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UTILIZING AN SDL APPROACH IN DESIGNING A GAMIFICATION-BASED MOOC TO ENHANCE AUTONOMOUS LEARNING

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ABSTRACT

Aim/Purpose	This research explores the design and development of a gamified Massive Open Online Course (MOOC) aligned with the Self-Directed Learning (SDL) approach. The focus is addressing challenges to foster autonomous learning within the MOOC context.
Background	MOOCs have emerged as a prominent platform for global education; however, they face ongoing challenges, particularly in their capacity to facilitate SDL effectively. Despite their popularity, there are gaps and limitations in existing MOOC designs that hinder the cultivation of autonomous learning. This research seeks to bridge these gaps and enhance MOOCs' ability to support SDL through systematic design improvements and the strategic integration of gamification elements.
Methodology	In this study, we adopt the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) instructional design model as the foundational framework. It begins with the Analysis phase, which includes a comprehensive literature review and a questionnaire administered to 41 undergraduate students to

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	gain insights into learner preferences. The Design phase follows, where we develop an innovative MOOC framework enriched with gamification elements. This framework is then implemented and tested during the Development and Implementation phases. Finally, during the Evaluation phase, field testing of this framework is conducted with a limited-scale participant group.
Contribution	This research makes a substantial contribution to the academic field and profession by systematically addressing identified gaps and limitations in MOOC design. It delves into the crucial role of MOOCs within the self-learning environment, emphasizing their significance in catering to self-directed learners. Additionally, this research sheds light on the transformative impact of gamification on MOOCs. By showcasing how the ADDIE model can be effectively utilized, this research not only addresses existing challenges but also advocates for the optimization of MOOCs to better serve and empower self-directed learners.
Findings	Our study has unveiled a transformational shift in MOOCs. Through the effective integration of gamification, we observed changes in learner engagement, motivation, and the cultivation of SDL behaviors. Participants experienced a substantial increase in their enthusiasm for learning, which led to improvements in their ability to take charge of their learning journeys. This was not merely a superficial enhancement but a profound shift that left participants consistently expressing heightened satisfaction and a deep sense of accomplishment.
Recommendations for Practitioners	Our findings strongly advocate for the adoption of a systematic approach to MOOC design. Practitioners should consider leveraging the ADDIE instructional design model, as demonstrated in our study, to elevate MOOCs to new heights. By strategically incorporating gamification elements, MOOCs can become powerful tools for enhancing learner engagement and fostering autonomous learning. This transformation will not only benefit individual learners but also contribute to the broader landscape of online education.
Recommendations for Researchers	Researchers should delve deeper into the realm of gamification within MOOCs. The potential for refining and optimizing specific gamification strategies, especially within the structured framework of the ADDIE model, is an area ripe for exploration. Additionally, there is a need for nuanced research that delves into tailoring MOOCs to cater to self-directed learners' unique needs. By doing so, we can continue to drive the boundaries of knowledge in online education and offer more effective solutions to learners worldwide.
Impact on Society	Our study transcends the confines of academic inquiry and holds implications for society. By harnessing the power of gamification within MOOCs, we can enhance online education. This means not only making education more accessible but also rendering it more engaging and effective on a global scale. Our findings have the potential to democratize learning, empower learners, and ultimately contribute to a more educated and skillful society.
Future Research	Future investigations should embark on a journey to uncover the long-term effects of gamification in MOOCs. Moreover, exploring the scalability of these approaches and their influence on diverse learner populations is paramount. As we move forward, the focus should remain on refining and expanding our understanding of how gamification, within the structured context of the ADDIE instructional design model, can continually optimize the landscape of online education.

Keywords MOOC, gamification, autonomous learning, self-directed learning

INTRODUCTION

The rise of Massive Open Online Course (MOOC) has been a transformative force in education, offering the tantalizing potential of universal access to knowledge (e.g., Czerniewicz et al., 2017; Duan, 2022; Gameel & Wilkins, 2019; Liyanagunawardena et al., 2019). These digital platforms have made significant strides in breaking down traditional barriers to learning, allowing individuals from diverse backgrounds to engage in education. Such democratization aligns with the principles of equitable access, as advocated by leading educational theorists (Ahmad et al., 2022; Wu & Wang, 2022). Furthermore, MOOCs have emerged as crucibles for pedagogical experimentation, providing educators with an opportunity to explore a variety of innovative techniques and technologies (Azevedo & Marques, 2017; Goopio & Cheung, 2021; Teixeira et al., 2019). This experimental ethos holds the promise of redefining the future of education, making it more adaptable to the evolving needs of learners.

Nonetheless, as a growing body of research has revealed, the MOOC landscape is fraught with challenges. A prominent concern revolves around the high attrition rates observed in many MOOCs (Khalil & Ebner, 2014; Liu et al., 2019; Sari et al., 2020). Despite initial enthusiasm, a substantial number of participants drop out before completing the course, casting doubt on the efficacy of MOOCs in sustaining learner engagement over time. This dropout phenomenon is closely entwined with learner motivation and engagement issues, as evidenced by studies showing that many MOOC participants struggle with maintaining their enthusiasm (Goopio & Cheung, 2021; Onah et al., 2014). Moreover, MOOCs often adhere to standardized formats, including video lectures and automated quizzes, which may not align with participants' diverse learning preferences and needs (Gameel & Wilkins, 2019; Shah & Khanna, 2022). This one-size-fits-all approach can hinder the development of personalized and interactive learning experiences. While MOOCs offer substantial potential, they also present challenges that necessitate nuanced solutions grounded in a deep understanding of the complex interplay of factors shaping online education.

In the context of MOOCs, autonomous learning is a skill that empowers individuals to independently control and direct their educational journeys (Deci & Ryan, 2000; Knowles, 1968; Ryan & Deci, 2006). However, many MOOCs still rely on structured and prescriptive approaches, limiting opportunities for learners to develop their autonomous learning skills (Zhu, 2021, 2022). Research has shown that aligning MOOCs with SDL principles can offer benefits such as increased learner motivation, the development of self-regulated learning behaviors, and improved critical thinking and problem-solving skills (Ivone & Jacobs, 2022; Khotimah et al., 2019; Khulaifiyah et al., 2021; Zhu, 2022; Zhu et al., 2020), highlighting SDL's transformative potential. Despite these advantages, MOOCs face challenges like high dropout rates (Goopio & Cheung, 2021), and difficulties in maintaining learner engagement represent significant hurdles in the path of Self-Directed Learning (SDL) (Agonács et al., 2020; Liu et al., 2019; Sari et al., 2020; Zhu & Doo, 2022). These challenges raise questions about the scalability and effectiveness of MOOCs as an educational delivery method. However, ongoing efforts are underway to harness the potential of SDL in MOOCs. More research is needed to explore SDL in online environments, evaluate intervention strategies, and develop instructional models that align with autonomous learning principles, ultimately unlocking SDL's transformative potential in MOOCs.

Gamification, a concept entailing the incorporation of game elements into non-game contexts (Landers, 2014; Ofosu-Ampong et al., 2020; Woodcock & Johnson, 2018), has emerged as an interesting avenue for addressing some of the multifaceted challenges encountered within MOOCs. Within this framework, game elements such as points, badges, leaderboards, and narratives have been suggested as instruments with the potential to weave an immersive and interactive tapestry of learning experiences within the MOOC landscape. However, it is important to underline that the empirical underpinnings of gamification's efficacy within MOOCs are currently relatively scant, thus necessitating a more thorough and extensive exploration. While existing research, often drawn from di-

verse educational settings, has showcased the positive impact of gamified elements on learner engagement and motivation (Fiş Erümit & Karakuş Yılmaz, 2022; van Roy & Zaman, 2018; Welbers et al., 2019), the applicability and nuances of these findings within the distinctive sphere of MOOCs remain a subject of inquiry. The dearth of empirical studies dedicated specifically to MOOCs underscores the pressing need for comprehensive investigations to elucidate the extent to which gamification can effectively tackle the intricate challenges these online courses face, ultimately promoting a deeper understanding of its potential and limitations in reshaping the future of MOOCs.

While previous research has recognized the potential of gamification to enhance learner engagement, motivation, and outcomes within the educational landscape (Bovermann & Bastiaens, 2020; Puig et al., 2023; Ramansyah et al., 2023; van Roy & Zaman, 2018), there remains a substantial gap in our understanding of its effective integration into MOOCs. Existing studies have primarily explored the use of gamification elements in traditional educational settings, but their application within MOOCs, particularly concerning the promotion of SDL, has been largely uncharted territory (Agonács et al., 2020; An et al., 2021; Aparicio et al., 2019; Cheng, 2023; Supriyono et al., 2020; Torres-Toukoumidis et al., 2021; Zhu, 2021). Furthermore, prior MOOC research has consistently identified challenges related to high dropout rates, limited learner engagement, and a lack of personalized learning experiences (Goopio & Cheung, 2021; Liu et al., 2019; Sari et al., 2020). This research highlights the critical need for a gamification-based MOOC that addresses longstanding issues and fosters essential SDL skills. With the rapid evolution of digital learning environments, bridging these gaps has become imperative.

