

Development of ARCS Model-Based Gamification Indicators with a Multilevel Interpretability Framework

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ABSTRACT

Maintaining learner motivation remains a persistent challenge in digital learning, particularly because the motivational benefits of gamification may decline as its novelty diminishes. Existing gamification approaches also frequently emphasize game mechanics without systematically connecting them to motivational principles or the different roles involved in instructional development. This study aimed to develop operational gamification design indicators grounded in the Attention, Relevance, Confidence, and Satisfaction (ARCS) model and organize them within a multilevel interpretability framework. A conceptual framework development approach informed by the front-end analysis and formative design principles of Educational Design Research was employed. The development process involved theoretical analysis, conceptual synthesis, qualitative expert review, and theoretical refinement. Relevant principles from educational gamification, ARCS-based motivational design, and narrative-oriented learning were synthesized to formulate preliminary indicators, which were subsequently refined through expert feedback. The study produced 21 operational indicators distributed across Attention (5), Relevance (5), Confidence (5), and Satisfaction (6). These indicators were organized into three interpretative levels: Reader, focusing on conceptual understanding; User, focusing on practical implementation and adaptation; and Developer, focusing on the structural and technical design of gamified learning systems. The resulting framework provides a theoretically grounded blueprint that connects motivational principles with actionable gamification design across different user roles. As the framework remains conceptual and has not undergone empirical implementation or learner-outcome testing, further research is required to examine its validity, usability, and effectiveness across educational contexts.

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1. INTRODUCTION

Learning motivation plays a central role as a determinant of success in learning environments, particularly in the evolving digital era. Digital learning modalities such as mobile learning have emerged as innovations that enable learning to take place anytime and anywhere (Hendrayana & Wahyudin, 2018). Within digital learning contexts, learners are required to be more autonomous in managing their time and determining their own learning goals. Learners who demonstrate a stronger understanding of autonomy and self-regulation concepts in online learning environments tend to exhibit higher levels of intrinsic motivation (Nguyen & Chen, 2023). The use of instructional media that fosters learners' interest and enjoyment facilitates their understanding of the learning materials presented (Hardinata & Ruhiat, 2023). The advancement of educational technology has encouraged the adoption of various instructional design approaches aimed at enhancing learning motivation, one of which is learning gamification (Schindler et al., 2017).

Gamification is defined as the use of game design elements in non-game contexts to enhance user engagement and motivation. One of the primary reasons gamification is considered effective lies in its ability to increase students' motivation and engagement. When implemented using appropriate methodologies, gamification can be effective in educational settings, leading to increased participation and improved knowledge acquisition (Jaramillo-Mediavilla et al., 2024). Gamification has been shown to contribute to higher levels of student engagement, learning achievement, and social interaction (Nadi-Ravandi & Batooli, 2022). The integration of gamification into learning environments encourages students to participate actively, which has positive implications for their motivation and comprehension of learning materials (Jutin & Maat, 2024).

However, other findings suggest that motivation gains resulting from gamification often decline after the initial phase of implementation due to the dominance of the novelty effect (Hanus & Fox, 2015). The novelty effect refers to a phenomenon in which initial enjoyable and motivating experiences diminish as learners become accustomed to the implemented elements. This highlights the importance of contextual considerations in gamification, as its effects are highly dependent on how and where game elements are applied. When gamification is not designed with adequate attention to contextual and individual differences, its long-term motivational impact tends to diminish (Leftheriotis et al., 2017). The decline in motivational effectiveness is frequently associated with shallow gamification designs that lack a strong grounding in motivational theory (Dichev & Dicheva, 2017). Gamification implementations that emphasize elements such as points, badges, and leaderboards without considering the underlying psychopedagogical principles of learning motivation may result in negative outcomes (Toda et al., 2018). The use of gamification elements that focus on external rewards often produces ambiguous short-term effects and carries the risk of undermining more sustainable forms of intrinsic motivation (Klemke et al., 2018). More strategic design approaches in gamification implementation, including greater variation in gamification elements and more precise contextual adaptation, are therefore strongly recommended (Tuah et al., 2017; Kim & Castelli, 2021).

Despite these recommendations, existing gamification indicators are often insufficient for instructional design. Many conventional frameworks function merely as static, retrospective evaluation tools to assess engagement after a system is built, rather than serving as proactive design blueprints. They focus on mechanical elements but provide little guidance on how to integrate human psychology into the learning architecture. To create a sharper transition from merely identifying gamification problems to implementing theoretical solutions, a robust motivational framework must be introduced early in the design stage. Several leading psychological theories explain human motivation, such as Self-Determination Theory (SDT) (Ryan & Deci, 2020), Flow Theory (Engeser et al., 2021), and Expectancy-Value Theory (Eccles & Wigfield, 2020). While SDT provides a comprehensive macro-level understanding of psychological needs (autonomy, competence, relatedness), and Flow Theory explains the optimal balance between learner skill and task challenge, they primarily serve as descriptive psychological models rather than prescriptive instructional tools. Similarly, Expectancy-Value Theory explains why students engage but does not explicitly detail how to build that engagement step-by-step

In contrast, the ARCS motivational theory developed by Keller offers an instructional design framework that focuses on four core prescriptive dimensions: Attention, Relevance, Confidence, and Satisfaction (Keller, 2010). Most previous studies have discussed the application of the ARCS model within specific contexts but have often focused on measuring its effects after implementation. In the context of gamified learning, there is a need for modeling approaches that incorporate game elements and player types within the distribution of design indicators (Özhan & Kocadere, 2019). A meta-analysis conducted by Mei et al. revealed that many applications of the ARCS model remain inconsistent across studies (Mei et al., 2025). Strong instructional design is critical for the successful implementation of motivational theories in educational contexts; however, these aspects are rarely discussed in detail during the design stage (Alaidaros & Mohamed, 2025; Ma & Lee, 2021).

