

ARTICLE

Evaluating the Validity and Practicality of a Technology-Based E-Learning for Language Research Methods in Higher Education

Ermanto ¹ , Vicno Triwira Dhika JR ^{2*} , Havid Ardi ³ , Novia Juita ¹ , Ridha Hasnul Ulya ¹ ,
Aditya Rachman ¹ 

¹ Department of Indonesian Language and Literature, Faculty of Language and Arts, Universitas Negeri Padang, Padang 25131, Indonesia

² Department of Language Teaching Science, Faculty of Language and Arts, Universitas Negeri Padang, Padang 25131, Indonesia

³ Department of English Language and Literature, Faculty of Language and Arts, Universitas Negeri Padang, Padang 25131, Indonesia

ABSTRACT

This study evaluates the validity and practicality of a novel technology-based e-learning system developed explicitly for language research methods in higher education. Recognizing the promising potential of integrating e-learning with corpus linguistics principles, the research focused on designing and assessing tools for teaching corpus linguistics-based language research. Validity was determined by examining the alignment of the e-learning content with fundamental corpus linguistic principles and established research methodologies. Practicality was assessed based on the platform's usability, accessibility, and the overall feasibility of its tools for both educators and students. Observations revealed positive adaptation from both instructors and learners, with lecturers effectively integrating diverse features and students actively utilizing the platform to access materials, collaborate, and interact. The findings confirm the success of this approach, evidenced by positive feedback regarding content clarity, relevance, and applicability. Furthermore, the e-learning media demonstrated high practicality, as indicated by both teacher and student responses. Overall, these results indicate significant potential for

*CORRESPONDING AUTHOR:

Vicno Triwira Dhika JR, Department of Language Teaching Science, Faculty of Language and Arts, Universitas Negeri Padang, Padang 25131, Indonesia; Email: vicnotriwira@gmail.com

ARTICLE INFO

Received: 28 June 2025 | Revised: 3 July 2025 | Accepted: 8 July 2025 | Published Online: 6 August 2025
DOI: <https://doi.org/10.30564/fls.v7i8.10793>

CITATION

Ermanto, Dhika JR, V.T., Ardi, H., et al., 2025. Evaluating the Validity and Practicality of a Technology-Based E-Learning for Language Research Methods in Higher Education. *Forum for Linguistic Studies*. 7(8): 583–598. DOI: <https://doi.org/10.30564/fls.v7i8.10638>

COPYRIGHT

Copyright © 2025 by the author(s). Published by Bilingual Publishing Group. This is an open access article under the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) License (<https://creativecommons.org/licenses/by-nc/4.0/>).

this e-learning system to enhance learning effectiveness, particularly in language research methods, thereby advancing empirical language studies within digital environments. This research contributes to the growing body of literature on effective technology integration in linguistics education.

Keywords: E-Learning; Validity; Practicality; Language Learning

1. Introduction

The development of e-learning has become a significant trend within the modern educational landscape, offering flexibility, accessibility, and the potential to enhance learning experiences. Concurrent with technological advancements, diverse pedagogical approaches and research methodology are being integrated into e-learning platforms to augment learning effectiveness^[1-3]. One promising area involves incorporating corpus linguistics principles into e-learning-based language learning methods. Corpus linguistics, with its emphasis on the analysis of large-scale authentic language data, offers unique insights into patterns of language use, frequency, and collocation, which holds the potential to enrich the language acquisition process significantly.

Nevertheless, the development of e-learning for corpus linguistics-based language research methods presents distinct characteristics that warrant careful consideration, particularly concerning the validity of the linguistic content presented and the practicality of utilizing platforms and analytical tools for both researchers and learners^[4-6]. Validity in this context pertains to the extent to which the e-learning design and content accurately represent corpus linguistics principles, facilitate a correct understanding of research methodologies, and effectively develop relevant corpus analysis skills^[7-9]. Practicality, on the other hand, highlights aspects of platform ease of use, resource accessibility, time and cost efficiency, and user readiness (both instructors and learners) in adopting and utilizing this e-learning within the context of language research^[10, 11]. Insufficient attention to validity may lead to methodological misconceptions, while low practicality can impede the adoption and effectiveness of e-learning implementation within academic and research environments^[12, 13].

Previous research has explored the validity of developed contents, including studies by Fransisca^[14], who examined the validity of e-learning contents at the vocational high school level, Ningsih et al.^[1], who discussed the validity of trigger-point-based learning media, Putri et al.^[7]

conducted validity tests on electronic student worksheets, and Afidah et al.^[15], who investigated the validity of digital comic-based learning media for biology education. Several previous studies have demonstrated that well-designed e-learning can enhance student engagement and facilitate more effective learning. The utilization of digital technology in learning has also been observed in several previous studies, including Afidah et al.^[15], who discussed the practicality of digital comic-based learning media, Marlini and Rismawati^[16], who researched the practicality of learning media based on Macromedia Flash Technology, Fransisca^[14], who tested the practicality of e-learning at the high school level, Yanto^[17], who analyzed the practicality of interactive learning media at the vocational school level, and Ilhami et al.^[18], who studied the practicality of puzzle-based learning media. The studies described an overview of the importance of technology as a support for the learning process. This is based on the development of the times, which increasingly emphasizes digital technology.

Despite numerous studies highlighting the significant potential of technology-enhanced learning media in improving educational processes and offering comprehensive analyses of its practicality, most of this research tends to focus on specific subjects at the primary to vocational secondary education levels (e.g., biology, computer skills, early reading, electrical circuits). However, the development and evaluation of e-learning systems specifically designed for language research methods courses in higher education, particularly those integrating corpus linguistics principles, remain relatively limited. This gap indicates an urgent need to investigate the validity and practicality of e-learning within this specific context. Doing so will address the existing knowledge void and provide relevant learning innovations for university students.

Considering the unique affordances of e-learning in facilitating access to and interaction with linguistic corpora, coupled with the inherent complexities of teaching and learning corpus linguistics-based language research methods, a

rigorous investigation into the validity and practicality of specifically designed e-learning interventions is paramount. This study aims to address this critical need by systematically examining the alignment of e-learning content with core corpus linguistic principles and research methodologies (validity), as well as evaluating the usability, accessibility, and feasibility of the platform and its tools for both instructors and learners (practicality). This research essentially addresses two core questions. Firstly, it aims to validate the product and design of an e-learning platform created explicitly for the corpus-linguistics-based language research methods course. Secondly, it seeks to assess the practicality of this developed e-learning platform for the corpus-linguistics-based language research methods course. Ultimately, the findings of this research are expected to provide valuable insights and evidence-based recommendations for the effective development and implementation of e-learning resources that can enhance the teaching and learning of corpus linguistics-based language research, thereby contributing to the advancement of empirical language studies in the digital landscape.