This research aims to create a gamified MOOC to boost autonomous learning by integrating gamification elements. This addresses engagement, motivation, and autonomy challenges in a digital SDL context. Through a review of our research findings, we aim to shed light on the effectiveness of the interventions employed and their implications for enhancing the overall SDL experience. Furthermore, we explore the broader impact of our research on the landscape of digital education, offering insights into potential future directions in this field.

LITERATURE REVIEW

MOOCs and Autonomous Learning

MOOCs have revolutionized education by offering global accessibility to learners (Al-Imarah & Shields, 2019; Duan, 2022; Liyanagunawardena et al., 2019; Mellati & Khademi, 2020). Despite their potential for democratizing education, the challenge lies in ensuring active learner engagement and autonomy (Shah & Khanna, 2022; Tang, 2021). As a result, MOOCs have gained recognition for enabling learners from diverse backgrounds to access high-quality educational content and resources. However, the promise of MOOCs as democratizing tools is accompanied by a significant challenge: how to ensure that learners actively engage with course content and take charge of their learning journey. The concept of autonomous learning, rooted in educational theory (Deci & Ryan, 2000; Johnson & Davies, 2014; Knowles, 1968; Merriam, 2001; Ryan & Deci, 2006), becomes pivotal in addressing this challenge, emphasizing self-direction and critical thinking. However, MOOCs often face high attrition rates, emphasizing the need for enhanced learner motivation and course material design (García Espinosa et al., 2015; Goopio & Cheung, 2021; Sari et al., 2020). Research has also highlighted the importance of learner motivation, self-regulation, and the design of engaging course materials in MOOCs (Chen & Oakley, 2020; Doherty et al., 2015; Tang & Qian, 2022). Furthermore, the role of peer interaction and support in MOOCs has been explored, demonstrating their potential to enhance autonomous learning (Jiang & Peng, 2023; Zhu et al., 2020). Despite these insights, there is a notable gap in the literature regarding the integration of gamification into MOOCs to promote autonomous learning via SDL. While gamification has shown benefits in motivation and engagement (Borrás-Gené et al., 2019; Jarnac de Freitas & Mira da Silva, 2023), its specific application in MOOCs and its impact on fostering autonomous learning demand further exploration.

Gamification in Education

Gamification has emerged as a dynamic and transformative concept in education (Landers, 2014; Ofosu-Ampong et al., 2020; Woodcock & Johnson, 2018) that integrates gaming elements into non-game environments, especially education, to enhance engagement (Puig et al., 2023; Schöbel et al., 2020). Rooted in Self-Determination Theory (SDT) (Deci & Ryan, 2000; Deci et al., 1996), gamification aligns with human needs for autonomy and competence (Boekaerts & Cascallar, 2006; Hu & Zhang, 2017; Johnson & Davies, 2014). It holds the potential to create dynamic, engaging, and autonomous learning environments. Gamification's multifaceted benefits include heightened engagement, achievement motivation, and autonomous learning support (Schöbel et al., 2020; Woodcock & Johnson, 2018). By creating dynamic learning environments where learners actively participate and compete, gamification can foster a sense of accomplishment, encouraging students to strive for personal growth and achievement (Afrilyasanti & Cahyono, 2022; Bovermann & Bastiaens, 2020; Puig et al., 2023). Furthermore, gamification's motivational impact is crucial for fostering autonomous learning via SDL. However, research gaps exist, particularly in the nuanced application within MOOCs and its impact on SDL. While studies hint at motivation and engagement benefits (Bovermann & Bastiaens, 2020; Fiş Erümit & Karakuş Yılmaz, 2022; van Roy & Zaman, 2018), deeper investigation is needed to optimize gamification's support for SDL in MOOCs.

SDL in Education and its Synergy with Gamification in MOOC

An SDL is an educational approach that empowers learners to take control, granting autonomy over their learning processes (Deci & Ryan, 2000; Knowles, 1968; Merriam, 2001; Ryan & Deci, 2000, 2006). It emphasizes the pivotal role of students as active participants, allowing them to set objectives, choose resources, and self-regulate their progress. The benefits of SDL extend beyond just acquiring knowledge; it fosters critical thinking, problem-solving skills, and a profound sense of ownership over one's education (Boekaerts & Cascallar, 2006; Johnson & Davies, 2014; Supriyono et al., 2020). SDL is valuable for adaptable and lifelong learning. Integrating gamification with SDL in MOOCs is an innovative approach that motivates learners through incentives and rewards, aligning with SDL principles in the digital era (Deci & Ryan, 2000; Ryan & Deci, 2006). The potential synergy between these two concepts is at the core of this research, as it explores how gamification-based MOOCs can effectively promote autonomous learning through an SDL approach (Agonács et al., 2020; Zhu et al., 2020; Zhu & Doo, 2022). Additionally, it is essential to consider the benefits and drawbacks of incorporating gamification in MOOCs. The benefits are multifaceted, with gamified elements enhancing learner engagement, motivating consistent participation, and providing clear feedback on progress (Antonaci et al., 2019; Borrás-Gené et al., 2019; Cheng, 2023; Ramansyah et al., 2023; Torres-Toukoumidis et al., 2021). However, it is crucial to acknowledge potential drawbacks, including the risk of overemphasizing extrinsic motivation through rewards and the possibility of superficial, task-oriented learning (Duan, 2022; Mellati & Khademi, 2020). Understanding these benefits and drawbacks is crucial when designing gamified MOOCs that aim to promote autonomous learning through the SDL approach.

The Current Research on Design Principles for Gamified MOOC: A Theoretical Framework

This study on design principles for a gamified MOOC firmly centers on the SDL approach, which takes the forefront in our literature review. This approach is the key foundation for our exploration, rooted in a robust theoretical framework. Within this framework, the strategic application of design principles emerges as a critical element in shaping gamified MOOCs that seamlessly align with our overarching goal: to foster autonomous learning through the SDL approach. To establish a solid theoretical foundation for our study, we draw upon well-established educational theories, with a primary focus on Self-Determination Theory (SDT) by Deci and Ryan (2000) and Ryan and Deci (2000, 2006), gamification theory (Landers, 2014), and various MOOC design theories (Chen & Oakley, 2020; Tang & Qian, 2022; Zhu, 2022). SDT, in particular, is instrumental in our research. It posits

that individuals are intrinsically motivated when their fundamental psychological needs for autonomy, competence, and relatedness are effectively met. Within our exploration, we harness the power of SDT to invigorate learners' sense of competence and autonomy through the strategic integration of gamification elements into MOOC design. Our ultimate ambition is to cultivate and nurture intrinsic motivation, as advocated by Deci and Ryan (2000), thus promoting SDL guided by the SDT approach. Our research seamlessly integrates SDL principles and gamification theory to construct a holistic framework for MOOC design. We explore how game elements can enhance learner engagement and motivation while aligning with SDL principles. Our primary focus is on harmoniously promoting autonomous learning through the intersection of gamification, SDL, and MOOC design. This multidimensional perspective contributes to the advancement of online education by empowering learners to take control of their educational journey.

METHOD

SYSTEM DESIGN

The research strategically employed the Analysis, Design, Development, Implementation, Evaluation (ADDIE) model to ensure a systematic and effective approach to the development and evaluation of our gamified MOOC platform. The decision to utilize ADDIE was driven by its recognized efficacy in instructional design (Richey & Klein, 2014), particularly in accommodating diverse educational needs and fostering engagement. In the initial Analysis phase, we meticulously assessed the specific learning objectives and identified the needs of our target audience, laying the groundwork for subsequent phases. As we transitioned to the Design phase, our focus was on crafting the platform's architecture and meticulously planning its user interface, functionality, and overall structure to align seamlessly with our educational objectives. Subsequently, during the Development phase, equal emphasis was placed on designing the course content. Here, we curated and structured the learning materials with precision, aiming to optimize engagement and facilitate effective learning experiences for our audience. Through these strategic steps, the application of the ADDIE model ensured a methodological approach to platform development, ultimately enhancing the educational experience for undergraduate Informatics Technology students at Universitas Negeri Malang (UM), Indonesia.

