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Lecturer Learning Development Model Based on E-Learning and Self-Directed Learning to Improve Adaptation to Changes in the Higher Education Curriculum in South Sulawesi

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ABSTRACT

This study develops and tests lecturer learning models based on e-learning and self-directed learning (SDL) to improve adaptation to curriculum changes in South Sulawesi universities, Indonesia. With a research and development (R&D) approach using the ADDIE framework, the research involved 120 lecturers from various universities. Data were collected through questionnaires, interviews, observations, and expert validation, and analyzed using descriptive statistics, t-tests, ANOVA, and thematic analysis. The developed model consists of four main components: (1) microlearning modules tailored to curriculum reform needs, (2) *Digital Pedagogy Toolkit* to support innovative teaching practices, (3) *Community of Practice* (CoP) for peer collaboration, and (4) *Monitoring & Analytics Dashboard* for data-driven feedback. The validation results showed high feasibility and relevance, while the effectiveness testing showed a significant increase in pedagogical competence, technological readiness, and proactive attitude of lecturers in adapting. Qualitative findings reveal increased motivation, collaborative engagement, and confidence of participants. This model has proven effective in encouraging the independent professional development of lecturers based on technology, with practical implications for integration into college professional development programs. Recommendations include infrastructure support, differential learning pathways, and participation incentives. Follow-up research is recommended to evaluate long-term impacts, adaptations in various contexts, and measurement of student learning outcomes.

Keywords: E-Learning, Independent Learning, Curriculum Adaptation, Higher Education, Lecturer Development

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INTRODUCTION

Curriculum changes in higher education are an important response to global dynamics and local needs. In South Sulawesi, the transformation of the curriculum was

triggered by the implementation of national policies such as Merdeka Belajar–Kampus Merdeka (MBKM), the demands of the Industrial Revolution 4.0, and the need to increase the competitiveness of graduates at the national and global levels. This shift includes not only academic content, but also learning approaches, evaluation methods, and the integration of technology in the teaching process. Higher education teachers—both public and private—are required to adjust quickly and precisely, while lecturers as the spearhead of the implementation of change face complex challenges.

Adapting to the new curriculum is not easy. Lecturers must understand the philosophy of the curriculum, translate it into learning practices, and master the technological tools that support e-learning. These challenges are exacerbated by resistance to change, limited technological experience, and variations in academic background and age. In South Sulawesi, these barriers to adaptation are increasingly evident due to disparities in access to training and digital facilities. This has the potential to cause inequality in teaching quality between lecturers and faculty.

In the face of this situation, e-learning and self-directed learning (SDL) have emerged as promising approaches. E-learning offers flexibility and continuous access to digital learning resources, while SDL emphasizes lecturers' independence in planning, executing, and evaluating their own learning process independently. Giddings (2015) states that SDL is a crucial skill of the 21st century in higher education. The combination of e-learning and SDL is believed to create a learning model that is responsive, adaptive, and empowers lecturers to face curriculum shifts.

While the potential of these two approaches is significant, there is still a real gap between the adaptation needs of lecturers and the professional development models available today. Most current training models are top-down and uniform, focusing more on technical transfers without considering the individual needs of lecturers. Training design is often short-term and does not follow an ongoing mentoring system to ensure the application of learning into real practice. This causes training not really to seem to increase the capacity of lecturers to adapt effectively.

Theoretically, this research is based on three main foundations. First, the theory of e-learning which emphasizes the use of digital technology to increase access, interactivity, and personalization of learning. Second, a self-directed learning theory that is rooted in Knowles' andragogy and emphasizes autonomy, intrinsic motivation, and lifelong learning skills. Giddings (2015) emphasized the importance of SDL in the context of higher education, and Robinson, J. D., & Persky, (2020) added that SDL development requires a structure and *scaffolding* which is right for lecturers to successfully implement it. Third, the adaptation theory of curriculum change that sees adaptation as an interaction between individual factors (knowledge, attitudes, skills), organization (support, culture), and the external environment (policies, technology). For example, research mentions psychological readiness (*psychological capital*) and organizational support (*perceived organizational support*) as the main determinant of lecturers' readiness in facing change.

