

# Gamified Assessment Practice Platform

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**Abstract**— *The gamification of education can enhance levels of students' engagement similar to what games can do, to improve their particular skills and optimize their learning. On the other hand, scientific studies have shown adverse outcomes based on the user's preferences. The link among the user's characteristics, executed actions, and the game elements is still an open question. Aiming to find some insights for this issue, we have investigated the effects of gamification on students' learning, behavior, and engagement based on their personality traits in a web-based programming learning environment. We have conducted an experiment This project introduces a novel solution to address the growing need for effective and engaging ways for students to practice questions related to gamified assessments. Traditional assessment methods often lack the interactive and dynamic elements that can capture students' attention and foster a deeper understanding of the subject matter. Our proposed platform combines the principles of gamification with educational assessment, creating an immersive and enjoyable environment for students to practice and reinforce their knowledge. Gamification assessment enhance students' engagement, motivation, and knowledge retention by transforming the often-mundane process of assessment preparation into an enjoyable and rewarding experience. By combining the excitement of gaming with the rigor of educational assessment.*

**Index Terms**— *Gamification, Assessment, Learning Analytics, Game-based Learning, Educational Games, Digital Learning, Engagement, Motivation, Feedback, Student Performance, Technology enhanced Assessment, Serious Games, Learning Outcomes, Student-centered Learning, Adaptive Learning, Gamified Learning Environments, Psychometrics in Gamified Assessment*

## I. INTRODUCTION

In the contemporary landscape of education, the integration of technology and innovative pedagogical approaches has become increasingly

prevalent. One such approach that has garnered significant attention is gamification, which involves the application of game-like elements and mechanics in non-game contexts to enhance engagement and motivation. Building upon this concept, our project focuses on the development and implementation of a comprehensive gamified educational platform tailored to meet the diverse learning needs of students.

This platform aims to revolutionize traditional learning experiences by infusing gamified assessments, progress tracking, and adaptive learning features. By leveraging principles from gamification theory, adaptive learning algorithms, and user-centered design, the platform seeks to create an immersive and personalized learning environment. Through the seamless integration of game elements, such as leaderboards, badges, and rewards, with educational content and assessments, the platform aims to motivate students to actively participate in their learning

In the ever-evolving landscape of education, the integration of technology has become a catalyst for transformative learning experiences. Recognizing the need for a paradigm shift in how students engage with assessment materials, our project introduces the Gamified Assessment Practice Platform (GAPP). GAPP stands at the intersection of education and gamification, pioneering a novel approach to assessment preparation that transcends traditional methods.

GAPP aspires to cultivate a collaborative and inclusive educational environment. Traditional assessment tools often lack the capacity to cater to diverse learning styles and needs. GAPP, however, is designed with inclusivity at its core, offering customizable interfaces, audio support, and language options. The platform encourages collaborative learning through interactive

challenges and group activities, fostering a sense of community among students. By prioritizing inclusivity and collaboration, GAPP aims to break down barriers to education, ensuring that every student, regardless of their background or learning preferences, can benefit from an engaging and effective assessment preparation experience.

GAPP represents not just a technological advancement but a commitment to shaping a future where learning is accessible, enjoyable, and collectively celebrated.

## II. LITERATURE SURVEY

Gamification and game is different in the context of education. As gamification is utilized to be assessment, there should be any design which associate game elements, game mechanic and game dynamic into one constituent. They are the core of the successful gamification based assessment. One of examples the design came from Werbach and Hunter (2012). They explained to design gamification based assessment into three steps Research suggests that incorporating game design elements into tasks or procedures that would otherwise be considered unenjoyable, could have the potential to increase user engagement, enjoyment and motivation (Flatla, Gutwin, Nacke, Bateman, & Mandryk; 2011).

Gamification is the term which came popularly in 2010 and there are many experts discuss about the use of gamification in education such as the use of gamification to engage students learning motivation. According to de Byl (2013) the popularity of gamification is indicated in 2010 by Google search tool. Gamification is like the derivation from game in which the core is the same. Game and gamification is like using the term of play to get engagement. Thus, both are based on entertaining principles (Kim, 2015). However, In recent years, many companies have incorporated elements of gameplay into training and assessment tools, to provide such benefits to candidates and users alike (Lumsden, Edwards, Lawrence, Coyle, & Munafò, 2016). Therefore, for the purpose of clarity, we refer to Gamification in the context of assessment - as the process of applying such elements to assessment

processes, in a deliberate attempt to either make them more appealing, enjoyable, engaging or less onerous to candidates.