Analysis phase

Our research started with a comprehensive Analysis phase, which included an extensive literature review and a thorough needs assessment of Informatics Technology students. To understand their specific language learning needs and preferences, we crafted a questionnaire adapted from Shah and Khanna (2022). This questionnaire aimed to unearth insights that would serve as the foundation for our gamified MOOC. The Analysis phase not only identified needs but also precisely defined them, providing a clear roadmap for students' engagement with the platform. It anchored our research in the real needs of the target audience, ensuring a purpose-driven and student-centered approach in subsequent phases.

Design phase

Building upon the insights gathered in the Analysis phase, the Design phase was an exercise in shaping the course structure and content of the gamified MOOC platform. Here, the focus was on not merely integrating gamification as an afterthought but rather weaving it into the very fabric of the course. This entailed a careful selection and organization of MOOC features, the development of gamification plugins, and the strategic infusion of game mechanics such as points, badges, and leaderboards. The user interface was thoughtfully designed for an intuitive and user-friendly experience, with the intention of enhancing overall engagement. The Design phase is where theory transformed into practical design, creating an environment where learning would be immersive and motivating.

Development phase

The development phase of gamified MOOC and course design, namely the English for IT Professionals course, involved a translation of its conceptualization into a tangible and engaging learning experience. This process included coding, database setup, and server deployment to ensure optimal functionality and performance of the online platform. Rigorous testing was conducted to meet high-quality standards, ensuring a seamless user experience. The instructional content, aligned with specified learning objectives, was integrated into the course structure. Diverse gamification elements, such as badges, points, and leaderboard features, were incorporated to enhance user engagement and motivation. In parallel, a range of MOOC activities, including interactive videos, e-books, presentations, quizzes, and engaging forum discussions, were implemented to provide a comprehensive and interactive learning experience. Expert validation was conducted before implementation to guarantee the content's alignment with research goals and ethical standards. The Development phase laid the foundation for a dynamic and interactive course structure, creating an immersive environment for IT professionals to enhance their language skills effectively.

Table 1 summarizes the diverse components of the English for IT Professionals course, seamlessly integrating gamification elements like badges and leaderboards with MOOC activities such as interactive video and forum discussions. This overview highlights the dynamic blend that enhances language proficiency for IT professionals, culminating in a comprehensive learning experience.

Table 1. Gamified MOOC features and course activities

MOOC Activities	Details
Topic 1: Essential IT Terminology	Introduction to foundational IT vocabulary and terminology, emphasizing reading skills. Gamification Elements: Badges, Points, Leaderboard. MOOC Activities: Interactive Video, E-book, Presentation, Game (Crossword), Forum, Glossary.
Topic 2: Building Technical Vocabulary	Comprehensive exploration to expand technical language skills, focusing on reading. Gamification Elements: Badges, Points, Leaderboard. MOOC Activities: Interactive Video, E-book, Presentation, Game (Who Wants to be a Millionaire), Forum, Glossary.
Topic 3: Data Visualization Quest	Crafting Visual IT Insights through practical exercises, integrating listening and speaking skills. Gamification Elements: Badges, Points, Leaderboard. MOOC Activities: Interactive Video, E-book, Presentation, Quiz, Game (Crossword), Forum, Glossary.
Topic 4: Cybersecurity Chronicles	Reporting Security Incidents with real-world scenarios, emphasizing listening and speaking. Gamification Elements: Badges, Points, Leaderboard. MOOC Activities: Interactive Video, E-book, Presentation, Games (Who Wants to Be a Millionaire, Hangman), Forum, Glossary.
Topic 5: Multimedia IT Presentations	Mastering the art of creating engaging IT presentations, focusing on speaking and listening skills. Gamification Elements: Badges, Points, Leaderboard. MOOC Activities: Interactive Video, E-book, Presentation, Quiz, Game (Quizventure), Forum, Glossary.
Topic 6: IT Career Adventure	Navigating the Job Market with language skills and career insights, covering reading, listening, and speaking. Gamification Elements: Badges, Points, Leaderboard. MOOC Activities: Interactive Video, E-book, Presentation, Quiz, Forum, Glossary.
Questionnaire	Collect feedback on the course content, structure, and language skill development. System Quality (SQ): 10 items, Information Quality (IQ): 10 items, Gamification Elements (GE): 10 items, Attitude and Satisfactions (ATS): 10 items.
Certificate	Awarded upon successful completion of the course.

Implementation phase

With the platform developed, the Implementation phase saw its real-world deployment and field-testing. Participants at Universitas Negeri Malang underwent training to familiarize themselves with the platform's features, empowering them to engage with it confidently for their educational pursuits. Throughout this phase, participants actively interacted with the platform, completing modules, participating in gamified activities, and immersing themselves in course materials. Extensive monitoring and tracking of their interactions yielded valuable data and insights into the actual learning experience. The Implementation phase was where the platform's efficacy was gauged in practice.

Evaluation phase

The Evaluation phase constituted the ultimate test of the research's objectives and the platform's effectiveness. Data collection involved the use of a participant questionnaire in the analysis stage. It provided a platform for participants to articulate their perceptions of the platform, its gamification features, and the impact it had on their learning experiences. Thematic analysis of these responses unearthed common threads and insights, serving as a critical step in assessing the platform's effectiveness in addressing the specific needs of the target audience. Additionally, a two-fold validation process ensured that the platform was not only ethically sound but also technically robust. Subject matter experts specializing in technology aspects meticulously evaluated the platform's content to ensure alignment with predefined objectives and ethical standards. Simultaneously, the user feedback phase engaged a selected group of participants to gather insights aimed at refining usability and optimizing the overall learning experience. The target audience, comprised of the 27 undergraduate students majoring in Informatics Technology at Universitas Negeri Malang (UM), Indonesia, who voluntarily enrolled in the LearnovaUM platform's MOOC, was chosen based on their academic background and interest in the subject matter. The questionnaire noted in Table 4 was administered digitally through the platform's interface, allowing for efficient data collection and analysis. This approach facilitated a comprehensive understanding of the users' perspectives, aiding in the iterative improvement of the platform's functionalities and content delivery. In the designated questionnaire sections – System Quality (SQ) with 10 items, Information Quality (IQ) featuring 10 items, Course Quality (CQ) comprising 10 items, Gamification Elements (GE) with 10 items, and Attitude and Satisfactions (ATS) also comprising 10 items – respondents were provided with a 1-4 Likert scale. This scale allowed the participants to express their views, ranging from "strongly disagree" to "strongly agree," on the attributes within each of these categories. It is important to note that a purposeful decision was made to exclude a "neither agree nor disagree" category. This design choice was aimed at eliciting clear and definitive responses.

FINDINGS

LEARNERS' NEEDS IN GAMIFICATION-BASED MOOC DEVELOPMENT

Our research starts with an in-depth exploration of learners' needs for developing a gamified MOOC platform. Insights summarized in Table 2 provide a foundation for understanding our target audience's educational preferences. These insights guide the development of a gamified MOOC to exceed our learners' needs, shaping our approach to integrating gamification effectively.

Table 2. Learners' needs in gamification-based MOOC development

Code	Statements	SD	D	A	SA	SD
Learning Needs and Preferences (LNP)						
LNP.1	Learning English for my specific field is crucial for my studies.	0% (0)	2.4% (1)	34.1% (14)	63.4% (26)	0.542
LNP.2	I often encounter challenges when using English in my field.	0% (0)	7.3% (3)	68.3% (28)	24.4% (10)	0.543
LNP.3	Improving my English skills is essential for effectively communicating in my field.	2.4% (1)	2.4% (1)	39% (16)	56.1% (23)	0.675
LNP.4	Developing English proficiency will lead to better career opportunities in my field.	2.4% (1)	0% (0)	29.3% (12)	68.3% (28)	0.623
LNP.5	I struggle to express complex ideas in English within my field.	0% (0)	14.6% (6)	61% (25)	24.4% (10)	0.625
LNP.6	I struggle to express complex ideas in English within my field.	0% (0)	14.6% (6)	61% (25)	24.4% (10)	0.625
Learning Approaches and Preferences (LAP)						
LAP.1	I prefer learning English for my specific purposes by reading materials related to my field.	4.9% (2)	12.2% (5)	56.1% (23)	26.8% (11)	0.714
LAP.2	Watching videos or listening to audio materials related to my field would enhance my English skills.	0% (0)	4.9% (2)	46.3% (19)	48.8% (20)	0.631
LAP.3	Engaging in interactive exercises would help me apply English concepts in real-world scenarios in my field.	0% (0)	2.4% (1)	43.9% (18)	53.7% (22)	0.636
LAP.4	Learning English through real-life case studies in my field interests me.	2.4% (1)	12.1% (5)	48.8% (20)	36.6% (15)	0.749
LAP.5	I would benefit from role-playing scenarios in English related to my field.	0% (0)	9.8% (4)	58.5% (24)	31.7% (13)	0.613
LAP.6	I'm open to joining study groups to practice English within my field.	0% (0)	9.8% (4)	53.7% (22)	36.6% (15)	0.791
Integrating Gamification Elements (IGE)						
IGE.1	The inclusion of gamification elements would enhance my motivation to learn English for specific purposes.	0% (0)	7.3% (3)	65.9% (27)	26.8% (11)	0.558
IGE.2	I am likely to engage with a gamification-based MOOC for learning English in my field.	2.4% (1)	7.3% (3)	73.2% (30)	17.1% (7)	0.590
IGE.3	Earning points or rewards for completing English learning tasks would motivate me.	0% (0)	7.3% (3)	58.5% (24)	34.1% (14)	0.593
IGE.4	Competing with others in English challenges could make learning more enjoyable.	2.4% (1)	17.1% (7)	48.8% (20)	31.7% (13)	0.768

