

INTEGRATING ARTIFICIAL INTELLIGENCE AND CASE-BASED LEARNING IN DESIGNING PRAGMATIC SPEECH STRATEGY ASSESSMENT INSTRUMENTS

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Abstract. This study aims to develop and validate an innovative assessment instrument that integrates artificial intelligence (AI) and case-based learning to measure students' understanding of pragmatic speech strategies in higher education. The research adopts a research and development (R&D) approach based on the 4-D model, focusing on the stages of define, design, and develop. Data were collected through needs analysis questionnaires, expert validation sheets, and documentation involving students and lecturers from the Indonesian Language and Literature Education program. The instrument was designed to incorporate contextual case scenarios supported by AI to enhance analytical and reflective thinking in pragmatic communication. The validation results indicate that the instrument achieved a content validity score of 77.5% (valid), linguistic validity of 84.61% (very valid), and graphical feasibility of 88.46% (very valid), with an overall validity score of 83.52%, categorized as highly valid. These findings demonstrate that the integration of AI and case-based learning provides a contextual, adaptive, and effective evaluation tool for assessing students' pragmatic competence. The study concludes that AI-assisted assessment instruments can significantly enhance the quality of learning evaluation by promoting higher-order thinking skills and contextual language use, although further empirical testing is recommended to measure their impact on learning outcomes.

Keywords: Artificial Intelligence; Case-Based Learning; Assessment Instrument; Pragmatic Competence; Speech Strategy; Higher Education

I. INTRODUCTION

The rapid advancement of digital technologies has transformed educational practices, particularly in the domain of learning assessment and evaluation. Among these technologies, artificial intelligence (AI) has emerged as a powerful tool for enhancing adaptive learning, automated feedback, and data-driven decision-making in education [1]. AI-based systems enable more efficient and personalized assessment processes by analyzing learners' responses in real time and generating context-sensitive feedback [2]. In higher education, the integration of AI into assessment practices has been associated with improved measurement accuracy, scalability, and responsiveness to diverse learner needs [3]. However, despite these advancements, the application of AI in language learning assessment particularly in pragmatics remains underexplored, especially in developing contextually rich and cognitively demanding evaluation instruments [4].

Pragmatic competence, defined as the ability to use language appropriately in social and contextual interactions, is a critical component of communicative competence [5]. It encompasses understanding implicit meaning, speech acts, politeness strategies, and contextual adaptation in communication. Research indicates that many students struggle to apply speech strategies effectively in real-life interactions due to the abstract nature of pragmatic concepts and the lack of contextualized assessment tools [6]. Traditional assessment methods, which often rely on multiple-choice or decontextualized items, fail to capture the complexity of pragmatic competence and higher-order thinking skills [7]. Therefore, there is a pressing need to design innovative assessment instruments that reflect authentic communication scenarios and evaluate students' analytical and interpretative abilities in language use.

One promising approach to address this limitation is the integration of case-based learning (CBL) into assessment design. Case-based learning emphasizes the use of real-world or simulated scenarios to engage learners in problem-solving and critical analysis [8]. In the context of language education, CBL allows students to interpret communication situations, identify appropriate speech strategies, and justify their responses based on pragmatic principles. Empirical studies have demonstrated

that case-based approaches significantly enhance contextual understanding, critical thinking, and learner engagement [9]. Furthermore, combining CBL with digital technologies can create more interactive and meaningful learning experiences, bridging the gap between theory and practice [10].

Despite its potential, the integration of AI and case-based learning in assessment instrument design remains limited in current research. Existing studies tend to focus either on AI-driven automated assessment systems or on case-based instructional strategies, with limited attention to their combined application in evaluating pragmatic competence [11]. This gap highlights the need for a hybrid assessment model that leverages AI capabilities to deliver adaptive, data-informed evaluation while maintaining the contextual richness of case-based scenarios. Such integration is expected to enhance not only the validity and reliability of assessment instruments but also their relevance to real-world communication contexts [12].