2. Methods

This study employs a quantitative approach, which can test products that have been developed^[17, 19, 20]. This study focuses on the development of digital learning tools for instruction in corpus linguistics-based language research methodologies. The tests carried out are divided into two types, namely validity and practicality. Validity can be interpreted as an assessment made by experts on something that has been developed. Practicality can be interpreted as an assessment made by users of something that has been developed^[21–23].

The validity of this research is divided into two types: e-learning design validity and e-learning content validity. E-learning design testing is a systematic process to evaluate the effectiveness and efficiency of a digital learning product. The main objective of this design testing is to ensure that the design is capable of achieving the established learning objectives and providing an optimal learning experience for students. Aspects that need to be considered in design testing include the appearance and function of the developed e-learning design. This design validity test is conducted by requesting assessments from experts on the e-learning de-

sign. In the context of e-learning, this product validity test is important to ensure that the learning materials presented are relevant and aligned with the learning objectives. The flexibility and ease of Google Forms can be an effective tool for collecting data in product validity testing. This product validity test is conducted by requesting assessments from experts on the e-learning product.

The next test is the practicality test. The practicality test of e-learning is conducted to assess the level of ease and suitability of the learning media within the actual learning context. In this study, the practicality test is divided into two types: the practicality test of e-learning by lecturers and the practicality test of e-learning by students. The practicality test in the context of e-learning refers to the assessment of how effectively and efficiently an online learning system can be used in a real learning environment. In other words, this test aims to measure the level of suitability and ease of use of e-learning from the lecturers' perspective. The practicality test of e-learning in this research was also conducted by distributing questionnaires via Google Forms to students. The questionnaire was designed to measure the practicality level of e-learning from the users' perspective. Quantitative data in the form of student response scores to various aspects of e-learning, such as ease of use, relevance of materials, and interactivity, were efficiently collected through this platform. Google Forms not only facilitated the data collection process but also enabled faster and more accurate data analysis.

In research focused on developing or evaluating instruments, interventions, or instructional materials, Aiken's V coefficient is a quantitative method essential for measuring the degree of consensus or agreement among multiple raters. This formula, introduced by Aiken in 1985, is primarily used as an indicator of content validity. This implies that the formula assesses the extent to which items within an instrument or components of an intervention are relevant and representative of the construct or domain intended to be measured. This evaluation is based on the systematic judgment of experts in the relevant field. While Aiken's V is rooted in content validity, its underlying principle can be adaptively extrapolated to assess the practicality of an instrument or intervention. In this context, practicality refers to ease of use, feasibility of implementation, time efficiency, and cost-effectiveness of a product or process. Unlike validity assessment, which content experts typically conduct, practicality evaluation can

involve direct users or those with implementation experience, such as lecturers and students.

For instance, in developing a learning module, after experts have validated its content, its practicality can be evaluated by lecturers who will use it and students who will learn from it. They would assess various aspects, such as clarity of instructions, ease of navigation, availability of supporting resources, and alignment with time allocation. The scores from these lecturer and student evaluations can then be processed using Aiken's V formula. A high V value from the lecturer and student assessments would indicate a strong consensus among them that the module is practical for use in the teaching and learning process. Thus, the application of Aiken's V is not limited to expert validity assessments; it also serves as a robust tool for gauging consensus regarding the practicality level of a product or intervention from the perspective of its direct users. This provides a comprehensive overview of the quality of a development, considering not only its content suitability but also the ease and effectiveness of its implementation in practice.

The validity and practicality of the e-learning [tool/method] for language research in this study were assessed by distributing questionnaires via Google Forms. After collecting the questionnaire results, the author tested the validity and practicality using Aiken's formula approach. Aiken's formula [Equation (1)] is used to analyze the score or achievement value of the product to be developed^[24-26].

$$V = \frac{\sum s}{n(c-1)} \quad (1)$$

$$s = r - lo$$

Based on Aiken's formula, decisions regarding the validity of grades can be made after they have been adjusted to the Aiken's formula index. Aiken's formula search results will produce a decision, which has been adjusted to the decision index^[3, 27, 28]. Aiken's decision index is categorized into non-valid scale decisions, medium-scale decisions, and valid scale decisions^[27].

Table 1 presents the decision adjusted to Aiken's formula index. The formula index provides a poor category for values ≤ 0.4 , a moderate category for values $0.4 < V \leq 0.8$, and a valid category for values $0.8 < V$. Decisions based on Aiken's index are classified as a final decision regarding the results that have been analyzed. A decision will be declared valid after the product assessment stage is completed, the product assessment results are calculated, and categories for the final results are formulated^[9, 29-31].

Table 1. Decision based on Aiken's index.

Intervals	Category
≤ 0.4	Not Valid
$0.4 < V \leq 0.8$	Medium
$0.8 < V$	Valid

The Language Research Methods course has transitioned to a fully digital e-learning format, leveraging various online platforms and resources. This e-learning implementation enables students to access course materials, interact with lecturers and peers, and submit assignments flexibly from anywhere at any time. To further illustrate, **Figure 1** shows the online (e-learning) products of the Language Research Methods course.



Figure 1. E-learning Platform.

The Research Methods in Language course is now delivered in a comprehensive e-learning format, designed to facilitate independent and structured learning. As an introduction to the course, students will gain a fundamental understanding of core concepts and principles in language research methodology. All learning materials are presented in diverse digital formats, including PDF files for theoretical modules and practical guides, as well as video tutorials that detail case examples and analysis procedures. To assess comprehension and learning progress, the e-learning platform features regular interactive quizzes. Additionally, application-based assignments will be provided to hone students' research skills.

The final evaluation of understanding and competency will be conducted through online Mid-Term Exams (UTS) and Final Exams (UAS), ensuring a comprehensive assessment throughout the course.

The e-learning validity and practicality questionnaires were administered online via Google Forms. The use of Google Forms for data collection in this study significantly enhanced efficiency, particularly in assessing the validity and practicality of e-learning for the Research Methods in Language course. To further illustrate this, a screenshot of the Google Form distributed to respondents is presented in

Figure 2.

The screenshot shows a Google Form interface. At the top, the title is 'Validitas Produk E-learning dari Para Ahli'. Below it, the form title is 'Validitas (Ahli) Konten Pembelajaran Metode Penelitian Bahasa Berbasis Digital (E-learning)'. The form includes a description: 'Angket ini digunakan untuk kepentingan penelitian tentang Desain dan Konten Pembelajaran Metode Penelitian Bahasa Berbasis Digital (E-learning).'. It also lists the researchers: 'Penelitian ini dilaksanakan oleh Prof. Dr. Ermanto, S.Pd., M.Hum. (ketua peneliti), Dr. Novia Juita, M.Hum. (anggota peneliti), dan Dr. Havid Ardi, M.Hum. (anggota peneliti)'. There is a field for 'Nama' (Name) and a 'Kirim' (Send) button.

Figure 2. Google form questionnaires.

