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Perceived Barriers to Adopting Game-Based Learning: A Case of Higher Education Institutions

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***Abstract*— Background of the Research**: Game Based Learning is a revolution in contemporary education paradigm, which provides strong tools for active student involvement, experiential learning and cognitive retention. But it is still not well institutionalized in Higher Education Institutions which have high resistance and logistical difficulties. The present study looks into the multi-dimensional, perceived barriers to GBL adoption of university teachers who are the primary arbiters of curriculum changes.

Methodology: The study used a cross sectional quantitative survey research design involving a non-probability snowball sampling of 214 university teachers. The six domains were identified as the core, theory-driven domains and assessed using a structured survey instrument with a 5 point Likert scale (where lower scores represent higher level of agreement about the extent of a barrier).

Results: Descriptive, statistical analysis showed that the most severe barriers to implementation were perceived to be Technological Challenges (M = 1.78) and Financial and Resource deficits (M = 1.90). Student Engagement dynamics (M = 1.98) and Pedagogical Challenges (M = 1.99) were followed closely. Also noteworthy as friction vectors in the system were Institutional and Institutional resistance (M = 2.09 ± 0.70), and Assessment and Evaluation complexities (M = 2.10 ± 0.63) which were both substantial.

Conclusions: The results highlight that although the educators at universities are aware of the intrinsic value of active-learning gamification, its effective implementation in universities is significantly limited due to structural constraints. To close the longstanding disconnect of gamified learning theories into classroom reality, HEIs need to shift from mere technology workshops to systematic infrastructure and development changes, from periodic instructional design collaborative processes to ongoing ones, and from non-formalized pedagogical innovation award systems to formalized ones.

Keywords: Game-Based Learning, Digital Pedagogy, Higher Education, Faculty Perceptions, Barriers to Adoption, Quantitative Analysis.

I. Introduction

In the past decade, universities and colleges all over the world have faced incredible demands to upgrade their pedagogical structures and to tune their classroom instruction to the cognitive profiles of "modern digital-native learners". The traditional lecture style teaching mode is being criticized for passive learning for a long time, and the model of active learning is gradually replacing or supplementing the traditional teaching mode. One of these methods is the Game-Based Learning (GBL) paradigm, which is gaining a lot of interest because of the structural mechanics, dynamics and aesthetics of digital and non-digital games that can be used to provide specific curricular outcomes (Balaskas et al., 2023; Eltahir et al., 2021). Current research suggests that by purposefully incorporating game-like elements into academic subjects, including elements like progressive questioning, failure-tolerant reward systems, and immersive story-telling, there are benefits to increased cognitive engagement, spatial reasoning, problem solving and retention of knowledge.

Although there is a growing empirical body of evidence supporting the cognitive and psychological advantages of GBL, its widespread adoption in the mainstream academic curriculum seems to be rather slow (Gunduzalp, 2024; Pisal et al., 2022; Wang & Zheng, 2021). This mismatch between the ideal and reality in the classroom reveals a significant conflict in today's educational landscape. While the use of gamification is considered a tool for motivation and experiential learning by instructional designers and educational researchers, the frontline university educator

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often sees gamification use with skepticism and/or reports significant logistical and procedural challenges. Professional culture in higher education is conservative, with strong emphasis on the conventional modes of scholarship production over pedagogical innovation, rigid institutional structures, and prescriptive syllabi.

To understand why GBL has not been adopted at a national level, it is very important to explore the specific and multidimensional barriers perceived by University teachers. The Faculty members are the main decision makers of curricular changes, the attitudes, technological self-efficacy and operational readiness of the Faculty members will determine the success or failure of any pedagogical innovation. The perceived barriers can range from structural issues, pedagogical concerns, and a lack of incentive for faculty to take risks with new pedagogical approaches. This study is therefore set to systematically map and analyze the multi-layered barriers which inhibit the university instructors/ professors/ teachers to adopt and implement GBL methodologies. This study presents empirical feedback from practicing higher education teachers, which helps institutional leaders and educational policy makers to make data-driven decisions to create effective scaffolding and reduce any institutional obstacles to the implementation of gamified digital pedagogy in academic practice.