Code	Statements	SD	D	A	SA	SD
IGE.5	Learning through gamified quizzes would be appealing to me.	0% (0)	7.3% (3)	58.5% (24)	34.1% (14)	0.593
IGE.6	I believe gamification could make learning English in my field more interactive.	0% (0)	2.4% (1)	56.1% (23)	41.5% (17)	0.542
IGE.7	Unlocking achievements as I progress in English proficiency would encourage me.	0% (0)	2.4% (1)	63.4% (26)	34.1% (14)	0.521

In LNP.1, 97.5% agree on the importance of learning English in their Informatics Technology field, with minimal disagreement (2.4%). LNP.2 shows that 92.7% acknowledge facing challenges when using English in their field, with moderate variability (SD of 0.543) in responses. LNP.3 reveals that 95.1% agree on the importance of enhancing English skills for effective field communication, with minimal disagreement (2.4%). In LNP.4, 97.6% agree that English proficiency leads to better career opportunities in their field, with no disagreement. LNP.5 reflects that 85.4% agree on struggling to express complex ideas in English, with some strong agreement (24.4%) and minor disagreement (14.6%). LNP.6 shows similar responses as LNP.5, indicating consistent patterns of agreement and disagreement regarding the challenge of expressing complex ideas in English within their field.

In LAP.1, 82.9% prefer learning within their field through reading materials, with some variation (SD of 0.714). LAP.2 shows unanimous agreement (95.1%) on the benefits of videos or audio materials for English skills enhancement. LAP.3 reveals 97.6% agreement on the importance of interactive exercises for applying English concepts in real-world scenarios within their field. LAP.4 reflects strong interest (85.4%) in case-based learning in their field, with some diversity in preferences (SD of 0.749). In LAP.5, 90.2% agree on the benefits of role-playing scenarios in English related to their field, with some minor disagreement (9.8%). LAP.6 indicates substantial interest (90.2%) in collaborative learning in study groups for English practice within their field, with some diversity in preferences (SD of 0.791).

In IGE.1, 65.9% agree, 26.8% strongly agree on gamification elements' motivational impact on language learning, and only 7.3% disagree. The SD of 0.558 indicates a relatively consistent consensus on this motivation-enhancing effect. IGE.2 reveals 73.2% agreement and 17.1% strong agreement regarding participants' interest in a gamification-based MOOC for English learning, with 7.3% in disagreement. The SD of 0.590 suggests a relatively unified enthusiasm for such MOOCs. IGE.3 shows 58.5% agreement and 34.1% strong agreement on the motivational potential of earning points or rewards, with 7.3% in disagreement. The SD of 0.593 implies a relatively consistent consensus on this motivation-enhancing aspect. In IGE.4, 48.8% agree, and 31.7% strongly agree on the appeal of competition in English challenges, with 17.1% in disagreement. The SD of 0.768 suggests diverse attitudes toward competition in learning. IGE.5 finds that 58.5% agree and 34.1% strongly agree on the value of gamified quizzes for learning, with 7.3% in disagreement. The SD of 0.593 implies a relatively consistent consensus on the appeal of gamified quizzes. In IGE.6, 56.1% agree, and 41.5% strongly agree on gamification's potential to enhance interactivity in English learning, with 2.4% in disagreement. The SD of 0.542 suggests a relatively consistent consensus on this interactivity-enhancing aspect. Finally, in IGE.7, 63.4% agree, and 34.1% strongly agree on the motivational impact of unlocking achievements, with 2.4% in disagreement. The SD of 0.521 indicates a relatively consistent consensus on the motivation-enhancing effect of achievements.

Developing a Gamification-Based MOOC

In the Analysis phase, the research delved deeply into the specific needs and preferences of the target audience, primarily composed of undergraduate students. Through the questionnaire adapted from Marcu (2020), a comprehensive understanding of language learning requirements was obtained. The

insights gathered served as the bedrock for designing the Gamification-Based MOOC (see Table 2. for the results).

Then, the Design phase meticulously crafted the structure of the Gamification-Based MOOC, leading to the development of "LearnovaUM." It involved the careful selection and organization of MOOC features, the creation of plugin features for gamification, and the seamless integration of gamification strategies. The integration of game mechanics such as points, badges, and leaderboards was strategically designed to motivate and engage learners throughout their educational journey. Special attention was given to user interface design to ensure the platform's intuitiveness and user-friendliness, enhancing the overall learning experience.

Additionally, the Development phase brought "LearnovaUM" to life as a fully functional MOOC platform (available at https://umlearninginnovation.com/). Technical aspects, including coding, database setup, and server deployment, were executed to ensure optimal functionality and performance. Simultaneously, instructional content, comprising lessons, multimedia resources, and interactive exercises, was integrated into the platform. This content was thoughtfully aligned with predefined learning objectives. Gamification elements, such as badges and leaderboards, were embedded to create an immersive and motivating learning environment. In this stage, validation of the platform's design was a crucial step, involving three expert validators with specialized knowledge in technology aspects like the Technological Framework (TF), Technical Support and Accessibility (TSA), and User Interface (UI). Their combined expertise ensured LearnovaUM's seamless and user-friendly learning environment.

In the validation stage of our platform's design, three esteemed validators, each holding a Ph.D. degree, contributed significantly. Validator 1, a seasoned professional with a Ph.D. in Computer Science and a decade of experience in educational technology, led the assessment of the Technological Framework. Validator 2, with a Ph.D. in Educational Technology and substantial experience in user accessibility, spearheaded the evaluation of Technical Support and Accessibility. Validator 3, an expert UI/UX designer with a Ph.D. in Visual Communication and five years of experience in Educational Interface Design, provided invaluable insights into the User Interface. These distinguished validators were carefully selected for their extensive qualifications and expertise, ensuring a thorough evaluation that refined the technological soundness and user-friendliness of LearnovaUM. Results are given in Table 3.

Table 3. Validation results of technology aspects

Item	Description	Validator 1	Validator 2	Validator 3
Technological Framework (TF)				
TF.1	The chosen technology platform adequately supports content delivery.	9	8	9
TF.2	The technology chosen aligns well with the objectives of the MOOC.	8	7	8
TF.3	The platform offers seamless integration of multimedia elements.	9	8	8
TF.4	The technology allows for easy modifications to content.	8	9	9
TF.5	The chosen platform provide scalability for potential future growth.	9	8	8
TF.6	The technology offers robust security features to protect user data.	8	8	8
TF.7	The chosen technology supports real-time interaction.	9	9	9
TF.8	The technology provides analytics of user engagement.	9	7	9

Item	Description	Validator 1	Validator 2	Validator 3
TF.9	The platform is compatible with different devices or browsers.	10	8	9
Total TF		79	71	77
Average		75.67		
Technical Support and Accessibility (TSA)				
TSA.1	Adequate technical support is available for learners' experiencing issues.	8	8	9
TSA.2	Technical support response time is helpful.	8	8	9
TSA.3	Accessibility features ensure the course is usable by all learners.	9	8	8
TSA.4	The course platform offers options for adjusting the displayed content of text size.	8	8	9
TSA.5	Navigation features accommodate users with visual impairments.	8	8	9
TSA.6	Captioning or transcripts are provided for multimedia content.	8	7	9
TSA.7	The course platform adheres to web accessibility standards.	8	7	8
TSA.8	Technical support is accessible through various communication channels.	7	7	9
TSA.9	The course platform provides guides for troubleshooting common issues.	8	7	9
TSA.10	Accessibility features are clearly communicated to learners.	8	8	8
Total TSA		80	76	87
Average		81		
User Interface (UI)				
UI.1	The UI design ensures easy navigation through course modules.	9	8	10
UI.2	The interface design aligns with design principles.	8	8	9
UI.3	The UI layout is visually appealing.	9	7	9
UI.4	The course's UI promotes clear communication.	9	8	8
UI.5	The interface maintains a cohesive design throughout the MOOC.	9	9	9
UI.6	The UI adapts well to different screen sizes or devices.	9	9	9
UI.7	The design enhances user engagement through visual elements.	8	8	9
UI.8	The interface design prioritizes accessibility.	9	8	8
UI.9	The interface design prioritizes accessibility readability.	8	8	9
UI.10	The UI promotes user interaction with intuitive buttons.	8	8	9
Total TSA		86	81	89
Average		85.33		

Validation results for TF aspects show strong agreement among expert validators, indicating effective support for content delivery, multimedia integration, and content modifications. These aspects are very valid (75.67) and require no modifications. TSA aspects also exhibit a strong consensus, with the platform offering adequate technical support and accessibility features. These aspects are very valid (81) and require no modifications. UI aspects show a strong consensus in favor of the platform's design, which is user-friendly and visually appealing. These aspects are very valid (85.33) and require no

modifications. In summary, LearnovaUM, the developed gamification-based MOOC, is well-designed, accessible, and aligned with its objectives, ready for implementation and use. Figure 1 shows the opening screen for LearnovaUM, the developed MOOC.