Utilizing Google Forms for data collection in research on the validity and practicality of e-learning in Language Research Methods courses offers significant convenience and efficiency. Google Forms enable researchers to reach a wide range of respondents without geographical limitations, thereby reducing the time and costs typically associated with distributing physical questionnaires. The platform's automated features for data collection and organization also enhance the efficiency of the analysis process, minimizing potential errors from manual transcription and accelerating data processing stages. This enables researchers to focus more deeply into interpreting results and the implications of findings related to the validity and practicality of the developed e-learning model.

2.1. E-Learning Validity

Product validation can be interpreted as assessments conducted by experts on a product that has been developed.

Validity in a development is positioned as a product that will be assessed by experts^[32, 33]. The e-learning validity test in this study is divided into e-learning design validity testing and e-learning content validity testing. The e-learning design validity test includes aspects of display and function. The e-learning content validity test includes content, construction, and language use. Here are some questions about the aspects of validity in e-learning design.

Table 2 presents a questionnaire for the design validity test by experts. The experts were asked to evaluate the developed e-learning by selecting from the provided assessment options. The assessments consisted of STS (*Sangat Tidak Setuju/Strongly Disagree*), TS (*Tidak Setuju/Disagree*), KS (*Kurang Setuju/Less Agree*), S (*Setuju/Agree*), and SS (*Sangat Setuju/Strongly Agree*). The validity of this e-learning design was assessed by two expert respondents specializing in instructional technology. Their evaluation of the e-learning design's validity encompassed both its visual interface and functional aspects.

Table 2. E-learning design validity questionnaire.

Aspect	Indicator	Score				
		STS	TS	KS	S	SS
Appearance	Completeness information on home page <i>e-learning</i>					
	Accuracy election color background behind					
	Compliance color writing with background					
	Accuracy style And size <i>font</i>					
	Accuracy position text					
	Quality appearance component learning					
	Convenience feature on appearance home page <i>e-learning</i>					
Function	<i>E-learning</i> help student For think critical					
	Language used very easy understood					
	<i>E-learning</i> can interesting attention student					
	<i>E-learning</i> push student For follow activity learning					
	<i>E-learning</i> create good communication between lecturer with student					
	<i>E-learning</i> give chance to student For Study independent					
	<i>E-learning</i> in accordance with objective learning					
	<i>E-learning</i> in accordance with condition And strategies used					

Table 3 presents a questionnaire for the product validity test by experts. Subsequently, the content validity of the e-learning was tested, encompassing aspects of content, construction, and language. The validity questionnaire above will be given a rating scale/score range of 1–5. Calculating practicality and validity tests, the values given are generally on a scale of 1–5 points^[28, 34]. Number one (1) assumes the lowest level, while number five (5) assumes the highest

level. Therefore, in this validity test, a score scale of 1–5 will be given. The assessments consisted of STS (*Sangat Tidak Setuju*/Strongly Disagree), TS (*Tidak Setuju*/Disagree), KS (*Kurang Setuju*/Less Agree), S (*Setuju*/Agree), and SS (*Sangat Setuju*/Strongly Agree). Two experts assessed the validity of this e-learning product. Both experts evaluated the content, construct, and language employed in the developed e-learning product.

Table 3. Product expert validity questionnaire.

Aspect	Indicator	Score				
		STS	TS	KS	S	SS
Contents	Compliance of <i>e-learning</i> with the syllabus					
	Suitability of <i>e-learning materials</i> with learning outcomes					
	Suitability of materials to teaching needs					
	conformity of material to indicators					
	The truth of the substance of learning in <i>e-learning</i>					
	Ease of understanding learning materials					
	The benefits of materials with student insight					
Construction	Suitability of <i>e-learning materials</i> to students' ability levels					
	<i>e-learning</i> learning objectives					
	Accuracy of the sequence of presentation of material in <i>e-learning</i>					
	Systematic accuracy of e-learning materials					
Language	Completeness of <i>e-learning information</i>					
	Clarity in providing information					
	Compliance with Indonesian language rules					
	The effectiveness of language used in <i>e-learning</i>					
	Communicativeness of language use					

2.2. E-Learning Practicality

Practicality relates to the use of something that has been developed^[14, 16, 17]. The practicality of e-learning in this study is divided into two types: lecturer-based e-learning practicality and student-based e-learning practicality. The e-learning practicality test by lecturers represents an assessment of the e-learning's practicality level from the lecturers' perspective. Specifically, this involves the collection and

analysis of lecturers' assessment data on various items or aspects of the e-learning to determine how easy, efficient, and effective the e-learning is within the context of teaching and managing language research methodology courses. The e-learning practicality test by students aims to measure and evaluate how easy, helpful, and efficient the e-learning is from the students' perspective as users. **Table 4** presents the questionnaire on the e-learning practicality of language research methodology for lecturers.

Table 4. Lecturers practicality questionnaire.

Aspect	Indicator	Score				
		STP	TP	CP	P	SP
Display Aspect	Attractive appearance					
	Conformity of image size, color and resolution					
	The color combination used is interesting					
	Use of fonts that are easy to read					
	Easy to understand language					
Ease of Use Aspect	Clarity of instructions for using the feature					
	Time efficiency when conducting research					
	Ease of selecting features					
	Ease of information related to the science that is compiled					
	Ease for educators in preparing materials					
Aspects of Material Presentation	Flexibility of using <i>e-learning</i>					
	The presentation of the material can be understood and accessed					
	<i>e-learning</i> features makes it easier for users					
Benefits Aspect	The material presented is in accordance with learning objectives					
	Helping educators explain the material					
	Training student independence					

The practicality of e-learning was evaluated by three faculty members specializing in research methods in language courses. This practicality test aims to assess the suitability of the e-learning developed for language research methodology courses. The practicality questionnaire above will be given a rating scale/score range of 1–5. Calculating practicality and validity tests, the values given are generally on a scale of 1–5 points^[28, 34]. Number one (1) assumes the lowest level, while number five (5) assumes the highest level. The assessments consisted of STP (*Sangat Tidak Praktis*/Very Impractical), TP (*Tidak Praktis*/Not Practical), CP (*Cukup Praktis*/Quite Practical), P (*Praktis*/Practical), and SP (*Sangat Praktis*/Very Practical). The next practicality test is the e-learning practicality test conducted by students. **Table 5** presents some questions regarding the aspects of

practicality for students.

The respondents for this questionnaire consisted of 15 students from one research methods in language class. The practicality test is divided into four aspects: display, ease of use, material presentation, and benefits. These aspects are assessed to examine the practicality of using e-learning for language research methodology for students. The practicality questionnaire above will be given a rating scale/score range of 1–5. Calculating practicality and validity tests, the values given are generally on a scale of 1–5 points^[28, 34]. Number one (1) assumes the lowest level, while number five (5) assumes the highest level. The assessments consisted of STP (*Sangat Tidak Praktis*/Very Impractical), TP (*Tidak Praktis*/Not Practical), CP (*Cukup Praktis*/Quite Practical), P (*Praktis*/Practical), and SP (*Sangat Praktis*/Very Practical).