Moreover, literature reviews indicate that gamification indicators are commonly presented as static lists without accounting for the diverse needs and roles of indicator users. In their meta-analysis, Sailer and Homner noted that although gamification demonstrates positive effects, many approaches tend to be generic and fail to consider variations in user characteristics (Sailer & Homner, 2020). Several prior studies have also insufficiently examined the role of users in gamification design, resulting in less effective implementations (Hewko et al., 2025). In practice, educators, instructional designers, and system developers possess different levels of understanding and distinct objectives when utilizing design indicators. The lack of an interpretative framework for these differing roles may limit the optimal use of such indicators.

Accordingly, a clear research gap exists regarding the lack of operational, design-stage gamification indicators grounded in a prescriptive motivational theory like ARCS. Furthermore, prior frameworks do not fully provide clear interpretability across different user roles (Buckley & Doyle, 2017). To address this gap, this study poses two explicit research questions: (1) How can ARCS motivational dimensions be formulated into operational gamification design indicators? and (2) How can a framework be structured to ensure these indicators are interpretable and usable across different user roles? Therefore, the primary purpose of this study is to develop ARCS-based gamification indicators through a comprehensive conceptual synthesis. The novelty of this research lies in the formulation of a multilevel interpretability framework that provides targeted contextualization. By providing these indicators, this study contributes a design-oriented tool that bridges motivational theory and gamified learning development. These indicators serve as proactive blueprints for conceptual readers, instructional practitioners, and system developers.

2. METHODS

2.1 Research Design

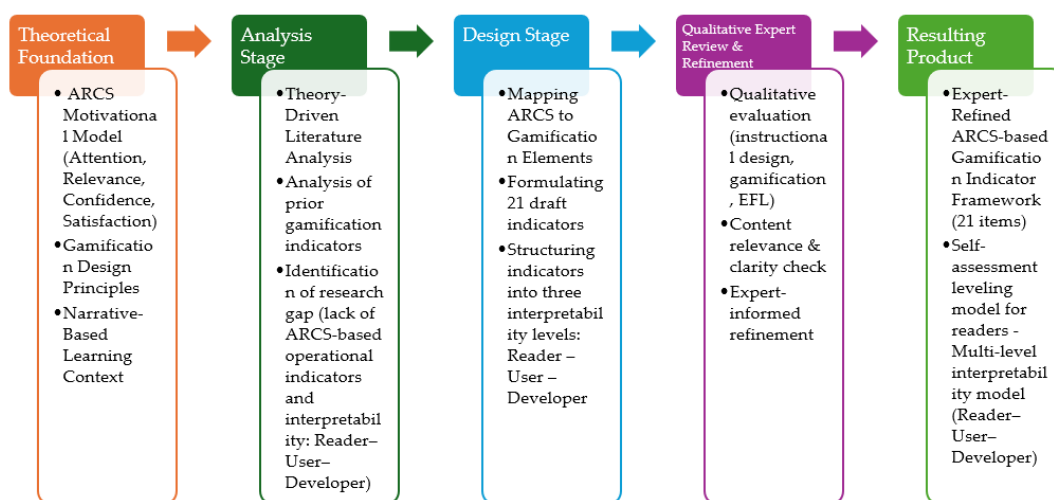


Figure 1. Research Design of the Study

This study employed a conceptual framework development approach informed by the front-end analysis and formative design principles of Educational Design Research (EDR) (McKenney & Reeves, 2018; Richey & Klein, 2007). Rather than implementing a complete EDR cycle, the study focused on the early-stage development of a theoretically grounded framework for ARCS-based gamification design. This approach was selected because the primary aim of the study was to formulate operational design indicators by integrating motivational theory with gamification principles and to structure these indicators for interpretation across different user roles.

The framework development process consisted of four sequential phases: (1) theoretical analysis, in which relevant concepts and design principles related to gamification, learning motivation, and the ARCS model were examined; (2) conceptual design, in which the identified principles were synthesized and translated into preliminary gamification design indicators aligned with the four ARCS dimensions of Attention, Relevance, Confidence, and Satisfaction; (3) qualitative expert review, in which the preliminary framework was examined for theoretical coherence, clarity, and operational feasibility; and (4) theoretical refinement, in which the indicators and their multilevel interpretations were revised based on the expert feedback. These phases established a systematic progression from theoretical foundations to an expert-refined conceptual framework.