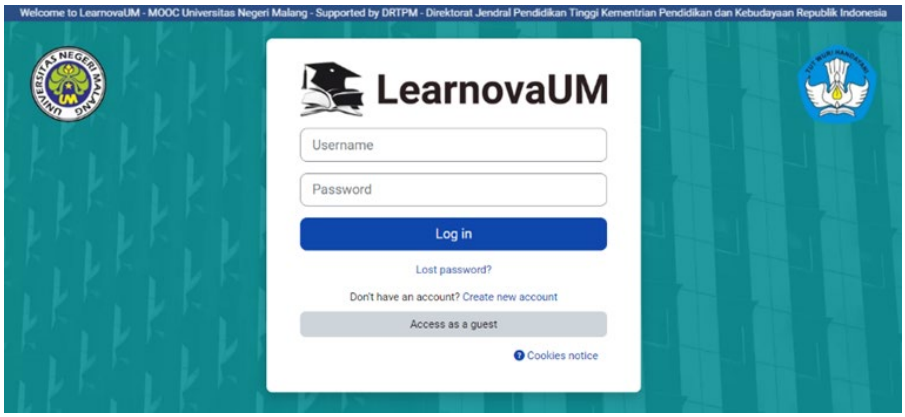

Figure 1. Landing page of a gamification-based MOOC LearnovaUM

Moreover, during the Implementation phase, "LearnovaUM" underwent field-testing with participants at Universitas Negeri Malang. Participants received training to familiarize themselves with the platform's features, fostering confidence in using it for learning purposes. Throughout this phase, participants actively engaged with the platform, progressing through modules, participating in gamified activities, and interacting with course materials. Rigorous monitoring and tracking of their learning experiences provided valuable data and insights. Figure 2 provides an illustrative example of the results observed during the limited field-testing of gamification element leaderboard levels.

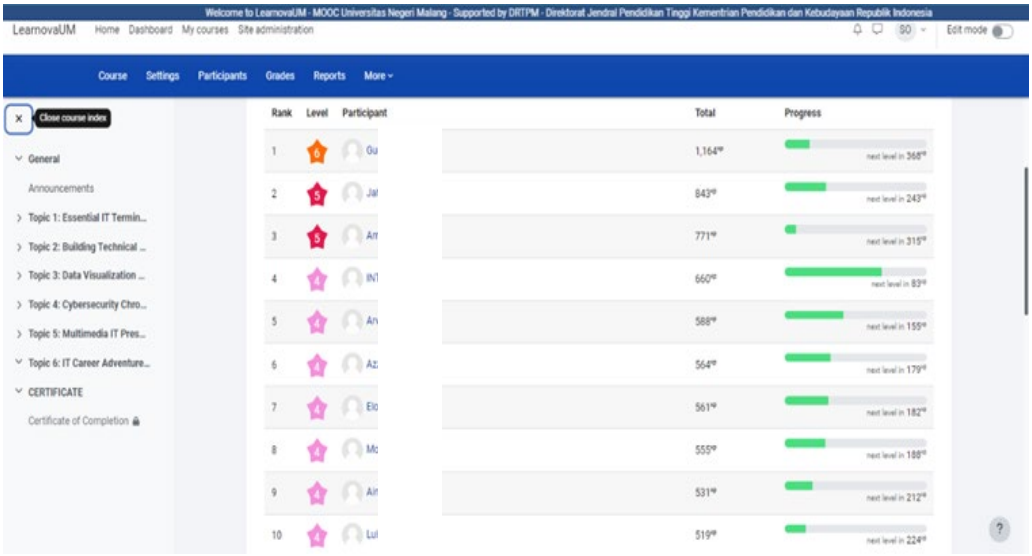

Figure 2. Example of gamification element leaderboard levels

Lastly, in the Evaluation phase assessed "LearnovaUM" by collecting participant feedback through questionnaire. Thematic analysis identified common themes and insights. Expert validation ensured content alignment with goals and ethics, while user feedback from questionnaire maintained ethical research practices. See Table 4 for the questionnaire results.

Table 4. Results of the users' experience in LearnovaUM

Code	Statements	SD	D	A	SA	SD
System Quality (SQ)						
SQ.1	The MOOC platform is easy for me to use.	0% (0)	7.4% (2)	48.1% (13)	44.4% (12)	0.629
SQ.2	The MOOC system is straightforward to navigate.	0% (0)	11.1% (3)	70.4% (19)	18.5% (5)	0.518
SQ.3	I can easily access materials on the MOOC platform.	3.7% (1)	0% (0)	77.8% (21)	18.5% (5)	0.424
SQ.4	The MOOC system works smoothly.	0% (0)	14.8% (4)	66.7% (18)	18.5% (5)	0.587
SQ.5	It's easy for me to customize my learning experience.	3.7% (1)	0% (0)	66.7% (18)	29.6% (8)	0.636
SQ.4	The MOOC platform is accessible on different devices.	0% (0)	3.7% (1)	70.4% (19)	25.9% (7)	0.641
SQ.5	I feel confident using the MOOC.	3.7% (1)	11.1% (3)	63% (17)	22.2% (6)	0.506
SQ.6	The MOOC's user interface is user-friendly.	0% (0)	11.1% (3)	74.1% (20)	14.8% (4)	0.706
SQ.7	I can easily track my progress.	0% (0)	7.4% (2)	77.8% (21)	14.8% (4)	0.518
SQ.8	The MOOC platform offers clear instructions.	2.4% (1)	0% (0)	29.3% (12)	68.3% (28)	0.474
SQ.9	Data within the MOOC is organized logically.	0% (0)	0% (0)	81.5% (22)	18.5% (5)	0.629
SQ.10	Overall, the MOOC enhances my learning experience.	0% (0)	0% (0)	70.4% (19)	29.6% (8)	0.518
Information Quality (IQ)						
IQ.1	The MOOC provides relevant course materials.	3.7% (1)	3.7% (1)	5.93% (16)	33.3% (9)	0.396
IQ.2	I can find the information I need on the MOOC.	0% (0)	11.1% (3)	70.4% (19)	18.5% (5)	0.465
IQ.3	The information in the MOOC is easy to understand.	0% (0)	3.7% (1)	66.7% (18)	29.6% (8)	0.698
IQ.4	The MOOC offers additional resources that enrich my learning.	0% (0)	3.7% (1)	70.4% (19)	25.9% (7)	0.550
IQ.5	The content is applicable to my work.	0% (0)	0% (0)	63% (17)	37% (10)	0.526
IQ.6	Course content is presented clearly.	0% (0)	0% (0)	77.8% (21)	22.2% (6)	0.506
IQ.7	The MOOC provides a variety of learning materials.	0% (0)	0% (0)	63% (17)	37% (10)	0.492
IQ.8	The MOOC includes real-world examples.	0% (0)	3.7% (1)	92.6% (25)	3.7% (1)	0.424
IQ.9	The MOOC's content is tailored to IT professionals.	0% (0)	7.4% (2)	77.8% (21)	14.8% (4)	0.492
IQ.10	I can easily access course references.	0% (0)	0% (0)	59.3% (16)	40.7% (11)	0.277