In addition, the development of assessment instruments requires adherence to rigorous standards of validity, reliability, and usability. According to recent studies, AI-assisted assessment tools must be carefully designed to ensure alignment with learning objectives, fairness in evaluation, and transparency in scoring mechanisms [13]. The incorporation of case-based scenarios further necessitates the consideration of linguistic clarity, contextual accuracy, and cognitive complexity. Therefore, the design of an AI-integrated, case-based assessment instrument involves a multidisciplinary approach that combines educational measurement, applied linguistics, and educational technology [14].

This study addresses the identified research gap by developing and validating an AI-assisted, case-based assessment instrument for measuring students' understanding of pragmatic speech strategies in higher education. The novelty of this research lies in the integration of AI technology with case-based learning principles to create a contextual, adaptive, and analytically oriented evaluation tool. The study contributes to the literature by providing an empirical framework for designing innovative assessment instruments that align with 21st-century learning demands. Practically, it offers insights for educators and curriculum developers on implementing technology-enhanced assessment strategies to improve language learning outcomes. Ultimately, this research supports the transformation of educational assessment from a static measurement tool into a dynamic and intelligent system that fosters higher-order thinking and contextual competence [15].

Artificial Intelligence in Educational Assessment

The integration of artificial intelligence (AI) in educational assessment has significantly transformed traditional evaluation practices by enabling automation, personalization, and data-driven insights. AI based assessment systems utilize techniques such as natural language processing (NLP), machine learning, and learning analytics to evaluate student responses with greater efficiency and consistency [16]. These systems are capable of providing instant feedback, adaptive testing, and predictive analytics that support both formative and summative assessment processes. Recent studies indicate that AI-enhanced assessment improves not only grading efficiency but also diagnostic accuracy in identifying students' learning gaps [17].

However, despite these advantages, scholars have raised concerns regarding the limitations of AI in assessing complex cognitive and contextual competencies, particularly in language learning domains such as pragmatics. AI systems often struggle to interpret implicit meaning, socio-cultural nuances, and context-dependent language use, which are essential components of pragmatic competence [18]. Furthermore, issues related to algorithmic bias, transparency, and validity remain critical challenges in the deployment of AI for high-stakes assessment [19]. Therefore, while AI offers technological sophistication, its effectiveness depends on how well it is integrated with pedagogical approaches that capture contextual and interpretative dimensions of learning.

Case-Based Learning and Authentic Assessment

Case-Based Learning (CBL) is a pedagogical approach that emphasizes learning through real-world scenarios, enabling students to apply theoretical knowledge to practical situations. In assessment contexts, CBL supports the development of authentic assessment instruments, where students are required to analyze cases, make decisions, and justify their reasoning [20]. This approach aligns with constructivist learning theory, which posits that knowledge is constructed through active engagement and contextual experience.

In language education, CBL has been shown to enhance learners' ability to interpret communicative contexts, evaluate speech strategies, and develop pragmatic awareness. By presenting realistic communication scenarios, case based assessments allow students to demonstrate higher order thinking skills such as analysis, synthesis, and evaluation [21]. Moreover, CBL fosters learner engagement and motivation by making assessment tasks more meaningful and relevant to real life communication. However, traditional implementation of case-based assessment often relies on manual evaluation, which can be time-consuming and subject to subjective bias. This limitation highlights the need for technological integration to improve efficiency and consistency in scoring.

Research Gap: The Need for AI-Integrated Case-Based Assessment

Although both AI-based assessment and case-based learning have been widely studied, existing literature tends to treat them as separate domains, with limited exploration of their integration. AI research primarily focuses on automation and scalability, while case-based learning research emphasizes contextual understanding and critical thinking [22]. This separation creates a gap in developing assessment instruments that are both technologically advanced and pedagogically meaningful. Specifically, there is a lack of models that combine AI's capability for adaptive evaluation with the contextual richness of case-based scenarios to assess pragmatic speech strategies. Most AI-driven assessment tools are designed for objective testing formats, such as multiple choice or short answer questions, which are insufficient for capturing the complexity of pragmatic competence. Conversely, case-based assessments provide contextual depth but lack efficiency and scalability when evaluated manually. This gap suggests the need for a hybrid assessment framework that integrates AI with case-based learning to achieve both validity and

efficiency [23].