Accordingly, the study was positioned as an early-stage conceptual development study rather than an empirical evaluation of the framework's effectiveness. No intervention or learner-outcome testing was conducted at this stage. The resulting framework was intended to provide a theoretically grounded blueprint for subsequent development, implementation, and empirical validation in educational settings.

2.2 Analysis Stage

The initial phase aimed to identify the theoretical requisites for gamification that supports sustainable learning motivation. To achieve this, a theory-driven literature analysis was conducted to map design principles derived from recent educational gamification studies, narrative-based learning approaches, and the ARCS motivational model. The outcomes of this synthesis highlighted the limitations of surface-level gamification and reinforced the necessity for indicators anchored in robust motivational theory (Dichev & Dicheva, 2017).

2.3 Design Stage

Building upon the analysis, the design stage formulated operational indicators aligned with the four dimensions of the ARCS model: Attention, Relevance, Confidence, and Satisfaction (Keller, 2016). To ensure transparency, the mapping process utilized a conceptual synthesis matrix (see Table 1). This matrix juxtaposed abstract motivational dimensions directly against gamification mechanics (Toda et al., 2018) and cognitive depth levels (Anderson & Krathwohl, 2001). This synthesis generated a preliminary set of ARCS-based indicators applicable to instructional planning. To address the diverse technical aptitudes of potential users, the framework was structurally designed using a multilevel interpretability matrix. This proposed a clear conceptual alignment across three distinct user roles.

Table 1. Conceptual Synthesis Matrix for the Multilevel Framework

Capacity Level	ARCS Motivational Focus	Cognitive Depth (Revised Bloom)	Gamification & Instructional Design
Level 1: Reader (Conceptual Understanding)	Identifying psychological values within motivational components.	<i>Remember (C1) & Understand (C2):</i> Recognizing and explaining concepts.	Understanding the theoretical functions of basic mechanics (e.g., points, badges).
Level 2: User (Practical Implementation)	Adapting and applying motivation-generating	<i>Apply (C3) & Analyze (C4):</i> Executing and diagnosing media pathways.	Applying and utilizing existing gamification

	features in learning environments.		elements for learning scenarios.
Level 3: Developer (System Development)	Designing, structuring algorithms, and integrating game mechanics to sustain motivation.	<i>Evaluate (C5) & Create (C6):</i> Building, programming, and developing new architectures.	Designing storyboards and creating leveling and reward architectures from scratch.

2.4 Qualitative Expert Review and Refinement

To ensure pedagogical robustness, the preliminary indicators were subjected to a qualitative expert review. An academic expert specializing in instructional design and educational technology evaluated the framework's theoretical coherence and operational feasibility. This study employed a qualitative heuristic evaluation to capture the insights required during early-stage framework development (McKenney & Reeves, 2018; Bakker, 2018). This approach prioritized substantive feedback regarding wording precision, structural coherence, and pedagogical appropriateness. Through theoretical reflection and qualitative adjustments based on the expert's feedback, the indicators underwent an expert-informed refinement. This iterative process facilitated the achievement of preliminary content validity (Almanasreh et al., 2019), resulting in the Expert-Refined ARCS-based Gamification Indicator Framework.

2.5 Data Analysis Techniques

Data obtained from both the literature synthesis and the expert's qualitative feedback were analyzed systematically. The conceptual synthesis focused on identifying and organizing motivational patterns relevant to gamification. Subsequently, the expert's qualitative inputs were examined to guide necessary revisions. This ensured the indicators remained consistent with the ARCS objectives while accommodating real-world educational values (Faidin et al., 2025). This iterative analysis aimed to establish operational clarity and flexibility across learning contexts (Koivisto & Hamari, 2019). This methodological strategy solidifies the study's position as a conceptual bridge between motivational theory and practical gamified design.

3. FINDINGS AND DISCUSSION

3.1. Development of ARCS-Based Gamification Indicators

The conceptual synthesis generated a structured framework comprising 21 operational indicators. These indicators integrate narrative-based learning strategies with specific gamification mechanics. The conceptual integration is visualized in Figure 2. Unlike generic gamification checklists that frequently focus on adding points and badges, this framework maps mechanical elements to psychological motivational drivers. When compared to the widely used Self-Determination Theory (SDT) in gamification (Ryan & Deci, 2020)—which emphasizes broad psychological needs like autonomy, competence, and relatedness—the ARCS-based approach offers a more granular, instructional-focused methodology. It provides strategies suited for design of educational materials, such as narrative texts.