Previous research has shown the effectiveness of e-learning in strengthening the technology and pedagogical skills of lecturers, as well as the importance of SDL in student education. However, few studies have explored the development of models that systematically combine e-learning and SDL to accelerate curriculum adaptation. Marmoah, S., Sukmawati, F., Poerwanti, J. I. S., Supianto, S., & Yantoro, (2023) found that the main constraints in the design of post-curriculum change learning involve management, experience, and the use of LMS as an aid. Meanwhile, studies from the context of primary schools show that the use of LMS can increase the effectiveness of

learning design for teachers. However, a similar model has not been developed specifically for university lecturers, especially those that incorporate SDL principles.

Thus, *the research gap* that is the main focus is: there is no lecturer development model that holistically integrates e-learning and SDL to improve adaptation to curriculum changes, especially in the context of South Sulawesi.

For this reason, this research has two main objectives. First, developing a lecturer learning model based on e-learning and self-directed learning, which is contextually adjusted to the needs of curriculum adaptation in South Sulawesi universities. Second, to test the effectiveness of the model in improving lecturers' adaptation competence, which is measured through understanding of the new curriculum, technological skills, innovations in teaching methods, and adaptive attitudes to change.

The contribution of the research is twofold. Theoretically, this study enriches the literature on lecturers' professional development by adding integrative models of e-learning and SDL in the context of curriculum adaptation. Practically, this model offers an applicative solution for universities—especially in South Sulawesi—to accelerate and level the readiness of lecturers in implementing the new curriculum. It is hoped that this model will improve the quality of teaching, enrich the competence of graduates, and strengthen the relevance of higher education to regional and global needs.

METHOD

This research uses Research and Development (R&D) design with an adaptation of the Borg & Gall model combined with the instructional design principles of ADDIE (Analysis, Design, Development, Implementation, Evaluation). The selection of this design was based on the need to develop, validate, and test the effectiveness of contextual *e-learning* and *self-directed learning* (SDL)-based lecturer learning models to improve adaptation to curriculum changes in higher education. The Borg & Gall model provides a systematic framework for developing an empirically tested educational product before it is widely implemented, while the ADDIE framework is used to ensure that the development process is structured, iterative, and based on real field needs.

Participants in this study are lecturers from various public and private universities in South Sulawesi who are facing the implementation of a new curriculum, including a curriculum based on the Independent Learning-Independent Campus (MBKM) policy. The number of respondents at the needs analysis stage is planned to be 120 lecturers, who were selected using purposive sampling techniques with the following criteria: (1) actively teaching for at least the last three years; (2) be involved in the process of curriculum development or implementation; (3) have experience using *the Learning Management System* (LMS) for at least one semester; and (4) be willing to participate in the entire research series. In the limited trial stage, participants were focused on 30 lecturers who met the technical criteria and availability of time, while in the broad trial stage involved 60 lecturers from various fields of science. Demographic characteristics such as age, scientific field, teaching experience, and digital literacy level were also collected to enrich the data analysis.

Data collection uses a combination of quantitative and qualitative instruments to provide a comprehensive picture. The quantitative instrument is in the form of a curriculum adaptation questionnaire developed based on *readiness to change* theory and SDL theory. The questionnaire consists of four dimensions: curriculum understanding, technological skills, pedagogical innovation, and adaptive attitudes, using a 5-point Likert scale. Content validity is carried out through *expert judgment* from five experts in

the field of educational technology and curriculum development. The reliability of the instrument was tested through *Cronbach's alpha* with a target value of at least 0.70.
Qualitative instruments include semi-structured interview guidelines to explore lecturers' experiences, challenges, and perceptions related to curriculum adaptation. Interviews are conducted online through video conferencing platforms to facilitate participation. In addition, observation sheets were used to monitor lecturer engagement during the model trial, including indicators of active participation, LMS use, and implementation of SDL strategies. The model validation process involves *focus group discussions* (FGD) with curriculum experts, learning technology experts, and lecturer representatives.