Table 5. Students practicality questionnaire.

Aspect	Indicator	Score				
		STP	TP	CP	P	SP
Display Aspect	Attractive appearance					
	Conformity of image size, color and resolution					
	The color combination used is interesting					
	Use of fonts that are easy to read					
	Easy to understand language					
Ease of Use Aspect	Clarity of instructions for using the feature					
	Time efficiency in conducting research					
	Ease of access to all features					
	Flexibility of using <i>e-learning</i>					
Aspects of Material Presentation	The use of <i>e-learning</i> is in accordance with learning objectives					
	The material presented is easy to understand					
	The features presented make the learning process easier.					
	Access features make it easier for students to search for research experiment data.					
Benefits Aspect	The features presented are in accordance with language research needs.					
	<i>E-learning</i> makes it easier for students to understand the material					
	<i>E-learning</i> increases my interest in understanding learning material					
	<i>E-learning</i> makes it easier for students to learn independently					

3. Results and Discussion

The validity test results indicate that the developed e-learning content has met the criteria for both content and design validity. The presented learning materials align with the established learning objectives and are capable of accurately measuring students' achievement of competencies. Additionally, the interactive and varied learning design supports the attainment of the desired learning outcomes. The validity test results demonstrate that the e-learning content has met the validity criteria in all assessed aspects. In terms of content, language, visual display, and learning structure, the content is deemed relevant, accurate, and aligned with the stated learning objectives. This indicates that the e-learning content has been well-designed and is ready for use in the learning process. The design validity test reveals that the

visual appearance, layout, and navigation of the e-learning platform have been well-designed. The attractive and user-friendly design elements support a positive learning experience for students^[6, 35–37]. Furthermore, the platform's technical quality, such as access speed and compatibility with various devices, is also considered excellent.

3.1. Validity of E-Learning Design

Validity testing aims to confirm whether the e-learning design has achieved its intended goals in terms of content, construct, and criteria. Several aspects need to be considered in the design validity test, including appearance and functionality. **Table 6** presents the assessment aspects of e-learning design validity for research methods courses at the university level.

Table 6. Indicator design validity test results.

Item	Rater 1	Rater 2	S1	S2	Σs	n(c-1)	V	Category
Item 1	4	4	3	3	6	8	0.75	Medium
Item 2	4	4	3	3	6	8	0.75	Medium
Item 3	5	4	4	3	7	8	0.875	High
Item 4	5	3	4	2	6	8	0.75	Medium
Item 5	4	3	3	2	5	8	0.625	Medium
Item 6	4	4	3	3	6	8	0.75	Medium
Item 7	5	4	4	3	7	8	0.875	High
Item 8	4	4	3	3	6	8	0.75	Medium
Item 9	5	4	4	3	7	8	0.875	High
Item 10	5	4	4	3	7	8	0.875	High
Item 11	5	4	4	3	7	8	0.875	High
Item 12	5	4	4	3	7	8	0.875	High

Table 6. Cont.

Item	Rater 1	Rater 2	S1	S2	Σs	n(c-1)	V	Category
Item 13	4	4	3	3	6	8	0.75	Medium
Item 14	4	4	3	3	6	8	0.75	Medium
Item 15	5	4	4	3	7	8	0.875	High
Total	68	58						

In general, each item assessed by the respondents is categorized as high (valid). According to Aiken's scale, categories that meet the validity criteria are moderate and high. Based on this, it can be understood that the respondents con-

sider the aspects developed in the e-learning to be highly appropriate. Additionally, the overall validity of the e-learning design can be tested. To clarify, **Table 7** presents the overall results of the e-learning design validity test.

Table 7. Overall design validity test results.

Item	Rater		s1	s2	Σs	V	Category
	1	2					
Item 1–15	68	58	53	43	96	0.8	High

The validity test results of the e-learning design indicate that the learning content has met a high level of validity. This implies that the presented learning materials are relevant to the established learning objectives, the measurement product used is capable of measuring the expected competencies, and the user interface is deemed appropriate and engaging.

3.2. Validity of E-Learning Content

The purpose of product validity testing is to assess the extent to which the items in an instrument, such as a questionnaire, accurately represent the concept or variable being

measured. In the context of e-learning, product validity testing is essential to ensure that the presented learning materials are relevant and aligned with the learning objectives.

Table 8 presents the results of the item-by-item validity test. In general, each item assessed by the respondents falls into the high (valid) category. According to Aiken's scale, the categories that meet the validity criteria are moderate and high. Based on this, it can be understood that the respondents consider the aspects developed in the e-learning to be very appropriate. Additionally, the overall validity of the e-learning content can also be tested. To clarify, **Table 9** presents the overall validity test results of the e-learning content.

Table 8. indicator content validity test results.

Item	Rater 1	Rater 2	S1	S2	Σs	n(c-1)	V	Category
Item 1	5	5	4	4	8	8	1	High
Item 2	5	4	4	3	7	8	0.875	High
Item 3	5	4	4	3	7	8	0.875	High
Item 4	4	5	3	4	7	8	0.875	High
Item 5	5	4	4	3	7	8	0.875	High
Item 6	5	4	4	3	7	8	0.875	High
Item 7	5	4	4	3	7	8	0.875	High
Item 8	5	5	4	4	8	8	1	High
Item 9	5	4	4	3	7	8	0.875	High
Item 10	4	4	3	3	6	8	0.75	Medium
Item 11	4	4	3	3	6	8	0.75	Medium
Item 12	5	4	4	3	7	8	0.875	High
Item 13	5	4	4	3	7	8	0.875	High
Item 14	5	5	4	4	8	8	1	High
Item 15	5	4	4	3	7	8	0.875	High
Item 16	4	4	3	3	6	8	0.75	Medium
Total	76	68						

Table 9. Overall content validity test results.

Item	Rater		s1	s2	Σs	V	Category
	1	2					
Item 1–16	76	68	60	52	112	0.875	High

Based on the e-learning content validity test, the results were categorized as valid. The validity test results indicate that the developed e-learning content has met the established validity criteria. Aspects such as aligning content with learning objectives, clarity of language, and relevance of media to learning materials have been addressed. This suggests that the e-learning content has been well-designed and has the potential to achieve the desired learning objectives.

The results of the e-learning design and content validity test indicate a high level of validity, which underscores the effectiveness of the instructional materials developed for this study. The findings suggest that the e-learning content not only meets the educational standards but also aligns well with the learning objectives set forth at the outset of the project. The high validity scores reflect the careful consideration given to both the pedagogical framework and the technological aspects of the e-learning platform, which are critical for engaging learners and facilitating meaningful learning experiences^[1, 7, 14, 15].

One of the primary factors contributing to the high validity scores is the rigorous design process employed during the development of the e-learning materials. The iterative design approach allowed for continuous feedback from subject matter experts, instructional designers, and potential learners. This collaborative process ensured that the content was not only accurate and relevant but also tailored to meet the diverse needs of the target audience. The active involvement of stakeholders throughout the design phase is a best practice in e-learning development, as it fosters a sense of ownership and increases the likelihood that the materials will be well-received by users. The results from the validity test affirm that this approach was successful, as evidenced by the positive feedback regarding the clarity, relevance, and applicability of the content^[38–40].