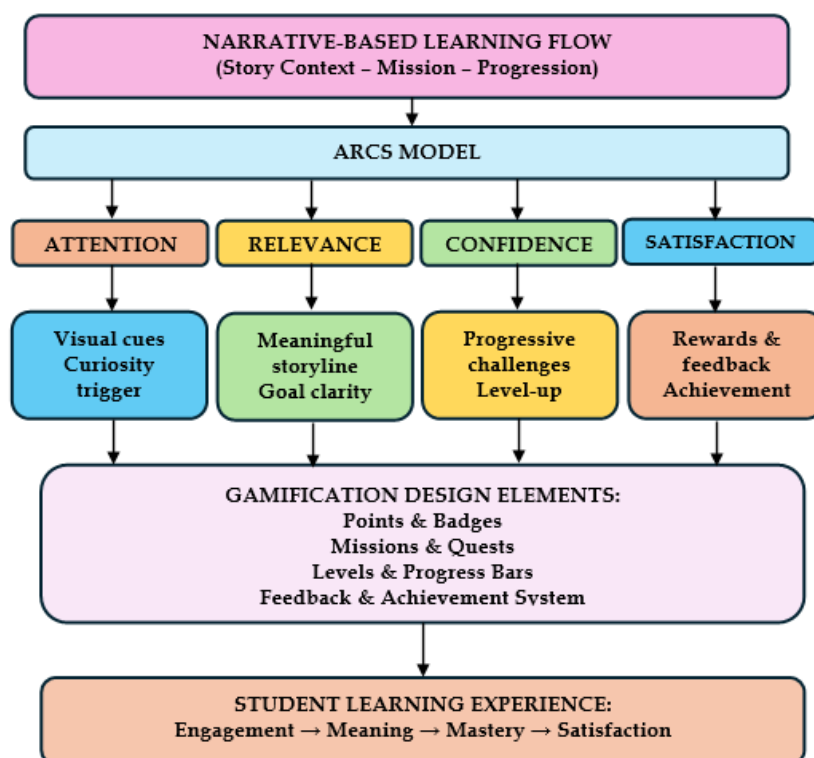


Figure 2. Conceptual Integration of ARCS and Narrative Gamification

3.2. Distribution of Indicators Across ARCS Dimensions

The 21 indicators are distributed across the four dimensions of the ARCS model to maintain motivation. First, the Attention dimension (5 indicators) operationalizes perceptual and inquiry arousal. It incorporates mechanics such as narrative suspense, mystery elements, and unexpected visual cues to capture initial learner focus. Second, the Relevance dimension (5 indicators) connects game missions to real-world utility and personal motives, utilizing local folklore contexts to bridge abstract learning goals with familiar cultural narratives. Third, the Confidence dimension (5 indicators) is structured around expectancy for success. It employs progressive leveling, clear instructional scaffolding, and formative feedback loops to prevent cognitive overload. Finally, the Satisfaction dimension (6 indicators) utilizes equity and positive consequences, deploying intrinsic narrative resolutions and extrinsic badge systems to reinforce learner persistence.

The distribution of these parameters is detailed in Table 2.

Tabel 2. ARCS-Based Gamification Indicators with a Multilevel Interpretability Framework

ARCS Dimension	Code	Gamification Indicator	Level 1: Reader (Conceptual Understanding)	Level 2: User (Practical Implementation)	Level 3: Developer (System Development)
Attention	A1	The instructional design includes elements that trigger curiosity through narratives or initial challenges.	Demonstrating curiosity in learning motivation.	Utilizing narratives and initial challenges.	Designing an adaptive narrative system.
	A2	There is a variety of activities or missions that prevent boredom in learning.	Recognizing the importance of variety.	Executing various types of missions.	Designing varied mission architectures.

	A3	Visual, audio, or interactive elements are used to capture and sustain student attention.	Identifying attention-grabbing elements.	Using interactive media effectively.	Integrating dynamic multimedia components.
	A4	The storyline or quest is presented progressively to build suspense, curiosity, and engagement.	Understanding the concept of suspense/curiosity in narrative texts.	Executing the mission flow progressively.	Designing narrative pacing and flow algorithms.
	A5	The system provides surprises or changes that are not entirely predictable by the students.	Recognizing surprise elements.	Discovering and adapting to surprise elements.	Developing a dynamic, condition-based system.
Relevance	R1	Missions or activities are designed in strict alignment with learning objectives.	Understanding objective alignment.	Connecting missions to objectives.	Designing a system aligned with instructional goals.
	R2	The learning narrative represents experiences or contexts familiar to the students.	Recognizing contexts familiar to students.	Utilizing familiar student contexts.	Developing culturally/socially familiar contexts.
	R3	Character design in the story is relevant to the students' social and cultural backgrounds.	Understanding roles relevant to students.	Assigning contextually relevant roles.	Designing an engaging fictional character profile system.
	R4	Gamification activities are designed to reinforce student comprehension of the learning material.	Recognizing activities that reinforce material understanding.	Linking materials and activities to reinforce comprehension.	Developing learning mechanics that deepen comprehension.
	R5	The system provides flexible learning paths tailored to diverse student needs.	Understanding learning flexibility.	Exploring flexible learning path options.	Designing adaptable and flexible learning pathways.
Confidence	C1	A progressive leveling system exists, reflecting the student's growing capabilities.	Understanding the function of progressive leveling.	Utilizing the progressive leveling function.	Designing the progressive leveling algorithm.
	C2	The system provides clear and continuous formative feedback.	Recognizing the pedagogical role of feedback.	Providing regular instructional feedback.	Developing an automated feedback engine.
	C3	Visual progress indicators (bars, badges, statuses) are displayed consistently.	Understanding progress visualization.	Analyzing visual progress indicators.	Designing intuitive progress visualization.
	C4	The difficulty level of challenges is dynamically adjusted to student capabilities.	Understanding the concept of capability adaptability.	Adjusting challenge controls to match capabilities.	Developing adaptive difficulty mechanics.
	C5	Students are granted control over their own learning pace and strategies.	Recognizing autonomous learning pace and strategies.	Analyzing learning choices based on individual pace.	Designing a customizable, student-controlled system.