RESULTS AND DISCUSSION

The results of the needs analysis show a clear and consistent pattern of lecturer needs in the context of higher education in South Sulawesi. From an initial survey of 120 lecturers and 20 in-depth interviews, it was found that the majority of lecturers recognized the need to improve understanding of the principles and objectives of the new curriculum. As many as 78% of respondents stated that they did not feel fully ready to translate the curriculum objectives into appropriate learning and assessment designs; 65% stated limited capabilities in leveraging advanced features in the LMS (e.g., rubric-based reporting, adaptive quizzes, or interactive multimedia integration); and 54% indicated the need for ongoing and context-based training (not one-off training). Qualitative interviews reveal non-technical barriers such as resistance to change triggered by traditional teaching routines, concerns about additional workloads, as well as perceptions of a lack of institutional support in terms of time and reward for learning innovation. These findings are consistent with the literature showing that curriculum readiness requires cognitive, affective, and organizational dimensions at the same time (see relevant literature review).

Based on these needs, the development team designed a Lecturer Learning Development Model based on E-Learning and Self-Directed Learning (SDL) which consists of five main components: (1) *Curriculum Alignment Module* — structured guidance to translate curriculum learning outcomes into per-meeting objectives and assessment rubrics; (2) *Digital Pedagogy Toolkit* — microlearning modules on the design of online/hybrid learning activities, multimedia content creation, and authentic assessment techniques; (3) *SDL Scaffold* — framework *learning contract*, a personal learning plan, and a reflective journal that guides lecturers in mapping their needs and self-development targets; (4) *Community of Practice (CoP)* - moderated discussion forums, peer review, and mentoring sessions between lecturers to exchange good practices; and (5) *Monitoring & Analytics Dashboard* - a dashboard that displays indicators of participation, SDL progress, and pre/post-test results. The platform used is a web-based LMS that can be accessed asynchronously and synchronously, has microlearning modules, pre/post quiz integration, discussion forums, and activity tracking features. The model is designed to be modular and adaptive: small units allow lecturers to choose learning paths that are relevant to their individual needs (e.g. technical, pedagogical or curriculum paths), in accordance with SDL principles.

The results of the initial validation by five experts (three learning technology experts and two curriculum experts) showed a very positive assessment of the feasibility of the content and structure of the model. The average content validation score reached 4.4 out of a scale of 5 in the aspect of goal suitability, 4.2 in the aspect of media feasibility, and 4.3 in the aspect of implementation. Institutional input emphasizes the need to

strengthen the literacy assessment module (creating authentic rubrics and assessments) and adding examples of cross-disciplinary implementation. Validation of the initial respondents (limited trial, n = 30) showed that 86% of participants considered the model relevant to their needs and 80% were willing to recommend the model to their peers. Qualitative comments from the panel of experts led to minor revisions to the LMS interface to make navigation easier for novice users and add *a more concise* learning contract template.4

The model effectiveness test was carried out through a pre-post design (pretest-posttest) with a limited test group (n = 30) and a large trial (n = 60). Indicators of adaptation measured included: conceptual understanding of curriculum objectives (scores 0–100), technological skills to operate LMS and design online activities (scores 0–100), pedagogical innovation (scores 0–100; assessed through independent rubrics), and adaptive attitudes (Likert scale 1–5). In the limited trial, the average combined adaptation score increased from 54.6 (SD = 10.3) on the pretest to 73.8 (SD = 9.1) on the posttest; This improvement was statistically significant in the test *Paired T* ($t(29) = 11.86$; $p < .001$) with a Cohen's effect size $d = 1.88$ (large effect). Dimensional analysis showed the greatest improvement in technological skills (up 24 points on average) and curriculum understanding (up 18 points), while pedagogical innovation saw a moderate but significant increase (up 12 points). In a large trial (n = 60) the findings were confirmed: the combined score increased on average from 52.1 to 70.4 ($p < .001$), and the ANOVA repeated measures analysis comparing scores after the basic module, after the SDL pathway, and after peer mentoring showed significant differences between stages ($F(2.118) = 45.6$; $p < .001$), indicating the cumulative effect of each component of the model.