Code	Statements	SD	D	A	SA	SD
Service Quality (SvQ)						
SvQ.1	The MOOC provides valuable support.	0% (0)	3.7% (1)	74.1% (20)	22.2% (6)	0.474
SvQ.2	Technical support is readily accessible.	0% (0)	0% (0)	66.7% (18)	33.3% (9)	0.501
SvQ.3	I can easily communicate within the MOOC without complications.	0% (0)	3.7% (1)	74.1% (20)	22.2% (6)	0.483
SvQ.4	The MOOC can foster a strong sense of community among learners.	0% (0)	0% (0)	77.8% (21)	22.2% (6)	0.480
SvQ.5	Instructors within the MOOC demonstrate expertise in course content.	0% (0)	0% (0)	77.8% (21)	22.2% (6)	0.483
SvQ.6	The communication features of the MOOC platform are user-friendly.	0% (0)	3.7% (1)	70.4% (19)	25.9% (7)	0.424
SvQ.7	Registration process is easy within the MOOC.	0% (0)	7.4% (2)	55.6% (15)	37% (10)	0.424
SvQ.8	Enrolment process is easy within the MOOC.	0% (0)	0% (0)	63% (17)	37% (10)	0.506
SvQ.9	Feedback is actively incorporated to make improvements.	0% (0)	7.4% (2)	66.7% (18)	25.9% (7)	0.609
SvQ.10	Support services are available round-the-clock.	0% (0)	7.4% (2)	74.1% (20)	18.5% (5)	0.492
Gamification Elements (GE)						
GE.1	Gamification elements enhance my motivation.	3.7% (1)	3.7% (1)	59.3% (16)	33.3% (9)	0.492
GE.2	Gamification elements make learning more enjoyable for me.	3.7% (1)	7.4% (2)	66.7% (18)	22.2% (6)	0.526
GE.3	Gamified activities reinforce my understanding.	3.7% (1)	3.7% (1)	66.7% (18)	25.9% (7)	0.698
GE.4	Interactive games are engaging.	0% (0)	3.7% (1)	59.3% (16)	37% (10)	0.675
GE.5	Gamification elements are seamlessly integrated into the course.	0% (0)	0% (0)	74.1% (20)	25.9% (7)	0.662
GE.6	Feedback for achievements is meaningful.	0% (0)	11.1% (3)	51.9% (14)	37% (10)	0.555
GE.7	Gamification aligns with course objectives.	0% (0)	0% (0)	70.4% (19)	29.6% (8)	0.447
GE.8	Stories or narratives within gamification elements enhance engagement.	0% (0)	0% (0)	81.5% (22)	18.5% (5)	0.656
GE.9	Overall, gamification elements contribute positively to my learning experience.	0% (0)	7.4% (2)	59.3% (16)	33.3% (9)	0.465

The SQ aspect assesses the users' experiences with the MOOC platform's usability, accessibility, and overall functionality. SQ.1 examines the ease of use, with 48.1% of users strongly agreeing and 44.4% in agreement, indicating that the majority of users find the MOOC platform easy to navigate. SQ.2 delves into the platform's navigation, where 70.4% strongly agree that it is straightforward, and

18.5% agree. This suggests that users generally have a positive experience in terms of navigating through the MOOC. SQ.3 explores users' access to materials, with 77.8% strongly agreeing and 18.5% agreeing, demonstrating that users find it easy to access the course materials. Overall, the System Quality aspect indicates that the MOOC platform succeeds in its aims of usability and accessibility, making it a user-friendly environment.

IQ focuses on the relevance, accessibility, and comprehensibility of course materials within the MOOC. IQ.1 examines the relevance of course materials, with 33.3% strongly agreeing and 5.93% in agreement, indicating a need for alignment with user expectations. IQ.2 assesses users' ability to find information, where 70.4% strongly agree, and 18.5% agree, showcasing positive experiences in information retrieval. In IQ.3, 66.7% strongly agree that the information is easy to understand, while 29.6% somewhat agree. This suggests that the course content is presented in a user-friendly manner. Overall, IQ highlights that while course materials are perceived as relevant and accessible, there's potential for further clarity and alignment with users' needs.

The SvQ aspect examines support services and communication features within the MOOC platform. SvQ.1 evaluates the provision of valuable support, with 74.1% strongly agreeing and 22.2% agreeing, indicating users' positive views of support services. In SvQ.2, 66.7% strongly agree that technical support is readily accessible, showcasing efficient support channels. SvQ.3 explores communication ease, where 74.1% strongly agree and 22.2% agree, suggesting that users find the platform conducive to effective communication. SvQ.4 assesses the platform's ability to foster a sense of community, with 77.8% strongly agreeing and 22.2% agreeing. This indicates that the MOOC successfully builds a strong learner community. SvQ.5 emphasizes instructor expertise, with 77.8% strongly agreeing, reinforcing the positive perception of instructor quality. Overall, SvQ reflects that the MOOC excels in providing support and facilitating communication, enhancing the overall learning experience.

DISCUSSION

The development of a gamified MOOC marks a significant milestone in online education. This research aims to systematically analyze the appropriateness of the ADDIE approach in developing a gamified MOOC. It involves a detailed examination of each phase of the ADDIE model to elucidate its relevance and efficacy in achieving our educational objectives. Additionally, the study aims to comprehensively explore participant feedback, discussing their experiences, preferences, and insights regarding the course content. This dual-focus approach seeks to provide a nuanced exploration of both the instructional design methodology and practical responses from our engaged participants.

This research endeavors to contribute valuable insights to the field, aligning them with prior research and assessing their broader implications. In the Analysis Phase, we delved deep into uncovering the complex landscape of language acquisition needs among the participants. Our findings underscore the critical importance of domain-specific English language proficiency, echoing previous research sentiments (Chen & Oakley, 2020; Khulaifiyah et al., 2021), solidifying the notion that learners perceive English competence as an invaluable asset (Sari et al., 2020; Tang & Qian, 2022). The prevailing consensus underscores the pressing demand for tailored language learning solutions that transcend generic approaches and cater to learners' domain-specific requirements. Moreover, the meticulous alignment of course content with predefined learning objectives reverberates with well-established principles in online course design (Duan, 2022; Mellati & Khademi, 2020). Learners today are discerning consumers of education, expecting nothing less than an impeccably tailored curriculum that directly addresses their needs. The alignment process ensures that the MOOC becomes a pedagogical powerhouse, delivering tangible educational value and enhancing learner satisfaction.

The Design Phase emerged as the crucible where gamification elements were meticulously forged into the very essence of the MOOC. Our findings resonate with prior research, which emphatically underscores the transformative potential of gamification (Cheng, 2021; Klemke et al., 2018; Raman-

syah et al., 2023). The infusion of elements such as points, badges, and leaderboards harness the intrinsic human desires for competition and achievement. It becomes evident that these gamification elements infuse the learning environment with dynamism and engagement (Afrilyasanti & Cahyono, 2022). Learners are not merely passive spectators; they become active participants in their educational journey, propelling themselves forward through intrinsic motivation. Furthermore, the meticulous attention bestowed upon user interface design is an embodiment of the golden rule in user experience (UX) design - user-centeredness (Ivone & Jacobs, 2022; Khotimah et al., 2019; Shah & Khanna, 2022). The MOOC's user interface acts as a gateway to knowledge, and its intuitiveness and user-friendliness ensure that learners traverse it with ease. In this era of information ubiquity, learners should not need to grapple with the tools at their disposal; instead, the tools should harmoniously amplify their learning experiences.

The Development Phase of LearnovaUM represents the convergence of technical expertise and rigorous validation processes, solidifying its foundation as a reliable and robust platform. The validation process, incorporating expert validation and user feedback, is akin to the relentless scrutiny of a master craftsman's creation. Our findings, as showcased in Table 3 of validation results, resoundingly affirm that LearnovaUM adheres to standards of accessibility and usability. These findings dovetail with research asserting the cardinal role of accessibility and usability in online learning (Antonaci et al., 2019; Azevedo & Marques, 2017; Shah & Khanna, 2022). In an era where learners struggle with the complexities of digital interfaces, the availability of responsive technical support, rapid issue resolution, and adherence to accessibility standards stand as pillars of assurance. These facets collectively ensure that learners embark on a seamless educational journey devoid of frustrating technical impediments and emerge with enriched satisfaction and confidence.

The Implementation Phase bore witness to the real-world immersion of learners within the LearnovaUM MOOC. The enthusiastic responses from participants serve as a testament to the transformative potential of gamification elements in igniting motivation and nurturing learning engagement (Agonács et al., 2020; Supriyono et al., 2020; Zhu et al., 2020; Zhu & Doo, 2022). In this phase, the MOOC ceaselessly engages learners, not as passive recipients but as active participants in a thriving community of knowledge seekers. This phase resonates with the social constructivist paradigm of learning (Simons, 2000), which posits that knowledge is co-constructed through interaction and collaboration. The MOOC's capacity to foster a vibrant sense of community and facilitate peer-to-peer communication aligns seamlessly with prior research emphasizing the pivotal role of peer interaction in online education (Cheng, 2023; Doherty et al., 2015; Teixeira et al., 2019; Zhu, 2022). In this dynamic learning ecosystem, learners not only gain knowledge from the course materials but also enrich their understanding through dialogue and collaboration, ultimately transforming into empowered, self-directed learners.