Satisfaction	S1	The reward system is designed to provide relevant motivational impact on learning achievements.	Understanding meaningful rewards.	Discovering meaningful reward applications.	Designing a pedagogically meaningful reward system.
	S2	The learning process is designed to provide appreciation for every student achievement.	Recognizing the presence of appreciation.	Identifying appreciation in achievements.	Designing an achievement appreciation system.
	S3	The system provides a space for reflection on the narrative-based learning experience.	Explaining reflection on learning experiences.	Analyzing reflection within learning experiences.	Designing a narrative system with a reflective space.
	S4	The application design ensures students remain consistently motivated after completing each stage.	Understanding sustained motivation.	Maintaining continuous learning engagement.	Designing long-term engagement features for sustainability.
	S5	The learning experience cultivates an emotional connection with the narrative or characters.	Recognizing emotional engagement with characters/narratives.	Analyzing emotional engagement triggers.	Designing an emotional engagement system.
	S6	Learning satisfaction is emphasized through competency mastery, not merely extrinsic rewards.	Understanding satisfaction derived from mastery.	Ensuring satisfaction through competency mastery.	Designing a competency-mastery driven system.

3.3. Multilevel Interpretability Framework

To address the diverse technical expertise of educational stakeholders, the resulting framework was structured using a multilevel interpretability matrix (refer to Table 1 in the Methods section). This structure outlines how the conceptual alignment of ARCS and gamification is interpreted differently depending on the stakeholder's role, as illustrated in Figure 3. Level 1 (Reader) focuses on conceptual understanding. Level 2 (User) focuses on practical implementation and adaptation of existing mechanics. Level 3 (Developer) focuses on the algorithmic and structural design of new gamified architectures.

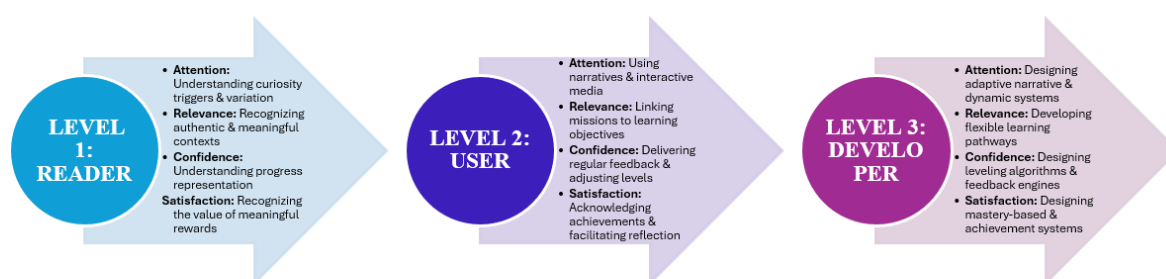


Figure 3. Multilevel Interpretability of ARCS-Based Gamification Indicators

3.4. Expert Review and Refinement

The initial framework underwent a qualitative evaluation by an instructional design expert. The evaluation prioritized pedagogical appropriateness and structural coherence. Adjustments were made to refine the wording precision of the indicators, ensuring they are actionable rather than purely

theoretical. Through this expert-informed refinement, abstract instructional concepts were translated into operational design steps. This iterative process facilitated the achievement of preliminary content validity, offering the framework as a conceptually sound blueprint prior to empirical testing.

3.5. Implications for Gamified Learning Design

The outcomes of this study present specific contributions to both educational theory and instructional practice.

1) Theoretical Implications

This study offers a preliminary bridge between motivational design theory and gamified learning development. It shows how ARCS can be operationalized into gamification design indicators. By doing so, this framework extends the existing literature. First, it shifts the focus from post-hoc evaluation (assessing gamification after implementation) to design-stage guidance (providing a blueprint during development). Second, it advances the discourse from utilizing generic gamification mechanics to implementing motivationally aligned indicators. Third, it transitions the focus from single-user interpretation to role-based interpretability, acknowledging the collaborative nature of educational technology development.

2) Practical Implications

Practically, the multilevel framework serves as a functional tool for instructional designers, language teachers, and software developers. For educators, the indicators function as a rubric to select or adapt gamified platforms that align with specific motivational gaps in their classrooms. For developers, the indicators provide clear parameters for structuring application features, such as leveling algorithms and narrative progression, ensuring that technical designs prioritize pedagogical goals over superficial engagement.

3.6. Limitations of the Study

While the proposed framework offers conceptually aligned structure, it is subject to certain limitations. First, the 21 indicators were formulated through theoretical synthesis and expert review, proposing preliminary content validity. The framework has not yet been subjected to a full-scale empirical field trial to measure its impact on student motivation or learning outcomes. Second, the indicators were conceptualized with a specific focus on narrative-based language learning; their applicability to other subjects (e.g., mathematics or exact sciences) may require further adaptation. Future research should focus on operationalizing this framework into functional learning applications and conducting field studies to validate its impact on diverse learner demographics.