II. Problem Statement

While much has been invested in the creation of educational games and gamified learning environments, there is a clear gap between what educational applications can do and what is actually used in the classroom in tertiary education institutions. While faculty members are expected to lead all aspects of active learning, they are also faced with an intricate matrix of technological, logistical, and pedagogical challenges that hinder incorporating game aspects. Use of these miscellaneous technologies such as classroom response systems or even straightforward digital quizzes has been accomplished by some instructors, but an all-encompassing implementation of a domain-specific game-based simulation – which remains an extraordinary rarity, is not a typical institutional practice.

This study's central focus is on the systemic resistance to GBL adoption, which is due to the multi-dimensional barriers encountered by the faculty members of the University.

These barriers are often not specifically identified through detailed and quantitative assessment and institutional interventions like generic IT workshops or blanket software purchases often don't address the exact points of friction that teachers experience. As a result, millions of dollars are spent worldwide on education technologies that are underutilized and faculty members become more dis-affectionate with the innovative active-learning models. In order to solve this misalignment, a call to action is needed to empirically test faculty perceptions along the various operational vectors that are interconnected: technological access, pedagogical alignment, student dynamics, assessment compliance, financial viability, and administrative support. The recognition and measurement of these specific barriers is vital to the development of effective institutional policies that can move GBL from an experimental phenomenon to a viable and normal pedagogical element in higher education.

III. Literature Review

The research literature in the field of GBL and gamification in higher education has been flourishing and the need for new pedagogical approaches to meet the challenges of the 21st century for higher education students has become increasingly recognized. It is helpful to make a distinction between the use of isolated elements from a game, in a non-game learning context (gamification) (Deterding et al., 2011), and the complete use of the full game as a learning activity that reaches specific learning targets (game-based learning) (Wiggins, 2016). While both methods are in place to improve student achievement, they require the commitment and ability of faculty at the university to restructure the way in which they teach. An extensive literature base documents the positive cognitive, affective and behavioral outcomes of GBL.

It has been demonstrated that, properly designed, educational games can evoke a state of "flow" that maximizes the student's attention, motivation, and engagement, and minimizes the anxiety of performance that is often seen in more technical or traditional subjects (Pham, 2022). Moreover, in game contexts, the idea of failure is reframed as an iterative feedback loop, a tool for learning, not dismissal, a challenge to think deeply and take risks, and a means for resilience (Rice, 2012). This structural design is similar to experiential and constructivist learning theories which assume that knowledge will be absorbed best if students can change variables, see

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immediate consequences of changes within the system, and reflect on them in realistic and simulated environments (Qian & Clark, 2016).

The literature, however, shows also that there is a persistent "attitude-use gap" among university teachers (Sánchez-Mena & Martí-Parreño, 2017). Explicit or systemic inhibitors are what typically make explicit or theoretical plans for teaching and learning impossible to survive in a frontline environment. The most important one is effort expectancy/Time poverty. University instructors are subject to the extreme constraint of time owing to the heavy teaching load, the grading work, administrative work and research requirements (Farooq et al., 2023). To develop a custom game or to modify an commercially-available game to exactly fit a complex course syllabus requires a significant upfront investment of faculty time, a luxury few deems available without some explicit support from the faculty or from the administration's release time (Heredia-Carroza & Stoica, 2024).

Another major area of research in today's educational field is technological barriers. Successful implementation of the advanced digital game-based learning (DGBL) depend on the quality of the IT infrastructure and the digital self-efficacy of educators and learners. For the successful implementation of the advanced DGBL, not only does it require quality of campus network, computing laboratories, and software licenses at the institution, it also demands high-level digital self-efficacy of teachers and students (Al-Azawi et al., 2024). In some instances, instructors are tech-averse or lack the confidence in their professional development in general as it is designed around learning management systems (LMS) that are not interactive or gamified. This is worsened when pupils themselves have different levels of digital literacy, and also when technical issues arise during high stakes moments in the classroom, which can impact on the flow of teaching and class management, and destroy the teacher's authority (Martín-del-Pozo et al., 2019).