The content validity test results also highlight the importance of user-centered design in the development of e-learning materials. By prioritizing the needs and preferences

of learners, the instructional design team created an engaging and interactive learning environment. The incorporation of multimedia elements, such as videos, simulations, and interactive quizzes, not only enhances the learning experience but also caters to various learning styles. The positive response from participants regarding the usability and accessibility of the e-learning platform further underscores the effectiveness of this user-centered approach. High validity scores in this area suggest that learners found the content both relevant and engaging, which is crucial for maintaining motivation and promoting active learning.

While the high validity scores are encouraging, it is essential to acknowledge the limitations of the current study and the potential areas for improvement. Although the findings indicate that the e-learning materials are valid, further research is needed to evaluate their effectiveness in real-world educational settings. Future studies could employ a mixed-methods approach, incorporating both quantitative and qualitative data to gain a more comprehensive understanding of the e-learning program's impact on learner outcomes. Additionally, exploring the long-term retention of knowledge and skills acquired through the e-learning materials would provide valuable insights into their effectiveness over time.

Another area for consideration is the scalability and adaptability of the e-learning materials. As educational contexts and learner demographics continue to evolve, the content must remain relevant and accessible to a diverse audience. Future iterations of the e-learning program should incorporate mechanisms for ongoing evaluation and revision to ensure that the materials continue to meet the needs of learners^[41, 42]. Engaging with a wider range of stakeholders, including learners from different backgrounds and educational settings, will be essential in this process. By fostering a culture of continuous improvement, the e-learning program can maintain its validity and relevance in an ever-changing educational landscape.

3.3. E-Learning Practicality Test Results by Lecturers

The implementation of e-learning has provided lecturers with significant flexibility in designing and delivering learning materials. Lecturers can access various learning resources, create interactive learning materials, and adapt their teaching methods to meet the needs and learning styles of students. This encourages lecturers to be more independent in developing digital and pedagogical competencies.

Table 10 presents the overall results of the e-learning practicality test by the lecturers. The table includes assessment data from three raters for each item. Rater 1, Rater 2, and Rater 3 provided assessment scores for the items. In addition, the table also lists the s1, s2, and s3 values, which are scores calculated from the raters' assessments. Σs is the total of s1, s2, and s3. The n(c-1) value is 12 for all items,

which is a constant used in the calculation of validity or reliability. Furthermore, there is a V value indicating the results of a specific practicality calculation, with values such as 0.833333, 0.916667, and 1. Lastly, each item is categorized as "High", indicating that the lecturers rated the practicality level of e-learning for the item as high.

Table 11 presents the results of the practicality test of all e-learning items carried out by the lecturer. Based on the practicality test of e-learning conducted by lecturers, it can be concluded that e-learning has a significant potential to enhance the quality of learning. However, to achieve optimal results, several improvements are required, such as upgrading the quality of the technological infrastructure, providing more intensive training for lecturers, and developing engaging and interactive learning materials. Additionally, further research is needed to examine the effectiveness of e-learning in various courses and across diverse student characteristics.

Table 10. Overall e-learning practicality test results by lecturers.

Item	Rater 1	Rater 2	Rater 3	s1	s2	s3	Σs	n(c-1)	V	Category
Item 1	4	4	5	3	3	4	10	12	0.833333	High
Item 2	4	4	5	3	3	4	10	12	0.833333	High
Item 3	4	4	5	3	3	4	10	12	0.833333	High
Item 4	4	5	5	3	4	4	11	12	0.916667	High
Item 5	3	5	5	2	4	4	10	12	0.833333	High
Item 6	4	5	5	3	4	4	11	12	0.916667	High
Item 7	4	4	5	3	3	4	10	12	0.833333	High
Item 8	4	4	5	3	3	4	10	12	0.833333	High
Item 9	4	4	5	3	3	4	10	12	0.833333	High
Item 10	4	5	5	3	4	4	11	12	0.916667	High
Item 11	4	5	5	3	4	4	11	12	0.916667	High
Item 12	4	4	5	3	3	4	10	12	0.833333	High
Item 13	4	4	5	3	3	4	10	12	0.833333	High
Item 14	4	5	5	3	4	4	11	12	0.916667	High
Item 15	4	5	5	3	4	4	11	12	0.916667	High
Item 16	5	5	5	4	4	4	12	12	1	High
Total	64	72	80							

Table 11. Overall e-learning practicality test results by lecturers.

Item	Rater			s1	s2	s3	Σs	V	Category
	1	2	3						
1-16	64	72	80	48	56	64	168	0.875	High

3.4. E-Learning Practicality Test Results by Students

The practicality of the e-learning platform was evaluated through a study involving students as research subjects.

Students were granted full access to the developed e-learning platform. During the trial period, students were required to interact with various available features, including accessing learning materials, taking quizzes, and participating in discussion forums. The researcher directly observed the stu-

dents' interaction process with the platform and collected data through surveys and interviews to measure the platform's level of practicality, ease of use, and effectiveness in supporting the learning process.

Table 12 presents the results of the practicality test of all e-learning items carried out by the lecturer. The practicality test results indicate that both students and lecturers hold positive perceptions towards the implementation of e-learning. A majority of respondents stated that the e-learning platform

adequately supported the learning process. This suggests that the design and development of the e-learning system have taken into account the needs of users with varying levels of proficiency. The implementation of e-learning has had a significant impact on the interaction patterns between students and lecturers. Although face-to-face interactions have decreased, communication through the e-learning platform has become more intense and flexible. This enables students to ask questions and receive feedback from lecturers more promptly.

Table 12. E-learning practicality test results by students.

Item	Rater 1–15	S1–15	Σ s	V	Category
1–18	1,105	835	835	0.77315	Medium

The practicality test results of this study reveal a notable difference in perception between lecturers and students. Lecturers provided a high rating with a score of 0.875 (high category), indicating their view of the e-learning platform as highly practical within the teaching context. Conversely, students rated the practicality at a medium level, scoring 0.773 (medium category). This disparity likely stems from various factors, including differences in user experience, expectations regarding features and functionalities, and levels of technological adaptability. The high perception among lecturers may reflect the ease with which e-learning can be integrated into the curriculum or its efficiency in managing materials and interactions. Meanwhile, the moderate perception from students suggests room for improvement in user interface, content accessibility, or more comprehensive technical support to enhance their overall learning experience.

The implementation of e-learning in language teaching has introduced a new dimension to the interaction between lecturers and students. Observations of the e-learning platform's practicality reveal a positive adaptation from both parties. Lecturers, as facilitators, have successfully integrated various e-learning features into their teaching activities, ranging from uploading teaching materials to interactive quizzes and discussion forums. Meanwhile, students have actively utilized the platform to access learning materials, collaborate in groups, and interact directly with lecturers^[42–44]. This indicates that the e-learning design has effectively facilitated the teaching and learning process.