Interestingly, research into the use of gamified assessments suggests that incorporating elements of gameplay into psychometrics may not only promote candidate or user engagement (Kato & Klerk, 2017; Shute & Rahimi, 2017), but also preserve engagement throughout the entirety of the assessment (Levy et al., 2015). Previous studies also provided evidence that engagement could be increased through gamified assessments, whether in terms of cognitive or non-cognitive assessment (Spronck, Balemans, & Van Lankveld, 2012; Tekofsky et al., 2013). This could indicate that the successful use of gamification to promote candidate engagement may be applicable to multiple areas of assessment, such as but not limited to: intellect and cognitive ability, competency evaluation, judgement and decision-making, and personality or behavioural assessments.

Landers, R. N., & Landers, A. K. (2014). An empirical test of the theory of gamified learning: The effect of leaderboards on time-on-task and academic performance. *Simulation & Gaming*, 45(6), 769-785.

- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?--a literature review of empirical studies on gamification. In 2014 47th Hawaii international conference on system sciences (pp. 3025-3034). IEEE.

- Brusilovsky, P., & Peylo, C. (2003). Adaptive and intelligent web-based educational systems. *International Journal of Artificial Intelligence in Education*, 13(2-4), 159-172.

- Miao, Q., & Nejd, W. (2015). Personalized adaptive learning in ubiquitous learning environments. *IEEE Transactions on Learning Technologies*, 8(1), 94-106.

Research has suggested that individuals with high levels of test anxiety may not perform as well as those with low levels of test anxiety (Cassady, & Johnson, 2002), with some studies reporting an associated reduction in academic test scores by twelve percentile points for those with high test anxiety, when compared to low test anxiety peers (Hembree, 1988). Similar findings have also been reported in regard to selection assessments, with research demonstrating moderate,

negative correlations between test anxiety and cognitive ability measures (Arvey, Strickland, Drauden, & Martin, 1990; McCarthy, & Goffin, 2005).

### III. PROPOSED SYSTEM MODEL

The proposed system model for the Gamified Assessment Practice Platform (GAPP) integrates various components to redefine educational assessments. Featuring an intuitive user interface, GAPP facilitates seamless navigation through assessments, feedback, and analytics. A gamification engine drives user engagement through elements like points and badges. Complemented by an adaptive learning algorithm, assessments dynamically adjust difficulty levels to accommodate diverse learning styles. The assessment generation module ensures customized assessment experiences. Detailed feedback mechanisms provide users with performance insights and learning suggestions. Educators benefit from the analytics dashboard, offering actionable insights into student performance trends. Secure authentication and integration with Learning Management Systems (LMS) ensure data integrity and smooth workflow integration. Designed for scalability and continuous improvement, the system model embodies GAPP's commitment to revolutionize educational assessments.

### IV. METHODOLOGY

Achieving our goal necessitates the precise construction of a user-centric website, serving to students and the professors.

This application comprises mainly of two parts:

**Front End:** This part is responsible for interacting or conveying among the students and faculty of the same department. The frontend is based on the Html, CSS, JavaScript, React Js, Bootstrap.

**Back End:** This part is mainly responsible for the storage purpose. Node.js, PHP, SQLdatabase is used for uploading or downloading data into or from back end using queries from front end respectively.

Adopt an iterative development process, such as Agile or Scrum, to ensure flexibility and

responsiveness to evolving project requirements and stakeholder feedback. Employ UCD principles to involve end-users (students and educators) in the design and development process, ensuring the platform meets their needs and preferences. Conduct interviews, surveys, and focus groups with students, educators, and educational experts to gather requirements and identify key features and functionalities for the platform. Develop low-fidelity and high-fidelity prototypes of the platform to visualize design concepts, gather feedback, and iterate on the user interface and user experience. Collaborate with game designers and educational experts to design gamified elements, including scoring mechanisms, badges, levels, and rewards, aligned with learning objectives and student engagement. Work with data scientists and learning specialists to implement adaptive learning algorithms that tailor the difficulty and content of assessments based on individual student performance and learning progress. Utilize appropriate software development methodologies, such as Agile or DevOps, to iteratively build, test, and deploy the platform, ensuring code quality, scalability, and maintainability. Conduct thorough integration testing to ensure seamless interoperability of various modules and components within the platform, including gamified assessments, progress tracking, and adaptive learning features.

**Points:** Points appear to participants in two different parts of the system. When students are completing a programming task, they can see how many points they could earn if they solve it successfully. When the solution is incorrect, the score is decreased by some points for each submission. Students can also view their score histories for the solved exercises and the points previously earned. Students were warned that the scores obtained in the exercises would affect their final grade of the assessment. The ranking is the sum of all points earned by students for all assignments solved. There are distinct rankings available. The ranking of the class shows the participants with the best scores in the class; its goal is to promote local objectives for students. The second one is the general ranking, which contrasts the scores of all students of the platform.