Another layer of complexity is pedagogical and evaluative alignment. Academic traditionalists often argue that models based on games do not have enough academic content and that they eclipse sophisticated intellectual inquiry by offering a superficial distraction (Heredia-Carroza & Stoica, 2024). In addition, embedding games into fixed, predetermined programmes is very challenging. Traditional assessment methods such as midterm exams or multiple-choice quizzes are not effective ways to measure the multi-faceted and non-linear problem solving skills acquired in a complex educational simulation. The faculty members often find themselves in a pedagogical dilemma, where they cannot reliably measure and document certain learning outcomes that they have achieved through gameplay in a sense that they are exposed to negative student evaluations or to institutional censure. In summary, money and institutional culture are the major factors in determining faculty attitudes. The high cost of good quality serious games, and of professional simulation software, is well-known, requiring an initial investment of significant capital and paying fees that resource-poor public and private HEIs can't keep up (Al-Azawi et al., 2024). This economic challenge is exacerbated by a conservative institutional ethos that sees playing as being at odds with “real” learning. Without the formal recognition of pedagogical innovations in tenure and promotion or annual evaluation processes, faculty are rationally motivated to pay more attention to traditional research and conventional lecture styles (Hartt et al., 2024). Therefore, as current studies have indicated, achieving optimal results with GBL should be approached systemically, through a multi-level process that addresses technological, pedagogical, financial, and administrative obstacles.

IV. Material and Methods

4.1 Research Design

The research design in this study was cross sectional survey research with quantitative approach that aimed to study perceived obstacles to implementing game-based learning in higher education faculty members. A quantitative approach was found to be most suitable because it provides a systematic measure of specific, predetermined variables over a large number of respondents, provides descriptive statistical aggregation, provides objectivity for identifying patterns and provides generalizable inferences about the institutional barriers.

4.2 Participants and Sampling Technique

The study population for this study was the active full time and part time academic faculty members from different subjects of undergraduate/ post graduate courses from the various higher education institutions in Bhubaneswar, Odisha. A non-probability snowball sampling technique was used because there was no extensive, institutional,

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centralized list of teachers who were using or thinking about using interactive digital tools. The first group of participants was made up of the heads of departments and instructional innovators from a number of participating universities. The instrument was completed by these primary respondents, and then the survey link was passed on to professional colleagues in their respective networks, thus establishing a cascade of referrals. This resulted in a reduction in access barriers and responses from a wide range of institutional settings. The number of valid samples obtained from this method was N = 214 university teachers.

4.3 Data Collection Instrument

Data were collected using a very structured, self-administered digital questionnaire which was distributed through e-mail and professional academic networking sites. The questionnaire was created from a synthesis of validated constructs that were used in Unified Theory of Acceptance and Use of Technology (UTAUT) and existing educational barrier frameworks. It had two parts: a short demographic section and a main matrix of GBL barriers perceived. The barrier matrix evaluated six different theory based dimensions namely Technological Challenges, Pedagogical Challenges, Student Engagement, Assessment and Evaluation, Financial and Resource, Institutional and Administrative.

The responses to the core items were recorded on a 5 point Likert scale ranging from Strongly Agree (1) to Strongly Disagree (5). A lower mean score suggests a greater degree of agreement that the specific domain will be a significant hurdle for the adoption of GBL.

4.4 Data Analysis

Data were cleaned, checked and updated for completeness and entered into statistical analysis software. Frequency counts, percentage distributions, weighted mean scores (M) and standard deviations (SD) were calculated for each of the six factor categories. The means were used to provide an empirical foundation for discussion and policy recommendations of the perceived barriers in the thematic discussion as they were ranked from the highest mean to lowest mean.

V. Results

The aggregated frequencies, percentages, mean scores, and standard deviations for each of the six critical factors are systematically presented in Table 1.

Table 1: Frequency, Percentage, Mean, and Standard Deviation of Perceived Barriers to GBL Adoption (N = 214)

Factors		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean± Standard Deviation
Technological Challenges	Frequency	68.00	132.00	10.00	2.00	2.00	1.78± 0.66
	Percent	31.78	61.68	4.67	0.93	0.93	
Pedagogical Challenges	Frequency	43.00	141.00	24.00	2.00	4.00	1.99± 0.72
	Percent	20.09	65.89	11.21	0.93	1.87	
Student Engagement and Motivation	Frequency	41.00	145.00	24.00	0.00	4.00	1.98± 0.69
	Percent	19.16	67.76	11.21	0.00	1.87	
Assessment and Evaluation Challenges	Frequency	23.00	155.00	30.00	4.00	2.00	2.10± 0.63
	Percent	10.75	72.43	14.02	1.87	0.93	
Financial and Resource Challenges	Frequency	51.00	140.00	19.00	2.00	2.00	1.90± 0.66
	Percent	23.83	65.42	8.88	0.93	0.93	
Institutional and Administrative Support	Frequency	37.00	124.00	51.00	0.00	2.00	2.09± 0.70
	Percent	17.29	57.94	23.83	0.00	0.93	