Discussion

The development of 21 ARCS-based gamification indicators demonstrates that gamification design can be structured around motivational functions rather than merely around the presence of game elements. This distinction is important because previous research has shown that gamification can positively influence cognitive, motivational, and behavioral learning outcomes, although its effectiveness varies according to the design and context in which it is implemented (Sailer & Homner, 2020). Similarly, Koivisto and Hamari (2019) emphasized that gamification should be understood as a motivational information system whose effects depend on the interaction between design features and user experiences. The present framework addresses this issue by positioning gamification mechanics within the four motivational dimensions of Attention, Relevance, Confidence, and Satisfaction. Consequently, elements such as narratives, missions, levels, feedback, progress indicators, and rewards are not treated as independent features but as design mechanisms intended to serve specific motivational purposes.

The five indicators within the Attention dimension emphasize curiosity, variation, multimedia stimulation, progressive narrative, and surprise. This formulation is consistent with the ARCS perspective that learner attention should not only be initially captured but also maintained throughout the learning process (Keller, 2010, 2016). The inclusion of narrative progression and variation is

particularly relevant to gamified learning because repetitive use of game mechanics may lose its motivational appeal over time. Hanus and Fox (2015) demonstrated that gamification does not automatically produce sustained intrinsic motivation, while Dichev and Dicheva (2017) argued that the educational benefits of gamification remain dependent on theoretically informed implementation. Therefore, the Attention indicators developed in this study extend beyond visually attractive features by emphasizing variation, curiosity, and progressive experiences as instructional design considerations.

The Relevance indicators further demonstrate that motivational gamification requires alignment between game activities, learning objectives, and learners' contexts. The framework emphasizes objective alignment, familiar experiences, culturally relevant characters, reinforcement of content comprehension, and flexible learning pathways. These principles correspond with Keller's (2010) argument that learners are more likely to perceive instructional experiences as relevant when they connect with their goals, experiences, and needs. This dimension also responds to concerns regarding generic gamification approaches. Sailer and Homner (2020) showed that gamification effects are influenced by contextual and methodological conditions, while Koivisto and Hamari (2019) highlighted the importance of understanding gamification within specific user and implementation contexts. Accordingly, the present framework suggests that relevance should be intentionally designed rather than assumed to emerge from the addition of game elements. The incorporation of familiar social and cultural contexts may be particularly important for narrative-oriented learning, where stories and characters can connect instructional content with learners' prior experiences.

The Confidence dimension operationalizes motivation through progressive leveling, formative feedback, progress visualization, adaptive challenge, and learner control. These indicators reflect the ARCS principle that learners are more likely to persist when they perceive success as attainable and can recognize the relationship between their effort and progress (Keller, 2010). Progressive challenges and visible progress can make achievement pathways more explicit, while continuous feedback provides information that learners can use to regulate subsequent actions. Learner control also has conceptual correspondence with autonomy-oriented explanations of motivation. Ryan and Deci (2020) argue that autonomy and competence are fundamental to high-quality motivation, suggesting that gamified environments should provide meaningful opportunities for choice and mastery rather than relying exclusively on external incentives. Thus, the Confidence indicators provide a bridge between gamification mechanics and psychological conditions that may support sustained engagement.

The six Satisfaction indicators similarly indicate that rewards should not be interpreted solely as points, badges, or other extrinsic incentives. The framework incorporates meaningful rewards, recognition, reflection, sustained engagement, emotional connection, and competency mastery. This is theoretically significant because excessive dependence on external rewards can produce outcomes that differ from those expected from intrinsically meaningful learning experiences. Ryan and Deci (2020) distinguish between different qualities of intrinsic and extrinsic motivation, while Klemke et al. (2018) caution that gamification design requires attention to the relationship between game mechanisms and meaningful learning experiences. The emphasis on competency mastery in the present framework therefore shifts Satisfaction from simple reward acquisition toward recognition of learning progress and achievement. This interpretation is also consistent with the broader recommendation that gamification should be designed strategically rather than reduced to superficial reward structures (Dichev & Dicheva, 2017).

Beyond the individual indicators, a central contribution of the proposed framework is its multilevel interpretability structure. The same motivational principle is translated into three levels: Reader, User, and Developer. At the Reader level, indicators support conceptual recognition and understanding; at the User level, they guide practical implementation and adaptation; and at the Developer level, they are translated into structural or technical design requirements. This progression corresponds conceptually with the increasing cognitive complexity represented in the revised Bloom taxonomy, from remembering and understanding to applying, analyzing, evaluating, and creating

(Anderson & Krathwohl, 2001). The multilevel structure is particularly relevant because educational gamification involves stakeholders with different responsibilities and levels of technical expertise. Rather than requiring educators and software developers to interpret the same indicator identically, the framework provides role-sensitive representations of a shared motivational principle.