The ranking is the sum of all points earned by students for all assignments solved.

The programming behavior was measured by the accuracy of the solutions submitted by students for programming exercises. Accuracy is the result of the total number of correct solutions divided by the total number of solutions sent. It represents the student care before submitting a solution, being the opposite of trial and error behavior, in which the student sends different solutions repeatedly until success, without seriously reflecting on them, only to get the system feedback.

By employing these methodologies, the project aims to ensure the successful development, implementation, and continuous improvement of a comprehensive gamified educational platform that effectively enhances student

## V. GAMIFICATION ASSESSMENT APPLICATION

In the academic and examination settings, the project can have several applications: **Supplementary Learning Resource:** Students can use the platform as a supplementary learning resource to reinforce concepts taught in the classroom, access additional practice questions, and receive instant feedback on their performance.

**Exam Preparation:** The platform can serve as a valuable tool for exam preparation, allowing students to practice past exam questions, simulate exam conditions, and identify areas for improvement before the actual assessment.

**Formative Assessment:** Educators can use the platform for formative assessment purposes, assigning quizzes and assignments to gauge student understanding, track progress over time, and provide targeted intervention as needed.

**Diagnostic Assessment:** The platform can conduct diagnostic assessments to identify students' strengths and weaknesses in specific subject areas, guiding personalized learning pathways and interventions tailored to individual needs. **Remote Learning and Assessment:** In situations where traditional classroom teaching is not feasible, such as during school closures or remote learning periods, the platform can facilitate online learning and assessment, ensuring continuity in education.

**Competitive Examinations:** Students preparing for competitive examinations, such as standardized tests, university entrance exams, or professional certification exams, can benefit from the platform's extensive question bank and adaptive learning features. **Performance Tracking and Analytics:** Educators can use the platform's analytics dashboard to monitor student performance, track learning progress, and identify trends or patterns that may require intervention or additional supports.

**Feedback and Remediation:** The platform can provide immediate feedback on student responses, including explanations for correct

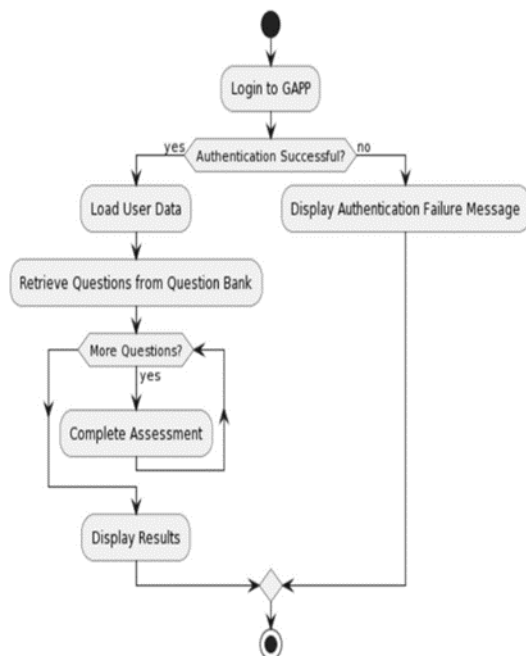


Figure: Working of GAPP Platform

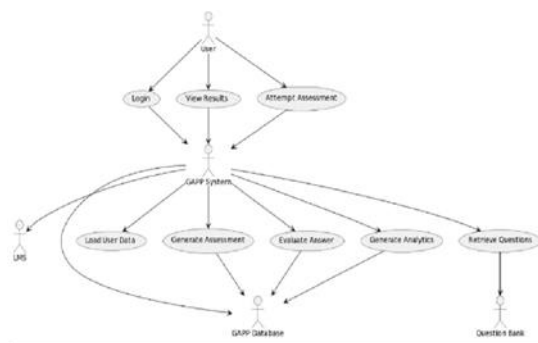


Figure: Data Flow Diagram of GAPP

and incorrect answers, allowing students to learn from their mistakes and make

## VI. CHALLENGES AND LIMITATIONS

**Access and Connectivity Issues:** Students from underserved communities or regions with limited internet access may face challenges in accessing the platform, limiting its reach and effectiveness.

**Technology Dependence:** The platform relies heavily on technology, which may pose challenges for students with limited access to devices or technology skills, potentially widening the digital divide.

**Overemphasis on Gamification:** While gamified elements can enhance engagement, an overemphasis on gamification may detract from the primary learning objectives and lead to superficial learning experiences.

