comparable to conventional instruction. Nevertheless, the motivational and collaborative challenges reported by students highlight the limitations of online learning, especially for courses requiring practical and social interaction. These findings suggest that a blended learning approach might be more suitable for certain components of the PPG curriculum.

Outcome Evaluation

Outcome evaluation focused on the long-term impact of e-learning on participants' professional development. The findings show that: 86% of respondents believed that e-learning improved their digital literacy, 82% felt more confident in using technology for teaching, 79% stated that they were better prepared to implement online learning in their own schools, 83% believed that e-learning experiences contributed to their overall professional competence. Interviews with alumni revealed that many graduates have started to apply digital tools and online platforms in their classrooms. Several participants reported that their experience as online learners helped them become more innovative and adaptive teachers.

The positive outcomes demonstrate that e-learning in the PPG program has contributed significantly to the development of future teachers' digital competencies. This is an important achievement considering the increasing demand for technology-integrated teaching in Indonesian schools. The results align with Trust (2018), who argues that participation in online learning environments can enhance teachers' professional growth and technological readiness. The outcome evaluation confirms that e-learning is not only a delivery method but also a means of preparing teachers for 21st-century education.

Integrated Discussion

Overall, the evaluation results show that e-learning implementation in the PPG program at Manado State University is generally effective, particularly in terms of policy support, infrastructure availability, learning outcomes, and professional impacts. However, several areas require improvement, especially: Strengthening lecturer digital pedagogical competencies, enhancing interactive and student-centered online learning practices, providing more consistent feedback and assessment management, addressing infrastructure disparities among students, Developing clearer operational guidelines and standards. The application of the CIPPO model in this study proved to be highly useful for identifying both strengths and weaknesses across different dimensions. The model enabled a

comprehensive understanding of e-learning implementation from planning stages to long-term impacts.

CONCLUSION

Based on the findings, several practical implications can be proposed: Continuous professional development programs for lecturers on online pedagogy, Development of standardized e-learning guidelines for the PPG program, Improvement of LMS features to support collaboration and interaction, Provision of internet assistance or offline access alternatives for students, Adoption of blended learning strategies for practice-oriented courses. The evaluation confirms that e-learning in the PPG program at Manado State University has played a significant role in supporting flexible learning and improving teacher professional competence. However, to achieve optimal effectiveness, systematic improvements in instructional processes and human resource development are still required.

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