This research conducted a practicality test of the e-learning implemented by lecturers and students in the context

of language teaching. The results demonstrate that e-learning has significant potential to enhance learning effectiveness, particularly in the field of language research methods. This discussion aims to delve deeper into the research findings, implications for teaching practices, and challenges faced in e-learning implementation^[6, 45, 46]. While research has shown numerous benefits of e-learning, several challenges need to be addressed. One primary challenge is the lack of technological skills among both students and lecturers. Although e-learning platforms are designed to be user-friendly, not all users have the same level of comfort with technology. Some lecturers have reported difficulties operating the e-learning system, which can hinder the teaching process. Therefore, educational institutions must provide adequate training for both lecturers and students to optimize the utilization of e-learning.

Furthermore, research also indicates that not all students feel comfortable with distance learning. Some students have complained about the lack of direct interaction with lecturers and classmates, which can diminish their learning experience. Social interaction is a crucial component of language learning, as language itself is a tool for communication. Therefore, it is essential to create a balance between online and face-to-face learning. Educational institutions may consider adopting a hybrid model, where some materials are taught online and others in person, allowing students to experience the benefits of both methods. Additionally, this research found that institutional support has a significant influence on the success of e-learning implementation. Lecturers who feel supported by their institution in using

technology are more likely to be enthusiastic about integrating e-learning into their teaching. This support can take the form of access to technological resources, training, and professional development. Therefore, educational institutions must ensure that they provide adequate infrastructure and necessary support for lecturers to adapt effectively to these changes.

This study evaluated the validity and practicality of an e-learning tool for teaching language research methods in higher education, finding the developed instrument to be highly valid and practical based on expert assessments and user perceptions. These findings align with a broader trend in the literature indicating the efficacy of technology-based learning media across various educational contexts. For instance, prior studies by Fransisca^[14] on e-learning in vocational high schools, Ningsih et al.^[1] on interactive PowerPoint media for high school short story texts, Afidah et al.^[15] on online digital biology comics, and Marlina and Ris-mawati^[16] on Macromedia Flash-based introductory reading media, all consistently reported high levels of validity and practicality for their developed tools. This consistency suggests that adopting technology in education, whether for vocational subjects, languages, sciences, or basic skills, is generally well-received and effective in facilitating the teaching and learning process.

However, it is important to note differences in technology specifications and application contexts. Our study utilized a more comprehensive and integrated e-learning tool for a specific language research methodology. In contrast, the comparative studies employed diverse media such as interactive PowerPoints, digital comics, and Macromedia Flash, reflecting the varied digital tools available. Furthermore, the scope of subject matter and educational levels also differed, ranging from higher education to vocational and general high schools. This diversity highlights the adaptive flexibility of educational technology to meet various curriculum needs. Nevertheless, the consistent findings regarding validity and practicality across platforms and disciplines reinforce the crucial argument that investing in well-designed e-learning development is essential for enhancing the quality and accessibility of education in the current digital era.

In the context of language teaching, the use of e-learning also opens up opportunities to introduce more diverse and contextualized materials. Lecturers can easily

access various online resources, such as videos, articles, and interactive modules, which can enrich students' learning experiences. This is especially important in language teaching, where cultural context and real-world language use significantly impact students' understanding. With e-learning, lecturers can quickly update teaching materials to reflect the latest developments in the field of language, ensuring that learning remains relevant and engaging for students^[47, 48]. Moreover, this research highlights the importance of students' intrinsic motivation in language learning through e-learning. Students with high motivation are more likely to participate in online learning actively and are more likely to explore additional materials^[44, 49, 50]. Therefore, lecturers need to create a supportive learning environment where students feel valued and motivated to learn. This can be done by providing rewards or recognition for students' achievements and creating engaging challenges in the learning process^[43, 51, 52].

This research concludes that while e-learning offers numerous advantages in language teaching, existing challenges cannot be overlooked. Therefore, a holistic approach is necessary for implementing e-learning, which involves lecturer training, institutional support, and attention to students' needs and preferences. In this way, we can maximize the potential of e-learning as a tool for language teaching while overcoming the various challenges that may arise.

The utilization of e-learning among students categorized as having moderate abilities has shown a positive impact on their learning motivation. The flexibility in terms of time and location when accessing learning materials, coupled with the availability of various interactive features, encourages students to become more actively involved in the learning process. Nevertheless, the learning outcomes achieved have not demonstrated statistically significant improvements.

4. Conclusion

This study successfully evaluated the validity and practicality of an e-learning tool designed for teaching corpus linguistics-based language research methods in higher education. The findings indicate that this e-learning tool is highly valid in terms of its design and content, and remarkably practical for use by both faculty and students. The high validity confirms that the e-learning materials and structure accurately reflect core corpus linguistics principles and rele-

vant research methodologies. Concurrently, the high level of practicality demonstrates the platform's ease of use, accessibility, and effectiveness in facilitating learning. Collectively, these findings suggest that e-learning presents a practical and viable pedagogical approach to enhance language research methods education. For future research, it is recommended that longitudinal studies be conducted to investigate the long-term impact of this e-learning tool on students' research comprehension and skills. Furthermore, subsequent research could broaden the scope of subjects and user groups, for instance, by involving other language programs or comparing their effectiveness across different educational institutions, and exploring the integration of more advanced interactive features to optimize the learning experience.

Author Contributions

Conceptualization, E.; writing—original draft preparation, E. and V.T.D.J.; writing—review and editing, H.A. and N.J.; visualization, R.H.U. and A.R. All authors have read and agreed to the published version of the manuscript.

Funding

This work received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

The research data is stored in Excel format and can be made available upon request by the journal.

Acknowledgments

The authors would like to thank Direktorat Riset, Teknologi, dan Pengabdian Masyarakat for funding this work under contract number 069/E5/PG.02.00.PL/2024.

Conflicts of Interest

The authors declare no conflict of interest.