Positioning the Novelty of This Study

This study positions itself at the intersection of AI-driven assessment and case-based learning, proposing a novel framework for designing pragmatic speech strategy assessment instruments. The novelty lies in three key contributions. First, the study integrates AI-assisted evaluation mechanisms with contextual case scenarios, enabling adaptive and analytically oriented assessment. Second, it addresses the limitation of traditional pragmatic assessment by introducing instruments that capture both linguistic accuracy and contextual appropriateness. Third, it contributes to the field of educational technology by demonstrating how AI can be operationalized not merely as a grading tool but as a cognitive support system that enhances higher-order thinking. By bridging the gap between technological innovation and pedagogical relevance, this study extends existing theoretical frameworks in both AI in education and authentic assessment. It aligns with recent calls for human centered AI in education, where technology is designed to complement, rather than replace, pedagogical principles [16], [22]. Therefore, the integration of AI and case-based learning represents a significant step toward developing intelligent, contextual, and scalable assessment systems for 21st-century education.

II. RESEARCH METHODS

This study employed a Research and Development (R&D) design to develop and validate an AI assisted, case-based assessment instrument for measuring students' pragmatic speech strategy competence in higher education. The research adopted the 4-D development model Define, Design, Develop, and Disseminate proposed by Thiagarajan, with this study focusing on the first three stages due to scope limitations [24]. In the define stage, a needs analysis was conducted through questionnaires and preliminary interviews with lecturers and students in the Indonesian Language and Literature Education program to identify gaps in existing pragmatic assessment practices. The design stage involved constructing assessment blueprints, case scenarios, and scoring rubrics aligned with pragmatic competence indicators, including speech acts, politeness strategies, and contextual appropriateness. AI integration was embedded at this stage by designing structured response formats compatible with natural language processing (NLP)-based evaluation and automated feedback generation. The develop stage included expert validation and iterative revision of the instrument. The participants consisted of two language assessment experts, one educational technology expert, and one linguist, alongside 30 undergraduate students selected through purposive sampling. Data collection instruments included validation sheets, practicality questionnaires, and documentation, ensuring triangulation across expert judgment and user feedback.

Data analysis was conducted using a combination of quantitative descriptive statistics and qualitative content analysis. The validity of the instrument was measured using a Likert-scale-based validation index, covering three aspects: content validity, linguistic clarity, and graphical design. The percentage scores were interpreted using established feasibility criteria (e.g., $\geq 80\%$ = very valid). Qualitative feedback from experts was analyzed to refine case scenarios, improve clarity, and ensure alignment with pragmatic constructs. Additionally, the AI component of the instrument was evaluated in terms of functional suitability, response accuracy, and usability, following recent guidelines for AI-based educational tools [25]. Reliability considerations were addressed through internal consistency of rubric scoring and iterative expert agreement. Ethical considerations were maintained by obtaining informed consent from all participants and ensuring anonymity in data reporting. The methodological framework ensures that the developed instrument meets standards of validity, reliability, and pedagogical relevance, supporting its applicability as an innovative assessment tool in AI-enhanced language learning environments.

III. RESULTS AND DISCUSSION

Results of Instrument Development and Validation

The development of the AI-assisted, case-based assessment instrument for pragmatic speech strategy competence resulted in a structured evaluation tool consisting of contextual case scenarios, analytic scoring rubrics, and AI-supported response analysis features. The validation process involved expert judgment across three main dimensions: content validity, linguistic quality, and graphical/design feasibility. The quantitative results of expert validation are presented in Table 1.

Table 1. Expert Validation Results of the Assessment Instrument

No	Validation Aspect	Score (%)	Category
1	Content Validity	77.50%	Valid
2	Linguistic Quality	84.61%	Very Valid
3	Graphical Feasibility	88.46%	Very Valid
Average Score		83.52%	Very Valid

The results indicate that the developed instrument achieved an overall score of 83.52%, which falls within the "very valid" category. The content validity score (77.50%) suggests that the instrument adequately represents key components of pragmatic

competence, including speech acts, politeness strategies, and contextual appropriateness. Meanwhile, the high linguistic and graphical scores indicate that the instrument is clear, comprehensible, and user-friendly, supporting effective implementation in classroom settings. These findings confirm that integrating case-based scenarios enhances the contextual relevance of assessment tasks, while AI integration contributes to the efficiency and adaptability of evaluation processes. Similar findings by Holmes and Tuomi [25] emphasize that AI-supported assessment tools can improve both accuracy and scalability when properly aligned with pedagogical objectives.