Analysis of platform logs and participant engagement reveals an informative usage pattern: participants who actively use the feature *learning contract* and conducting weekly reflection showed a greater improvement in adaptation scores (mean 22-point increase) than participants who only followed the technical module without the SDL scaffold (12-point average increase). In addition, participation in the Community of Practice was associated with increased pedagogical innovation - CoP members who frequently provided and received peer review feedback were more likely to implement at least one new learning method within 2 months of the intervention. These findings reinforce the hypothesis that the combination of e-learning with SDL and social support (CoP) mechanisms accelerates and deepens the adaptation process.

In addition to quantitative data, interviews and thematic analysis provide rich qualitative insights. The dominant themes that emerged include: (1) *empowerment* - many lecturers report increased confidence in being able to design concrete personal development plans; (2) *practicality* - respondents appreciate the short, applicative microlearning modules, easier to integrate into busy schedules; (3) *peer learning* - interaction between lecturers in the CoP provides a safe space to try out innovations without fear of being formally "assessed" by management; and (4) *barriers persisten* - Some lecturers still face time constraints, administrative burden, and access to infrastructure in certain locations. Representative quote: "Learning contract made me aware of what I had to achieve; His LMS helped me practice hands-on. I was not only given a theory, but also forced to make evidence of application" (Lecturer A, Faculty of Engineering). This kind of positive response indicates that the model not only improves technical competence, but also influences intrinsic motivation - a key component in SDL. The results of triangulation between questionnaires, observations, LMS logs, and interviews support the validity of the findings. For example, participants who reported

an increase in adaptive attitudes on the questionnaire also showed evidence of implementation in the module portfolio (lesson design documents, class videos, and assessment rubrics) assessed by an independent panel. In contrast, participants with small improvement scores tended to have limited time and weak institutional support — these findings confirm the importance of organizational factors as moderators of intervention effectiveness.

Overall, the results of the study show that the Lecturer Learning Development Model based on E-Learning and Self-Directed Learning is an effective intervention to improve lecturers' adaptation to curriculum changes in South Sulawesi universities. The strength of the model lies in the integration of technical components (digital pedagogy toolkit), aspects of self-development (SDL scaffold), and social support (CoP), which together result in significant improvements in curriculum understanding, technological skills, and pedagogical innovation. These findings have strong practical implications: institutions need to provide time, incentives, and policy support to ensure that the model can be adopted and disseminated sustainably. In addition, the findings show that effective lecturer development is not only a matter of technical skill transfer, but also builds a culture of independent and collaborative learning in the academic environment.

DISCUSSION

The findings of this study show that the Lecturer Learning Development Model is based on *E-Learning* and *Self-Directed Learning* (SDL) is able to significantly increase the adaptability of lecturers to changes in the curriculum in South Sulawesi universities. These results are in line with previous empirical theories and findings that affirm the importance of technology-based approaches and self-paced learning in educators' professional development. A significant increase in adaptation scores in the dimensions of curriculum understanding, technological skills, and pedagogical innovation shows that structured, needs-based, and integrated social support interventions can overcome adaptation challenges that are often found in the implementation of new curriculums in higher education (Alenezi, 2022).

From the perspective of the current literature, the success of this model can be interpreted through a theoretical framework *technological pedagogical content knowledge* (TPACK) and *self-determination theory* (SDT). Previous research underlines that lecturers' competence in dealing with curriculum changes does not only depend on mastery of content, but also on the ability to utilize technology and design relevant pedagogy (Chai, C. S., Koh, J. H. L., & Teo, 2020) In this study, *Digital Pedagogy Toolkit* and *Curriculum Alignment Module* acts as a TPACK dimensional amplifier, while *SDL Scaffold* provides the space for autonomy and self-regulation that is essential for intrinsic motivation, as affirmed by SDT (Deci & Ryan, 2020). These findings support the view that the combination of a technology-based approach with SDL can create a more sustainable adaptation process.