This role-based structure also distinguishes the framework from approaches that primarily evaluate whether gamification produces learning or motivational effects after implementation. The present framework instead positions indicators at the design stage, where motivational principles can inform instructional and technical decisions before a gamified environment is developed. This orientation is consistent with Educational Design Research, which emphasizes iterative connections between educational problems, theoretical understanding, and the development of practical solutions (McKenney & Reeves, 2018). The framework should therefore be interpreted as a design blueprint rather than as evidence that the proposed indicators have already improved learner motivation or achievement.

Overall, the findings suggest that meaningful educational gamification requires alignment among motivational theory, instructional objectives, game mechanics, and stakeholder roles. The proposed framework contributes to this alignment by operationalizing ARCS into 21 design indicators and translating them across three levels of interpretation. Nevertheless, these findings remain conceptual and expert-refined rather than empirically validated. The framework has not yet been tested through learner implementation, and its applicability beyond narrative-oriented learning remains to be established. Future research should therefore examine the indicators through broader expert validation, practical implementation, and empirical evaluation across different subjects and learner populations. Such testing is necessary to determine whether the theoretically aligned indicators produce the intended motivational and educational outcomes.

4. CONCLUSION

This study provides a preliminary framework consisting of 21 ARCS-based gamification indicators, systematically organized within a multilevel interpretability matrix. By mapping motivational psychology dimensions directly to actionable game mechanics, this research offers a conceptual blueprint intended to guide the design of gamified learning environments that may support sustained motivation.

The proposed framework is conceptual and preliminary. While it has achieved preliminary content validity through qualitative expert refinement, subsequent empirical testing is required to evaluate its operational impact. The findings suggest a structured approach for bridging narrative-based learning strategies with gamified instructional design.

To build upon this theoretical foundation, future research should transition this conceptual blueprint into practical applications. It is suggested that subsequent studies operationalize these indicators into functional digital platforms, such as Android-based learning applications developed for narrative texts that integrate culturally relevant content, like local folklore. Furthermore, to objectively measure the practical impact of these aligned mechanics, future researchers are encouraged to conduct main field trials. This approach would provide empirical insights into the framework's effectiveness in sustaining student motivation across diverse educational contexts.

Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

- Alaidaros, M., & Mohamed, S. N. A. (2025). Digital Twins and Holograms in STEM Education: A Systematic Review of Pedagogical Models, Benefits, and Barriers. *Research Square*. <https://doi.org/10.21203/rs.3.rs-7433004/v1>
- Almanasreh, E., Moles, R., & Chen, T. F. (2019). Evaluation of methods used for estimating content validity. *Research in Social and Administrative Pharmacy*, 15(2), 214–221. <https://doi.org/10.1016/j.sapharm.2018.03.066>
- Anderson, L. W., & Krathwohl, D. R. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Longman.
- Bakker, A. (2018). *Design Research in Education: A Practical Guide for Early Career Researchers*. Routledge. <https://doi.org/10.4324/9780203701010>
- Buckley, P., & Doyle, E. (2017). Individualising gamification: An investigation of the impact of learning styles and personality traits on the efficacy of gamification using a prediction market. *Computers & Education*, 106, 43–55. <https://doi.org/10.1016/J.COMPEDU.2016.11.009>
- Dichev, C., & Dicheva, D. (2017). Gamifying Education: What Is Known, What Is Believed and What Remains Uncertain: A Critical Review. *International Journal of Educational Technology in Higher Education*, 14(1). <https://doi.org/10.1186/s41239-017-0042-5>
- Eccles, J. S., & Wigfield, A. (2020). From expectancy-value theory to situated expectancy-value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary Educational Psychology*, 61, 101859. <https://doi.org/10.1016/j.cedpsych.2020.101859>
- Engeser, S., Schiepe-Tiska, A., & Peifer, C. (2021). *Historical Lines and an Overview of Current Research on Flow BT - Advances in Flow Research* (C. Peifer & S. Engeser, Eds.; pp. 1–29). Springer International Publishing. https://doi.org/10.1007/978-3-030-53468-4_1
- Faidin, N., Astuti, T. M. P., Prajanti, S. D. W., Hardati, P., & Mohamed, A. (2025). Shaping Children's Social Ethics in Female Migrant Families: Islamic Insights on Education and Gender Within the SDGs Framework. *Profetika Jurnal Studi Islam*, 26(01), 321–338. <https://doi.org/10.23917/profetika.v26i01.11124>
- Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers and Education*, 80, 152–161. <https://doi.org/10.1016/j.compedu.2014.08.019>
- Hardinata, & Ruhiat, Y. (2023). Media Pembelajaran Booklet Berbasis Flipbook pada Materi Aircraft Instrument System. *JURNAL ILMIAH PENDIDIKAN PROFESI GURU*, 6, 399–409. <https://doi.org/10.23887/jippg.v6i2.63195>
- Hendrayana, A., & Wahyudin. (2018). Mobile learning to improve mathematics teachers mathematical competencies. *Journal of Physics: Conference Series*, 948(1), 12049. <https://doi.org/10.1088/1742-6596/948/1/012049>
- Hewko, M., Shaiget, V. G., Smith, M. S., Kohlenberg, E., Ahmadi, P., Hernández, M. E. H., Proulx, C., Cabral, A., Segado, M., Chakrabarty, T., & Choudhury, N. (2025). Considering Theory-Based Gamification in the Co-Design and Development of a Virtual Reality Cognitive Remediation Intervention for Depression (bWell-D): Mixed Methods Study. *JMIR Serious Games*, 13, e59514. <https://doi.org/10.2196/59514>
- Jaramillo-Mediavilla, L., Basantes-Andrade, A., González, M. C., & Martín, S. C. (2024). Impact of Gamification on Motivation and Academic Performance: A Systematic Review. *Education Sciences*, 14(6), 639. <https://doi.org/10.3390/educsci14060639>
- Jutin, N. T., & Maat, S. M. B. (2024). The Effectiveness of Gamification in Teaching and Learning Mathematics: A Systematic Literature Review. *International Journal of Academic Research in Progressive Education and Development*, 13(1). <https://doi.org/10.6007/ijarped/v13-i1/20703>
- Keller, J. M. (2010). *Motivational Design for Learning and Performance - The ARCS Model Approach*. Springer. <https://doi.org/10.1007/978-1-4419-1250-3>
- Keller, J. M. (2016). Motivation, Learning, and Technology: Applying the ARCS-V Motivation Model.