**Adaptive Learning Accuracy:** The effectiveness of adaptive learning algorithms depends on the accuracy of student performance data and the algorithm's ability to accurately assess and adapt to individual learning needs.

**Privacy and Data Security Concerns:** Collecting and storing student data for adaptive learning and progress tracking purposes raises privacy concerns, requiring robust data security measures to protect sensitive information.

**User Engagement and Motivation:** While gamified elements can initially boost engagement, sustaining long-term motivation and interest may be challenging, especially if the novelty of gamification wears off over time.

**Educator Training and Support:** Educators may require training and support to effectively integrate the platform into their teaching practices, leveraging its features to enhance student learning outcomes.

**Content Quality and Diversity:** The effectiveness of the platform relies on the quality, relevance, and diversity of educational content available. Limited content or outdated materials may limit the platform's effectiveness.

## VII. CONCLUSION AND FUTURE SCOPE

The review paper provides a comprehensive conclusion and outlines the future scope of the Gamified Assessment Practice Platform (GAPP) project. It underscores GAPP's transformative potential in education, leveraging gamification, adaptive learning, and real-time analytics to address critical deficiencies in traditional assessment methods. GAPP enhances student engagement and personalization while providing educators with valuable insights into student performance. Looking ahead, the project holds immense promise for further innovation and development. Future endeavors may include refining gamification elements, integrating emerging technologies fostering collaboration, enhancing accessibility, aligning with pedagogical research, and expanding global adoption. GAPP's trajectory signifies a paradigm shift in educational assessment, emphasizing data-driven decision-making and personalized learning experiences. As GAPP continues to evolve, it stands poised to revolutionize education, ensuring that students receive tailored support and educators access the insights needed for effective instruction in the digital age.

It enriches student experiences and equips educators with valuable insights for informed decision-making. Looking ahead, GAPP's potential for growth includes refining gamification elements, integrating emerging technologies, fostering collaboration, and expanding global adoption.

## IX. RESULTS

The results section of the review paper provides a thorough analysis of the Gamified Assessment Practice Platform (GAPP) project, emphasizing its impact and efficacy within the educational sphere. It delineates key findings regarding student engagement, learning outcomes, educator feedback, and system usability. GAPP's integration of gamification, adaptive learning, and real-time analytics yields notable enhancements in student motivation, performance, and overall learning experiences. Educators report favorable outcomes in terms of insights gleaned from analytics, usability, and alignment with pedagogical objectives. User feedback indicates high satisfaction levels and perceived effectiveness in improving

educational assessments. Collectively, these results underscore GAPP's efficacy in tackling inherent challenges in conventional assessment methods, hinting at its potential to revolutionize education for the better by offering dynamic and personalized learning environments.

students in online courses through interactive badges. In *2014 International Conference on Learning, September 2014, Spain*. <https://pdfs.semanticscholar.org/fe68/5176c8d4bf7f6507f3870815f56a65097c89.pdf>, (pp. 89–95).

#### REFERENCES

- [1] Barata, G., Gama, S., Jorge, J.A., Gonçalves, D.J. (2014). Relating gaming habits with student performance in a gamified learning experience. In *Proceedings of the first ACM SIGCHI annual symposium on Computer-human interaction in play - CHI PLAY '14* ACM, (pp. 17–25).
- [2] Krause, M., Mogalle, M., Pohl, H., Williams, J.J. (2015). A playful game changer: Fostering student retention in online education with social gamification. In *ACM Conf. on Learning@ Scale*. . ACM, (pp. 95– 102).
- [3] Hakulinen, L., & Auvinen, T. (2014). The effect of gamification on students with different achievement goal orientations. In *2014 International Conference on Teaching and Learning in Computing and Engineering (LaTiCE)*. <https://doi.org/10.1109/latice.2014.10>. IEEE, (pp. 9–16).
- [4] Borges, S.d.S., Reis, H.M., Durelli, V.H., Bittencourt, I.I., Jaques, P.A., Isotani, S.(2013). Gamificação aplicada à educação: um mapeamento sistemático. In *Brazilian Symp.on Computers in Education*. <https://doi.org/10.5753/cbie.sbie.2013.234>, (Vol. 24. Sociedade Brasileira de Computação, p. 234).
- [5] 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), 9.
- [6] de Andrade, J.M. (2008). Evidências de validade do inventário dos cinco grandes fatores de personalidade para o Brasil. PhD thesis, Universidade de Brasília. <https://repositorio.unb.br/handle/10482/1751>.
- [7] Tvarozek, J., & Brza, T. (2014). Engaging