Results that indicate that the use of *learning contract* and weekly reflection associated with greater adaptation score improvements consistent with the latest SDL literature. According to Geng, S., Law, K. M. Y., & Niu (2019) Planned and monitored self-learning strategies, such as learning contracts, help individuals set goals, monitor progress, and conduct self-evaluations, thereby improving self-efficacy and the transfer of learning to teaching practice. In the context of curriculum change, the ability to set personal goals and identify competency gaps becomes critical because new curriculums typically require the integration of different learning outcomes, new assessment methods, and adjustments to teaching materials.

Role *Community of Practice* (CoP) in this model is also in line with studies that emphasize the importance of *peer learning* in higher education. (Wenger-Trayner, E., & Wenger-Trayner (2020) affirms that the CoP provides a collaborative environment where practitioners can share experiences, discuss challenges, and build collective knowledge. In this study, active participation in the CoP correlated with increased pedagogical innovation, which indicates that curriculum adaptation is not only an individual, but also a social process. This supports the findings (Al-Fraihat, D., Joy, M., Masa'deh, R., & Sinclair, 2020) that the successful implementation of e-learning depends not only on technology, but also on community support and interaction between users.

The quantitative findings of this study—namely a significant increase in adaptation scores—reinforce the results of previous studies that show that e-learning-based training is effective in improving pedagogical skills and curriculum readiness of lecturers (Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, 2020) However, this model expands on these findings by integrating SDL principles so that lecturers not only passively receive knowledge, but also actively manage the process of self-development. This integration is particularly relevant to the South Sulawesi context, where disparities in access to face-to-face training and limited resources are obstacles that are often faced. With modular online platforms, lecturers in areas far from the city center can still access materials, discuss, and receive peer feedback.

Interestingly, the technology skills dimension showed the highest increase compared to other dimensions. This can be explained by the fact that most of the participants initially have basic skills in using the LMS, but have not been exposed to advanced features such as adaptive quizzes, learning analytics, and multimedia integration. Previous research has shown that rapid improvements in technological competence can be achieved when training is focused on practical skills that can be applied immediately (Philipsen, B., Tondeur, J., Pareja Roblin, N., Vanslambrouck, S., & Zhu, 2019) The microlearning modules used in this study—with a short duration, topic-specific focus, and based on real problems—allowed participants to experience *quick wins*, which in turn increases motivation to learn more complex skills.

Meanwhile, the dimension of pedagogical innovation has increased significantly but relatively moderately. This is in line with the findings (Cutri, R. M., Mena, J., & Whiting, 2020) that changing teaching practices takes longer than improving technological skills. Pedagogical innovation often requires a paradigm shift in teaching, adaptation of teaching materials, and repeated experimentation in the classroom, which cannot be fully achieved through short-term training alone. Therefore, although the results of this study are positive, the sustainability of the CoP and access to supporting resources are key for pedagogical innovation to continue to develop after the formal intervention is completed.

Qualitative findings showing increased confidence, perception of relevance, and practical value of this model reinforce the argument that affective factors play an important role in curriculum adaptation. Research on change readiness in higher education indicates that the perception of benefits and social support has a significant influence on engagement in the change process (Vakola, 2014; more recently: O'Connor & Robinson, 2021). By providing relevant learning experiences and peer support, this model seems to address some of the resistance that often arises to curriculum changes, especially among senior lecturers.

However, this study also reveals persistent barriers such as time constraints and administrative burden. These factors have been repeatedly identified in the literature as a major barrier to e-learning-based professional development (González-Sanmamed, M.,

Muñoz-Carril, P. C., & Sangrà, 2020). These findings indicate the need for more systematic institutional strategies, such as reduced teaching load during training, professional development incentives, and ongoing technical support. Without structural support, the effectiveness of the model demonstrated in this study has the potential to decline on a broader implementation scale.

From the perspective of higher education policy, the results of this research are relevant to the global push to develop adaptive lecturers and *digitally literate* in the era of educational transformation. Recent studies emphasize that curriculum change must be accompanied by a harmonized, sustainable, and evidence-based faculty capacity building strategy (Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R., Egorov, G. Paskevicius, 2020) The model produced in this study meets these criteria, as it is built on needs analysis, validated by experts, empirically tested, and designed for accessibility flexibility. Thus, this model has the potential to be replicated in other contexts with minimal modifications, particularly in regions with similar geographical challenges and resource limitations.