LearnovaUM represents a harmonious blend of pedagogy and technology. Findings across the ADDIE stages align with prior research, validating effective online language education principles. By aligning course design with learner needs, using gamification for motivation, and ensuring technical excellence, LearnovaUM provides innovative language education solutions. In this era of educational technology, it redefines how learners engage with language learning. This research enriches the discourse on online language education, signaling a new frontier where pedagogy and technology empower learners.

CONCLUSION

This current study has looked into the process of developing LearnovaUM, a gamified MOOC platform guided by the structured framework of the ADDIE instructional design model. In this comprehensive exploration of LearnovaUM's development, we delved into aspects that define the platform's success, which are designing processes for smooth user navigation, integrating adaptive learning technologies tailored to individual preferences, maintaining content quality through careful development

practices, and strategically incorporating gamification elements to enhance learner engagement. The study emphasized the importance of customization in language learning experiences, a key factor gleaned from our research findings. Furthermore, the study provides concrete evidence of the effectiveness of the ADDIE approach in guiding the development of LearnovaUM. This structured framework ensured meticulous alignment with our educational objectives and facilitated the creation of a platform that effectively engages users. The systematic application of the ADDIE model enabled us to identify and address potential challenges early in the development process, resulting in a highly tailored and impactful language learning experience for our users. Acknowledging the study's limitations, particularly the field-testing phase conducted on a limited scale, we identify avenues for enhancing the platform's overall effectiveness. Our recommendation for future research involves expanding the study's scope to include a broader and more diverse user demographic. This expansion will enable a thorough assessment of learning outcomes over an extended period, providing more robust insights into the platform's efficacy. To enrich our findings, we specifically highlight the beneficial MOOC features that emerged during the study. Notably, features such as interactive simulations, personalized learning pathways, and real-time feedback significantly contributed to an enhanced learning experience. These insights underscore the importance of tailoring online education approaches to meet the evolving needs of learners. Additionally, our recommendations emphasize the necessity of maintaining agility in refining gamification elements. Aligning these elements with the dynamic preferences and needs of learners is crucial for sustained engagement and effectiveness. In conclusion, this research not only contributes to the optimization of online language education but also provides practical guidance for educators and instructional designers. Recognizing the ongoing nature of refining online education experiences, our study serves as a foundational step towards this overarching goal, with a commitment to continuous improvement and innovation in the field.

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REFERENCES

Afrilyasanti, R., & Cahyono, B. Y. (2022). Gamification as a helping hand for students' learning adaptation due to Covid-19 pandemic. *Journal of Asia TEFL*, *19*(4), 1141–1336. https://doi.org/10.18823/asiatefl.2022.19.4.11.1301

Agonács, N., Matos, J. F., Bartalesi-Graf, D., & O'Steen, D. N. (2020). Are you ready? Self-determined learning readiness of language MOOC learners. *Education and Information Technologies*, *25*(2), 1161–1179. https://doi.org/10.1007/s10639-019-10017-1

Ahmad, I., Sharma, S., Singh, R., Gehlot, A., Priyadarshi, N., & Twala, B. (2022). MOOC 5.0: A roadmap to the future of learning. *Sustainability, 14*(18), 11199. https://doi.org/10.3390/su141811199

Al-Imarah, A. A., & Shields, R. (2019). MOOCs, disruptive innovation and the future of higher education: A conceptual analysis. *Innovations in Education and Teaching International*, *56*(3), 258–269. https://doi.org/10.1080/14703297.2018.1443828

An, Y., Zhu, M., Bonk, C. J., & Lin, L. (2021). Exploring instructors' perspectives, practices, and perceived support needs and barriers related to the gamification of MOOCs. *Journal of Computing in Higher Education*, *33*(1), 64–84. https://doi.org/10.1007/s12528-020-09256-w

Antonaci, A., Klemke, R., Lataster, J., Kreijns, K., & Specht, M. (2019). Gamification of MOOCs adopting social presence and sense of community to increase user's engagement: An experimental study. In M.

Scheffel, J. Broisin, V. Pammer-Schindler, A. Ioannou, & J. Schneider (Eds.), *Transforming learning with meaningful technologies* (pp. 172-186). Springer. https://doi.org/10.1007/978-3-030-29736-7_13.

Aparicio, M., Oliveira, T., Bacao, F., & Painho, M. (2019). Gamification: A key determinant of massive open online course (MOOC) success. *Information & Management*, *56*(1), 39–54. https://doi.org/10.1016/j.im.2018.06.003

Azevedo, J., & Marques, M. (2017). MOOC success factors: Proposal of an analysis framework. *Journal of Information Technology Education: Innovations in Practice*, *16*, 233–251. https://doi.org/10.28945/3861

Boekaerts, M., & Cascallar, E. (2006). How far have we moved toward the integration of theory and practice in self-regulation? *Educational Psychology Review*, *18*(3), 199–210. https://doi.org/10.1007/s10648-006-9013-4

Borrás-Gené, O., Martínez-Núñez, M., & Martín-Fernández, L. (2019). Enhancing fun through gamification to improve engagement in MOOC. *Informatics*, *6*(3), 28. https://doi.org/10.3390/informatics6030028

Bovermann, K., & Bastiaens, T. J. (2020). Towards a motivational design? Connecting gamification user types and online learning activities. *Research and Practice in Technology Enhanced Learning*, *15*, Article 1. https://doi.org/10.1186/s41039-019-0121-4

Chen, K.-Z., & Oakley, B. (2020). Redeveloping a global MOOC to be more locally relevant: Design-based research. *International Journal of Educational Technology in Higher Education*, *17*, Article 9. https://doi.org/10.1186/s41239-020-0178-6

Cheng, Y.-M. (2021). Can gamification and interface design aesthetics lead to MOOCs' success? *Education + Training*, *63*(9), 1346–1375. https://doi.org/10.1108/ET-09-2020-0278

Cheng, Y.-M. (2023). How gamification and social interaction stimulate MOOCs continuance intention via cognitive presence, teaching presence and social presence? *Library Hi Tech*, *41*(6), 1781–1801 https://doi.org/10.1108/LHT-03-2022-0160.

Czerniewicz, L., Deacon, A., Glover, M., & Walji, S. (2017). MOOC-making and open educational practices. *Journal of Computing in Higher Education*, *29*, 81–97. https://doi.org/10.1007/s12528-016-9128-7

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Deci, E. L., Ryan, R. M., & Williams, G. C. (1996). Need satisfaction and the self-regulation of learning. *Learning and Individual Differences*, *8*(3), 165–183. https://doi.org/10.1016/S1041-6080(96)90013-8

Doherty, I., Harbutt, D., & Sharma, N. (2015). Designing and developing a MOOC. *Medical Science Educator*, *25*(2), 177–181. https://doi.org/10.1007/s40670-015-0123-9

Duan, T. (2022). A new idea for the optimization of MOOC-based teaching. *Education and Information Technologies*, *27*(3), 3623–3650. https://doi.org/10.1007/s10639-021-10755-1

Fiş Erümit, S., & Karakuş Yılmaz, T. (2022). Gamification design in education: What might give a sense of play and learning? *Technology, Knowledge and Learning*, *27*, 1039–1061. https://doi.org/10.1007/s10758-022-09604-y

Gameel, B. G., & Wilkins, K. G. (2019). When it comes to MOOCs, where you are from makes a difference. *Computers & Education*, *136*, 49–60. https://doi.org/10.1016/j.compedu.2019.02.014

García Espinosa, B. J., Tenorio Sepúlveda, G. C., & Ramírez Montoya, M. S. (2015). Self-motivation challenges for student involvement in the Open Educational Movement with MOOC. *International Journal of Educational Technology in Higher Education, 12*, 91–103. https://doi.org/10.7238/rusc.v12i1.2185

Goopio, J., & Cheung, C. (2021). The MOOC dropout phenomenon and retention strategies. *Journal of Teaching in Travel and Tourism*, *21*(2), 177–197. https://doi.org/10.1080/15313220.2020.1809050

Hu, P., & Zhang, J. (2017). A pathway to learner autonomy: A self-determination theory perspective. *Asia Pacific Education Review*, *18*, 147–157. https://doi.org/10.1007/s12564-016-9468-z

Ivone, F. M., & Jacobs, G. (2022). Learner autonomy and cooperative language learning. *Learning strategies and learner autonomy: Pedagogical struggles and opportunities in language and literature education* (pp. 5–14). UPI Press. https://www.researchgate.net/publication/361288146

Jarnac de Freitas, M., & Mira da Silva, M. (2023). Systematic literature review about gamification in MOOCs. *Open Learning: The Journal of Open, Distance and e-Learning, 38*(1), 73–95. https://doi.org/10.1080/02680513.2020.1798221