- Participatory Educational Research*, 3(2), 1–15. <https://doi.org/10.17275/per.16.06.3.2>
- Kim, J.-H., & Castelli, D. M. (2021). Effects of Gamification on Behavioral Change in Education: A Meta-Analysis. *International Journal of Environmental Research and Public Health*, 18(7), 3550. <https://doi.org/10.3390/ijerph18073550>
- 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>
- Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*, 45, 191–210. <https://doi.org/10.1016/j.ijinfomgt.2018.10.013>
- Leftheriotis, I., Giannakos, M. N., & Jaccheri, L. (2017). Gamifying Informal Learning Activities Using Interactive Displays: An Empirical Investigation of Students' Learning and Engagement. *Smart Learning Environments*, 4(1). <https://doi.org/10.1186/s40561-017-0041-y>
- Ma, L., & Lee, C. S. (2021). Evaluating the effectiveness of blended learning using the ARCS model. *Journal of Computer Assisted Learning*, 37(5), 1397–1408. <https://doi.org/10.1111/jcal.12579>
- McKenney, S., & Reeves, T. (2018). *Conducting Educational Design Research* (2nd Editio). Routledge. <https://doi.org/10.4324/9781315105642>
- Mei, Q., Chan, N. N., Gill, R. S., Subramaniam, N., Motevalli, S., & Ang, C. (2025). *Impact of attention , relevance , confidence , satisfaction (ARCS) model on teaching effectiveness in higher education : a systematic review.*
- Molenda, M. (2015). In search of the elusive ADDIE model. *Performance Improvement*, 42, 34–36. <https://doi.org/10.1002/pfi.4930420508>
- Nadi-Ravandi, S., & Batooli, Z. (2022). Gamification in Education: A Scientometric, Content and Co-Occurrence Analysis of Systematic Review and Meta-Analysis Articles. *Education and Information Technologies*, 27(7), 10207–10238. <https://doi.org/10.1007/s10639-022-11048-x>
- Nguyen, V. T. T., & Chen, H. (2023). Examining Impacts of Information System Success and Perceived Stress on Students' Self-Regulated Learning Mediated by Intrinsic Motivation in Online Learning Environments: Second-Order Structural Equation Modelling Analyses. *Education and Information Technologies*, 28(10), 12945–12968. <https://doi.org/10.1007/s10639-023-11685-w>
- Özhan, Ş. Ç., & Kocadere, S. A. (2019). The Effects of Flow, Emotional Engagement, and Motivation on Success in a Gamified Online Learning Environment. *Journal of Educational Computing Research*, 57(8), 2006–2031. <https://doi.org/10.1177/0735633118823159>
- Richey, R. C., & Klein, J. D. (2007). *Design and Development Research* (L. Akers & A. Messina, Eds.; 1st ed.). Lawrence Erlbaum Associates, Inc. <https://doi.org/10.4324/9780203826034-1>
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Sailer, M., & Homner, L. (2020). The Gamification of Learning: a Meta-analysis. *Educational Psychology Review*, 32(1), 77–112. <https://doi.org/10.1007/s10648-019-09498-w>
- Schindler, L. A., Burkholder, G. J., Morad, O. A., & Marsh, C. (2017). Computer-based technology and student engagement : a critical review of the literature. *International Journal of Education Technology in Higher Education*, 14. <https://doi.org/10.1186/s41239-017-0063-0>
- Toda, A. M., Valle, P. H. D., & Isotani, S. (2018). The Dark Side of Gamification: An Overview of Negative Effects of Gamification in Education BT - Higher Education for All. From Challenges to Novel Technology-Enhanced Solutions. *Communications in Computer and Information Science*, 832, 143–156. https://doi.org/10.1007/978-3-319-97934-2_9
- Tuah, N. M., Wanick, V., Ranchhod, A., & Wills, G. (2017). Exploring Avatar Roles for Motivational Effects in Gameful Environments. *EAI Endorsed Transactions on Creative Technologies*, 4(10), 153055. <https://doi.org/10.4108/eai.4-9-2017.153055>