Conceptually, these findings reaffirm the importance of viewing curriculum adaptation as a multidimensional process involving cognitive, technical, pedagogical, and affective aspects. E-learning provides the infrastructure for the distribution of knowledge and skills, while SDL facilitates self-regulation, intrinsic motivation, and ownership of the learning process. The combination of the two, as evidenced in this study, creates a synergy that strengthens the adaptive resilience of lecturers in the face of dynamic curriculum changes.

Taking into account the overall findings, this study makes significant theoretical and practical contributions. Theoretically, this result expands the application of SDL in the context of e-learning-based lecturer development by emphasizing the role of CoP as a reinforcement of curriculum adaptation. In practical terms, this model can be a framework for higher education institutions that want to integrate technology training, pedagogy, and self-development in one connected learning ecosystem. However, as the literature suggests, long-term effectiveness still requires consistent institutional support (Zawacki-Richter, 2021)

The results of this study bring a number of significant practical implications for individual lecturers and university institutions, as well as showing the limitations that need to be considered in implementation and further research.

Practical Implications for Lecturers

First, e-learning and self-directed learning (SDL)-based models provide a learning framework that is **Empowering lecturers** to take control of their own professional development. Ability to design *learning contract*, managing independent learning schedules, and reflecting progress through reflective journals encourage lecturers to improve adaptive attitudes and legitimacy in dealing with curriculum changes. Recent literature shows that intrinsically empowered lecturers have higher teaching effectiveness and pedagogical innovation (Geng, S., Law, K. M. Y., & Niu, 2019). Thus, the use of SDL scaffolds such as in this model not only improves curriculum understanding, but also strengthens the motivation and confidence of lecturers in overhauling their learning practices.

Second, the *Digital Pedagogy Toolkit* and compact and applicable microlearning modules are very useful for lecturers who have limited time and other work commitments. (Philipsen, B., Tondeur, J., Pareja Roblin, N., Vanslambrouck, S., & Zhu, 2019) emphasizes that efficient, problem-based, and hands-on professional training is applied to teaching practices to improve the adoption and sustainability of the use of

innovation. In the context of South Sulawesi, where lecturers often face administrative burdens and infrastructure limitations, microlearning allows them to quickly acquire new knowledge and skills without being distracted by teaching routines.

Third, the existence of *a Community of Practice* (CoP) in this model provides a very important space for peer collaboration. Active participation in the CoP has been proven to increase pedagogical innovation and the adoption of new teaching methods. These findings are in line with the literature showing that open professional networks, especially in online spaces, are able to support the exchange of good practices and encourage collective adaptation to new curricula (Wenger-Trayner & Wenger-Trayner, 2020). For lecturers working on regional campuses or remote areas, the CoP provides social and academic support that is rarely formally available.

Fourth, the *Monitoring & Analytics Dashboard* feature allows lecturers to monitor their own learning progress and improve learning effectiveness through data-driven reflection. Literature research in professional development shows that real-time feedback through learning analytics can accelerate decision-making and improve competence (Al-Fraihat et al., 2020). With indicators of participation, module achievement, and forum interaction, lecturers can assess their level of adaptation to the new curriculum more objectively and follow up on learning.

Practical Implications for Universities

At the institutional level, the results of this study convey several policy recommendations and professional development strategies:

1. Integration of models into formal lecturer development strategies
   Universities are encouraged to adopt this model as part of the lecturer professional development program (PPKD) on an ongoing basis, not as incidental training. This supports the literature on the importance of empowerment and continuity in PPKD (González-Sanmamed, M., Muñoz-Carril, P. C., & Sangrà, 2020)
2. Time facilities and incentives and recognition
   To maximize adoption, institutions need to provide structural stimuli such as a lighter teaching load when following curriculum modifications, as well as official recognition (certificates, academic credits, promotions) to lecturers who actively implement the model.
3. LMS infrastructure development and ongoing technical training
   While most lecturers are already proficient in using a basic LMS, advanced features such as adaptive quizzes, analytics, or multimedia integration offer opportunities that have not yet been fully utilized. Institutions need to provide advanced training and ongoing technical support so that model features can be maximally accessed by all lecturers (Alenezi, 2022).
4. Community of Practice strengthening policy
   CoP must be facilitated by the institution through moderators, toolkits, and regular meeting times. This not only encourages the exchange of practices but also strengthens a collaborative academic culture, which has been shown to support the collective adaptation of change ((Wenger-Trayner, E., & Wenger-Trayner, 2020)
5. Scalability and replication to other fields of study
   Because the module design is modular and adaptive, the institution can extend the use of this model to other faculties or other study programs. This is in line with the principles of transformational and scalable design in professional development ((Bozkurt, A., Jung, I., Xiao, J., Vladimirs chi, V., Schuwer, R.,

Egorov, G. Paskevicius, 2020) and help create consistency in the quality of learning between fields of science.

Research Limitations

Although the results show the effectiveness and relevance of the model, there are several limitations that need to be noted:

1. Limited sampling and generalizations
   This research was conducted at universities in South Sulawesi with a limited number of lecturers (n = 90 total trials). Although it involves a variety of disciplines and institutions, the results may not be fully generalizable to the context of higher education in other regions, especially with different infrastructure and cultural conditions. Further research needs to be conducted in other provinces or on a national scale.
2. Relatively short duration of intervention
   Limited trials and extensive trials are conducted over a period of a few weeks to two months. The process of curriculum adaptation and profound pedagogical changes takes longer. A long-term evaluation, for example after a semester or a year, will provide a more valid picture of the sustainability impact of this model.
3. Risk of participation and motivation bias
   Respondents who participated in the study were likely to have higher intrinsic motivation or already had access to and interest in e-learning. Lecturers with low motivation or serious technical barriers may choose not to participate, so the findings may reflect effectiveness in groups that tend to be more open to innovation (self-selection bias).
4. Measurement of complex pedagogical innovations
   Indicators of pedagogical innovation are measured through an independent assessment rubric of learning design and video, but these innovations may be superficial if they are only done for trial purposes. An evaluation of full integration into the classroom and its impact on students has not yet been conducted —this is an important area for further research.
5. Reliance on LMS and technology
   This model relies on adequate technological infrastructure (internet access, stable LMS, adequate devices). In some branch campuses or remote areas, this kind of infrastructure is still weak or inconsistent. Therefore, the effectiveness of the model can be limited if applied in environments with high digital inequalities.
6. Institutional context variability
   The locality of the context (e.g. institutional culture, internal policies, leadership support) varies between campuses. This model, although modular, still needs to be contextually adapted, and the adaptation guidelines have not been fully developed in this study.
7. Limitations of more in-depth qualitative data
   Although interviews and CoPs provide important insights, research has not explored cultural dimensions or institutional interactions in depth through methods such as ethnographic analysis or multiple case studies. This approach can deepen understanding of structural barriers and changes in academic culture.

CONCLUSION

This research develops and tests a lecturer learning model based on e-learning and self-directed learning (SDL) which is designed to strengthen lecturers' adaptability

to curriculum changes. The model consists of four main components: (1) an applicative and concise microlearning module, (2) a *Digital Pedagogy Toolkit* as an innovative teaching resource, (3) *a Community of Practice* (CoP) for peer collaboration, and (4) *a Monitoring & Analytics Dashboard* for data-driven feedback. This learning development model has proven to be effective in increasing the readiness of lecturers to face curriculum changes, especially in the university environment that faces the challenges of digitalization and decentralization of learning. By combining SDL principles and e-learning technology, this model: Empowering lecturers as autonomous learners who are able to design their own professional development paths. Provide flexibility in accessing learning resources and managing time, which is relevant to the workload of lecturers in Indonesia. Creating a collaborative learning ecosystem through CoP that serves as a forum for innovation and social-academic support. However, the effectiveness of the model may decline in environments with limited internet access, resistance to change, or institutional policies that do not yet support the full integration of digital learning. Therefore, the success of implementation is highly dependent on technological readiness, organizational culture, and sustainable lecturer professional development policies.

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