References

- [1] Ningsih, R.Y., Permatasari, S., Zulhafizh., 2024. Validity of the development of interactive learning media based on PowerPoint triggers for understanding short story text material in high school. *Jurnal Ilm Ilmu Pendidikan*. 7(5), 4981–4988. DOI: <https://doi.org/10.54371/jiip.v7i5.4470> (in Indonesian)
- [2] Awida, C.N., Azra, F., 2024. Android application development as learning media on molecular shape material for class XI SMA/MA. *G-Tech: Jurnal Teknologi Terapan*. 8(1), 186–195. DOI: <https://doi.org/10.33379/gtech.v8i1.3969> (in Indonesian)
- [3] Damayanti, L., Suana, W., Riyanda, A.R., 2021. Development of interactive learning media based on augmented reality for computer hardware introduction. *Ikra-Ith Informatika*. 6(1), 10–19. (in Indonesian)
- [4] Einfeldt, M., Sevastjanova, R., Zahner-Ritter, K., et al., 2023. The use of active learning systems for stimulus selection and response modelling perception experiments. *Computer Speech & Language*. 83, 101537. DOI: <https://doi.org/10.1016/j.csl.2023.101537>
- [5] Rui, Y., 2024. Simulation of e-learning in vocal network teaching experience system based on intelligent Internet of Things technology. *Entertainment Computing*. 50, 100711. DOI: <https://doi.org/10.1016/j.entcom.2024.100711>
- [6] Maqbool, M.A., Asif, M., Imran, M., et al., 2024. Emerging e-learning trends: a study of faculty perceptions and impact of collaborative techniques using fuzzy interface system. *Social Sciences & Humanities Open*. 10, 101035. DOI: <https://doi.org/10.1016/j.sshao.2024.101035>
- [7] Putri, R.T.H., Sholihah, F.N., Huda, M.F., 2024. Validity of e-LKPD containing Pancasila student profiles on Protista material. *EDUSCOPE: Jurnal Pendidikan, Pembelajaran, dan Teknologi*. 9(2), 50–61. DOI: <https://doi.org/10.32764/eduscope.v9i2.4234> (in Indonesian)
- [8] Musyaffi, A.M., Oli, M.C., Afriadi, B., 2023. Drivers of student technology readiness in using cloud accounting to improve student performance. *International Journal of Information and Education Technology*. 13(8), 1169–1176. DOI: <https://doi.org/10.18178/ijiet.2023.13.8.1918>
- [9] Yulianeta, Yaacob, A., Lubis, A.H., 2022. The development of web-based teaching materials integrated with Indonesian folklore for Indonesian language for foreign speakers students. *International Journal of Language*

- Education. 6(1), 46–62. DOI: <https://doi.org/10.26858/ijole.v6i1.22957>
- [10] Saliba, R., 2024. Transformation in transformative learning: a reversed experience of faculty members teaching in transnational higher education institutions in Qatar. *Social Sciences & Humanities Open*. 9, 100823. DOI: <https://doi.org/10.1016/j.ssaho.2024.100823>
- [11] Chaib, S.O., Joti, I., Khouliji, S., 2023. Evaluation of a computer-assisted language learning system based on adaptive learning designed for self-training in scientific French language. *International Journal of Information and Education Technology*. 13(8), 1284–1296. DOI: <https://doi.org/10.18178/ijiet.2023.13.8.1930>
- [12] Crosthwaite, P., Baisa, V., 2023. Generative AI and the end of corpus-assisted data-driven learning? Not so fast! *Applied Corpus Linguistics*. 3(3), 100066. DOI: <https://doi.org/10.1016/j.acorp.2023.100066>
- [13] Sarraf, S., Kushwaha, A.K., Kar, A.K., et al., 2024. How did online misinformation impact stockouts in the e-commerce supply chain during COVID-19 – a mixed methods study. *International Journal of Production Economics*. 267, 109064. DOI: <https://doi.org/10.1016/j.ijpe.2023.109064>
- [14] Fransisca, M., 2017. Testing the validity, practicality, and effectiveness of e-learning media in vocational high schools. *VOLT: Jurnal Ilmiah Pendidikan Teknik Elektro*. 2(1), 17. DOI: <https://doi.org/10.30870/volt.v2i1.1091> (in Indonesian)
- [15] Afidah, M., Wahyuni, S., Rikizaputra, et al., 2024. Validity and practicality of online-based unique digital biology comic learning media (KUDBI) on virus material. *Bio-Lectura: Jurnal Pendidikan Biologi*. 11(1), 122–138. DOI: <https://doi.org/10.31849/bl.v11i1.19702> (in Indonesian)
- [16] Marlina, C., Rismawati., 2019. Practicality of using macromedia flash-based beginning reading learning media. *Jurnal Tunas Bangsa*. 6(2), 128. (in Indonesian)
- [17] Yanto, D.T.P., 2019. Practicality of interactive learning media in the electrical circuit learning process. *INVOTEK: Jurnal Inovasi Vokasional dan Teknologi*. 19(1), 75–82. DOI: <https://doi.org/10.24036/invotek.v19i1.409> (in Indonesian)
- [18] Ilhami, S., Fitri, R., Rahmawati, D., et al., 2022. Meta-analysis of the practicality of puzzle learning media. *Journal of Teaching and Education*. 4(2), 611–619. (in Indonesian)
- [19] Dooly, M., Vinagre, M., 2022. Research into practice: virtual exchange in language teaching and learning. *Language Teaching*. 55(3), 392–406. DOI: <https://doi.org/10.1017/S0261444821000069>
- [20] Omidian, T., Ballance, O.J., Siyanova-Chanturia, A., 2023. Replicating corpus-based research in English for academic purposes: proposed replication of Cortes (2013) and Biber and Gray (2010). *Language Teaching*. 56(1), 128–136. DOI: <https://doi.org/10.1017/S0261444821000367>
- [21] Velikaya, E., 2016. Learning from collaborative teacher development in an EAP/ESP context. *Journal of Language and Education*. 2(1), 72–78. DOI: <https://doi.org/10.17323/2411-7390-2016-2-1-72-78>
- [22] Ağcam, R., Akbana, Y.E., Rathert, S., 2020. Dealing with emergency remote teaching: the case of pre-service English language teachers in Turkey. *Journal of Language and Education*. 7(4), 16–29. DOI: <https://doi.org/10.17323/jle.2021.11995>
- [23] Thumvichit, A., Varaporn, S., Tuvachit, V., 2021. Language education in emergencies: a systematic review. *Journal of Language and Education*. 7(4), 183–197. DOI: <https://doi.org/10.17323/jle.2021.12462>
- [24] Yustiana, S., Kusumadewi, R.F., 2020. Development of CTL-based module teaching materials as part of SSP development. *Jurnal Kontekstualita*. 1(2), 1–6. DOI: <https://doi.org/10.46772/kontekstual.v1i02.155> (in Indonesian)
- [25] Arifin, Z., Retnawati, H., 2017. Development of a measuring instrument for higher order thinking skills in mathematics for grade X high school students. *PYTHAGORAS: Jurnal Pendidikan Matematika*. 12(1), 98. DOI: <https://doi.org/10.21831/pg.v12i1.14058> (in Indonesian)
- [26] Pakesa, C.M., Yusmaita, E., 2019. Design of chemical literacy assessment on reaction rate topic of 11th grade senior high school. *Edukimia Journal*. 1(3), 84–89. DOI: <https://doi.org/10.24036/ekj.v1.i3.a61> (in Indonesian)
- [27] Wahyuni, A., Yusmaita, E., 2020. Design of chemical literacy test instruments on acids and bases for grade XI senior high school/vocational high school. *Edukimia*. 2(3), 106–111. DOI: <https://doi.org/10.24036/ekj.v2.i3.a186> (in Indonesian)
- [28] Kamal, M., Hadi, A., 2019. Development of interactive learning media in network system administration subject using Dreamweaver. *Voteteknika (Vocational Teknik Elektronika dan Informatika)*. 7(1), 114. DOI: <https://doi.org/10.24036/voteteknika.v7i1.103788> (in Indonesian)
- [29] Jumrah., 2019. Developing an intensive course model in improving English language skills of students of Early Childhood Islamic Education Department (PI-AUD). *International Journal of Language Education*. 3(1), 22–32.
- [30] Jazadi, I., Widari, I.G.A., Aprianti, A.D.I., 2023. Pre-service teachers' criticality in analysing school English teaching materials: Gender representation and Islamic perspective. *International Journal of Language Education*. 7(1), 77–93. DOI: <https://doi.org/10.26858/ijole.v1i1.38573>
- [31] Wulandari, B.A., Hustarna., 2020. Need analysis stage in reconstructing syllabus and developing teaching ma-