Jiang, Y., & Peng, J. E. (2023). Exploring the relationships between learners' engagement, autonomy, and academic performance in an English language MOOC. *Computer Assisted Language Learning*. https://doi.org/10.1080/09588221.2022.2164777

Johnson, G. M., & Davies, S. M. (2014). Self-regulated learning in digital environments: Theory, research, praxis. *British Journal of Research*, *1*(2), 1–14. http://hdl.handle.net/%0A20.500.11937/45935

Khalil, H., & Ebner, M. (2014). MOOCs completion rates and possible methods to improve retention - A literature review. *Proceedings of EdMedia: World Conference on Educational Media and Technology* (pp. 1305–1313). Association for the Advancement of Computing in Education. https://www.learntechlib.org/primary/p/147656/

Khotimah, K., Widiati, U., Mustofa, M., & Ubaidillah, M. F. (2019). Autonomous English learning: Teachers' and students' perceptions. *Indonesian Journal of Applied Linguistics*, *9*(2), 371–381. https://doi.org/10.17509/ijal.v9i2.20234

Khulaifiyah, K., Widiati, U., Anugerahwati, M., & Suryati, N. (2021). Autonomous learning activities: The perceptions of English language students in Indonesia. *Pegem Journal of Education and Instruction*, *11*(3), 34–49. https://www.pegegog.net/index.php/pegegog/article/view/1362

Klemke, R., Eradze, M., & Antonaci, A. (2018). The flipped MOOC: Using gamification and learning analytics in MOOC design - A conceptual approach. *Education Sciences*, *8*(1), 25. https://doi.org/10.3390/educsci8010025

Knowles, M. S. (1968). Andragogy, not pedagogy. *Adult Learning*, *16*(10), 350–352.

Landers, R. N. (2014). Developing a theory of gamified learning: Linking serious games and gamification of learning. *Simulation and Gaming*, *45*(6), 752–768. https://doi.org/10.1177/1046878114563660

Liu, M., Zha, S., & He, W. (2019). Digital transformation challenges: A case study regarding the MOOC development and operations at higher education institutions in China. *TechTrends*, *63*(5), 621–630. https://doi.org/10.1007/s11528-019-00409-y

Liyanagunawardena, T. R., Lundqvist, K., Mitchell, R., Warburton, S., & Williams, S. A. (2019). A MOOC taxonomy based on classification schemes of MOOCs. *European Journal of Open, Distance and E-Learning*, *22*(1), 85–103. https://doi.org/10.2478/eurodl-2019-0006

Marcu, N. A. (2020). Designing functional ESP (English for specific purposes) courses. *Procedia Manufacturing*, *46*, 308–312. https://doi.org/10.1016/j.promfg.2020.03.045

Mellati, M., & Khademi, M. (2020). MOOC-based educational program and interaction in distance education: Long life mode of teaching. *Interactive Learning Environments*, *28*(8), 1022–1035. https://doi.org/10.1080/10494820.2018.1553188

Merriam, S. B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. *New Directions for Adult and Continuing Education*, *2001*(89), 3–14. https://doi.org/10.1002/ace.3

Ofosu-Ampong, K., Boateng, R., Anning-Dorson, T., & Kolog, E. A. (2020). Are we ready for Gamification? An exploratory analysis in a developing country. *Education and Information Technologies*, *25*, 1723–1742. https://doi.org/10.1007/s10639-019-10057-7

Onah, D. F. O., Sinclair, J., & Boyatt, R. (2014, July). Dropout rates of massive open online courses: Behavioural patterns. *Proceedings of the 6th International Conference on Education and New Learning Technologies, Barcelona,* (pp. 5825–5834).

Puig, A., Rodríguez, I., Rodríguez, Á., & Gallego, I. (2023). Evaluating learner engagement with gamification in online courses. *Applied Sciences*, *13*(3), 1535. https://doi.org/10.3390/app13031535

Ramansyah, W., Praherdhiono, H., Sudana D, I. N., & Kuswandi, D. (2023). A gamified MOOC: The development of an interactive Moodle-based learning environment. *Ubiquitous Learning: An International Journal*, *17*(1), 93–119. https://doi.org/10.18848/1835-9795/CGP/v17i01/93-119

Richey, R. C., & Klein, J. D. (2014). *Design and development research*. Routledge. https://doi.org/10.4324/9780203826034

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality*, *74*(6), 1557–1586. https://doi.org/10.1111/j.1467-6494.2006.00420.x

Sari, A. R., Bonk, C. J., & Zhu, M. (2020). MOOC instructor designs and challenges: What can be learned from existing MOOCs in Indonesia and Malaysia? *Asia Pacific Education Review*, *21*, 143–166. https://doi.org/10.1007/s12564-019-09618-9

Schöbel, S. M., Janson, A., & Söllner, M. (2020). Capturing the complexity of gamification elements: a holistic approach for analysing existing and deriving novel gamification designs. *European Journal of Information Systems*, *29*(6), 641–668. https://doi.org/10.1080/0960085X.2020.1796531

Shah, J., & Khanna, M. (2022). What determines MOOC success? Validation of MOOC satisfaction continuance model. *Vision*. https://doi.org/10.1177/09722629221131386

Simons, P. R. J. (2000). Towards a constructivistic theory of self-directed learning. In G. A. Straka (Ed.), *Conceptions of self-directed learning: Theoretical and conceptual considerations* (pp. 155–169). Waxman. http://igitur-archive.library.uu.nl/ivlos/2005-0622-190617/5701.pdf

Supriyono, Y., Saukah, A., Latief, M. A., Widiati, U., & Suryati, N. (2020). EFL learners' self-regulated learning in a technology-mediated language learning setting. *International Journal of Innovation, Creativity and Change. 10*(10), 270–285. https://www.ijicc.net/images/vol10iss10/101021_Supriyono_2020_E_R.pdf

Tang, H. (2021). Person-centered analysis of self-regulated learner profiles in MOOCs: A cultural perspective. *Educational Technology Research and Development*, *69*(2), 1247–1269. https://doi.org/10.1007/s11423-021-09939-w

Tang, H., & Qian, Y. (2022). Designing MOOCs with LITTLE. *Cogent Education*, *9*(1). https://doi.org/10.1080/2331186X.2022.2064411

Teixeira, A. M., Mota, J., Pinto, M. C. T., & Morgado, L. (2019). Can MOOCs close the opportunity gaps? The contribution of social inclusive pedagogical design. *Revista Fuentes*, *21*(2), 239–252. https://doi.org/10.12795/revistafuentes.2019.v21.i2.08

Torres-Toukoumidis, A., González-Moreno, S. E., & Palma-Ruiz, J. M. (2021). Gamification in MOOC context. Documentary analysis. In Á. Rocha, H. Adeli, G. Dzemyda, F. Moreira, & A. M. Ramalho Correia (Eds.), *Trends and applications in information systems and technologies* (pp. 267–277). Springer. https://doi.org/10.1007/978-3-030-72654-6_26

van Roy, R., & Zaman, B. (2018). Need-supporting gamification in education: An assessment of motivational effects over time. *Computers & Education*, *127*, 283–297. https://doi.org/10.1016/j.compedu.2018.08.018

Welbers, K., Konijn, E. A., Burgers, C., de Vaate, A. B., Eden, A., & Brugman, B. C. (2019). Gamification as a tool for engaging student learning: A field experiment with a gamified app. *E-Learning and Digital Media*, *16*(2), 92–109. https://doi.org/10.1177/2042753018818342

Woodcock, J., & Johnson, M. R. (2018). Gamification: What it is, and how to fight it. *Sociological Review*, *66*(3), 542–558. https://doi.org/10.1177/0038026117728620

Wu, B., & Wang, Y. (2022). Formation mechanism of popular courses on MOOC platforms: A configurational approach. *Computers & Education*, *191*, 104629. https://doi.org/10.1016/j.compedu.2022.104629

Zhu, M. (2021). Enhancing MOOC learners' skills for self-directed learning. *Distance Education*, *42*(3), 441–460. https://doi.org/10.1080/01587919.2021.1956302

Zhu, M. (2022). Designing and delivering MOOCs to motivate participants for self-directed learning. *Open Learning*. https://doi.org/10.1080/02680513.2022.2026213

Zhu, M., Bonk, C. J., & Doo, M. Y. (2020). Self-directed learning in MOOCs: Exploring the relationships among motivation, self-monitoring, and self-management. *Educational Technology Research and Development*, *68*(5), 2073–2093. https://doi.org/10.1007/s11423-020-09747-8

Zhu, M., & Doo, M. Y. (2022). The relationship among motivation, self-monitoring, self-management, and learning strategies of MOOC learners. *Journal of Computing in Higher Education*, *34*(2), 321–342. https://doi.org/10.1007/s12528-021-09301-2

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