Practicality and User Response

In addition to expert validation, the practicality of the instrument was evaluated through student responses. The results showed that 86% of students found the instrument engaging and relevant, particularly due to the use of real-life communication cases. Students reported that the case-based format encouraged them to think critically and apply theoretical knowledge in practical contexts. The AI supported features such as automated feedback and structured response prompts were perceived as helpful in guiding students' reasoning processes. This aligns with Chen et al. [17], who argue that AI-driven feedback systems enhance learner autonomy and reflective thinking. The findings suggest that combining AI with case-based learning creates a more interactive and learner-centered assessment environment, which is essential for developing higher-order cognitive skills.

Discussion: Integration of AI and Case-Based Learning

The results demonstrate that the integration of AI and case-based learning addresses the limitations identified in previous assessment models. Traditional pragmatic assessments often lack contextual depth, while purely AI-based systems may fail to capture nuanced language use [18]. By combining these approaches, the developed instrument achieves a balance between technological efficiency and pedagogical authenticity. From a theoretical perspective, this finding supports the concept of authentic assessment, where learners are evaluated based on their ability to apply knowledge in real-world situations [20]. The case-based scenarios function as cognitive triggers that require students to interpret context, evaluate communication strategies, and justify their responses. Meanwhile, AI enhances the assessment process by enabling adaptive evaluation and consistent scoring, addressing issues of subjectivity in manual assessment.

Furthermore, the results align with Ifenthaler and Gibson [22], who highlight that AI integration in education is most effective when combined with constructivist learning approaches. The present study extends this argument by demonstrating that AI can serve as a facilitator of contextual learning, rather than merely an automation tool. This integration represents a shift toward intelligent assessment systems that support both measurement and learning processes simultaneously.

Contribution to Educational Assessment and AI Integration

This study contributes to the field in three significant ways. First, it provides empirical evidence that AI-assisted, case-based assessment instruments can achieve high levels of validity and usability in language education. Second, it introduces a hybrid assessment framework that bridges the gap between AI-driven efficiency and contextual evaluation. Third, it demonstrates that AI can be used to enhance not replace pedagogical practices, supporting a human-centered approach to educational technology [19]. The findings also reinforce the importance of aligning assessment design with 21st-century learning competencies, such as critical thinking, problem-solving, and contextual communication. As noted by Rahman [23], the future of educational assessment lies in integrating technology with authentic learning experiences to create more meaningful and effective evaluation systems.

Limitations and Future Directions

Despite its contributions, this study has several limitations. The sample size was relatively limited, and the instrument was tested within a specific academic context. Future research should involve larger and more diverse samples to enhance generalizability. Additionally, further studies are needed to evaluate the effectiveness of the instrument on learning outcomes, using experimental or quasi-experimental designs. Future research may also explore the integration of advanced AI techniques, such as deep learning and semantic analysis, to improve the accuracy of automated scoring in pragmatic assessment. Expanding the instrument into a web-based or mobile platform could further enhance accessibility and scalability in broader educational settings.

IV. CONCLUSION

This study confirms that the integration of artificial intelligence and case-based learning provides a robust framework for developing contextual and adaptive assessment instruments in language education. The findings demonstrate that the proposed instrument achieves a high level of validity (83.52%) and user acceptance (86%), indicating its effectiveness in measuring students' pragmatic speech strategy competence. By embedding real-life communication scenarios into AI-supported evaluation, the instrument successfully captures both analytical reasoning and contextual language use, addressing the limitations of traditional assessment models. The study contributes theoretically by advancing the concept of AI-enhanced authentic assessment, where technological capabilities are aligned with constructivist and pragmatic learning principles. Practically, it offers a scalable solution for educators to implement intelligent assessment systems that promote higher-order thinking and learner engagement. However, further research is needed to examine the long-term impact of such instruments on learning outcomes and to refine AI algorithms for deeper semantic interpretation. Overall, this study establishes that the convergence of AI and case-based learning represents a significant innovation in educational assessment, supporting the transition toward adaptive, contextual, and learner-centered evaluation systems in higher education.

V. REFERENSI

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