- terials for oracy in academic context subject. *International Journal of Language Education*. 4(1), 141–149.
- [32] Stognieva, O., Popov, V., 2021. Assessment under COVID-19: exploring undergraduate students' attitudes towards their online thesis proposal presentations vs. face-to-face. *Journal of Language Education*. 7(4), 139–155. DOI: <https://doi.org/10.17323/jle.2021.11657>
- [33] Al Khreshe, M., 2022. Teachers' perceptions of promoting student-centred learning environment: an exploratory study of teachers' behaviours in the Saudi EFL context. *Journal of Language Education*. 8(3), 23–39. DOI: <https://doi.org/10.17323/jle.2022.11917>
- [34] Zulfikar, D., 2018. Development of English language video tutorial learning media for continental food processing in vocational high schools with culinary services expertise programs [Thesis]. Sumatera Barat, Indonesia: Fakultas Teknik Univesitas Negeri Padang. (in Indonesian)
- [35] Le, H.N., Cuenen, A., Trinh, T.A., et al., 2024. Investigating the immediate and mid-term effect of a gamified e-learning platform for the enhancement of traffic knowledge and skills among Vietnamese adolescents operating powered two-wheelers. *Journal of Safety Research*. 90, 62–72. DOI: <https://doi.org/10.1016/j.jsr.2024.06.005>
- [36] Haahr, M., Rudenko, S., Jakubowski, K., 2025. Alice Dali augmented reality: evaluating a cultural outdoors game for intergenerational play. *Entertainment Computing*. 52, 100865. DOI: <https://doi.org/10.1016/j.entcom.2024.100865>
- [37] Kumar, K.N.P., Kumar, B.T.H., Bhuvanesh, A., 2024. Spectral clustering algorithm based web mining and quadratic support vector machine for learning style prediction in E-learning platform. *Measurement Sensors*. 31, 100962. DOI: <https://doi.org/10.1016/j.measen.2023.100962>
- [38] Shrestha, S., Dahlke, S., Butler, J.I., et al., 2024. Nursing students' perceptions on a pain management e-learning module: an exploratory quantitative study. *Pain Management Nursing*. 25(2), e138–e143. DOI: <https://doi.org/10.1016/j.pmn.2023.12.010>
- [39] Nouraey, P., Bavali, M., Behjat, F., 2023. A post-pandemic systematic review of e-learning: a cross-cultural study. *International Journal of Society, Culture & Language*. 11(3), 97–114.
- [40] Ho, H.C.Y., Poon, K.T., Chan, K.K.S., et al., 2023. Promoting preservice teachers' psychological and pedagogical competencies for online learning and teaching: The T.E.A.C.H. program. *Computers & Education*. 195, 104725. DOI: <https://doi.org/10.1016/j.compedu.2023.104725>
- [41] Tianyi, L., 2025. Research on digital entertainment media in English writing e-learning system based on interactive game learning method. *Entertainment Computing*. 52, 100855. DOI: <https://doi.org/10.1016/j.entcom.2024.100855>
- [42] Nagy, V., Duma, L., 2023. Measuring efficiency and effectiveness of knowledge transfer in e-learning. *Heliyon*. 9(7), e17502. DOI: <https://doi.org/10.1016/j.heliyon.2023.e17502>
- [43] Xu, W., 2024. Simulation of e-learning visualization technology based on image enhancement in the communication mode of public performance art videos. *Entertainment Computing*. 50, 100680. DOI: <https://doi.org/10.1016/j.entcom.2024.100680>
- [44] Seikh, M.R., Chatterjee, P., 2024. Evaluation and selection of e-learning websites using intuitionistic fuzzy confidence level based Dombi aggregation operators with unknown weight information. *Applied Soft Computing*. 163, 111850. DOI: <https://doi.org/10.1016/j.asoc.2024.111850>
- [45] Wang, J., 2025. Application of digital media entertainment technology based on soft computing in immersive experience of remote piano teaching. *Entertainment Computing*. 52, 100822. DOI: <https://doi.org/10.1016/j.entcom.2024.100822>
- [46] Ali, F., Yasar, B., Khan, U., et al., 2024. Can the compulsive use of e-learning lead to lower academic performance? The role of technology fatigue and technostress in hospitality and tourism students. *Journal of Hospitality, Leisure, Sport & Tourism Education*. 34, 100478. DOI: <https://doi.org/10.1016/j.jhlste.2024.100478>
- [47] Abdulmalik Ali, M., 2020. Investigation of vocabulary learning strategies to identify word meanings for Saudi EFL students in reading context. *Arab World English Journal*. 11(3), 149–169. DOI: <https://doi.org/10.24093/awej/vol11no3.9>
- [48] Kaur, P., Kumar, H., Kaushal, S., 2023. Technology-assisted language learning adaptive systems: a comprehensive review. *International Journal of Cognitive Computing in Engineering*. 4, 301–313. DOI: <https://doi.org/10.1016/j.ijcce.2023.09.002>
- [49] Bengueddach, A., Boudia, C., Bouamrane, K., 2023. Interpretive analysis of online teaching labs constructed using Moodle during the pandemic period. *Heliyon*. 9(5), e16007. DOI: <https://doi.org/10.1016/j.heliyon.2023.e16007>
- [50] Zgheib, G., Al Daia, R., Serhan, M., 2023. A contextual approach for exploring faculty readiness to teach online. *Heliyon*. 9(10), e20491. DOI: <https://doi.org/10.1016/j.heliyon.2023.e20491>
- [51] Limantara, N., Meyliana., Gaol, F.L., et al., 2023. Designing gamified learning management systems for higher education. *International Journal of Information and Education Technology*. 13(1), 25–32. DOI: <https://doi.org/10.18178/ijiet.2023.13.1.1776>
- [52] Yuliani, S., Hartanto, D., 2022. Digital online learning by using digital storytelling for pre-service teacher students. *International Journal of Language Education*. 6(3), 221–232. DOI: <https://doi.org/10.26858/ijole.v6i3.20408>