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The descriptive statistical indices showed that Technological Challenges had the lowest Mean (M = 1.78), and a relatively small Standard Deviation (SD = 0.66) as perceived as a single most critical barrier by University faculty. A high level of consensus was found, with 31.78% (n = 68) strongly agreeing and 61.68% (n = 132) agreeing that infrastructural deficits and technical instability are significant challenges. On the other hand, only a lone 1.86% disagreed altogether.

The second most significant barrier reported by the participants was Financial and Resource constraints with a mean score of M = 1.90 \pm 0.66$. In this construct, 23.83% (n = 51) strongly agreed and 65.42% (n = 140) agreed that high software procurement costs, licensing fees, and the widespread lack of instructional design time for specialized implementation of game-based mechanisms significantly limit their ability to implement effective game-based mechanisms.

The mean indices for factors of Student Engagement (M = 1.98) and Pedagogical Challenges (M = 1.99) were very similar, placing them close together as substantial, secondary institutional friction vectors. Student Engagement: 67.76% (n = 145) of faculty agreed that three operational barriers were the student participation dynamics, cognitive distraction, and student digital readiness. In regard to Pedagogical Challenges a total of 85.98% of teachers (20.09% strongly agree; 65.89% agree) stated that course learning objectives in complex courses are challenging on an architectural level, due to rapid developments in game simulations, and also on a cognitive level.

The last two barriers had the highest overall mean scores: Institutional and Administrative barriers (M = 2.09) and Assessment and Evaluation complexities (M = 2.10). Agreements within this range are lower than for the tech-infrastructure vector, but are still well in the "Agree" range.

VI. Discussion

The descriptive results of this research provide significant empirical evidence that the experience of higher education faculty in the adoption of GBL is not a standalone problem, but is rather the complex web of structural, operational and intellectual constraints. The overall position of Technological Challenges (M = 1.78) as the most important challenge validates the key finding that the basic infrastructure of many contemporary HEIs is not yet geared towards the integration of digital games. This finding is highly consistent with the basic tenets of modern educational research that have emphasized that "high-tech" DGBL cannot thrive in an inconsistent connectivity environment, in a campus with limited firewalls, and in poor technical hardware (Al-Azawi et al., 2024). If 93.46% of all faculty members who are active in teaching support or strongly support technology limitations as interference with their teaching, it indicates that any programmatic efforts to gamify learning will be completely stymied until institutions invest in their basic digital infrastructure and offer dedicated technical support in a way that is contextually appropriate (Martín-del-Pozo et al., 2019).

The acute severity of Financial and Resource constraints (M = 1.90) further helps to explain why theoretical instructional models are seldom implemented in the classroom. Well-designed serious educational games customized immersive simulations and special software packages have significant licensing fees which are not paid for by a standard academic departmental budget (Sánchez-Mena & Martí-Parreño, 2017). But this economic fact means that many thoughtful teachers resort to simpler, easily available, gamified resources that are effective for quick interactive reviews, but not rich enough to support or assess the development of higher-order thinking skills. In addition, a huge lack of instructional design time is a part of the resource barrier (Heredia-Carroza & Stoica, 2024).

Lastly, the results for Assessment and Evaluation complexities (M = 2.10) and Institutional and Administrative resistance (M = 2.09) reveal the high systemic inertia in higher education governance. The traditional university system of learning and assessment is firmly built on linear and predictable forms of assessment, which include formalized exams, essays, and standardized quizzes. These tools cannot work with the non-linear, adaptive, trial and error approaches characteristic of true game-based learning environments (Rice, 2012). This conflict causes the faculty to feel very exposed, as they are caught between rhetoric of innovation in their teaching and a concrete operational environment which refers to standardized criteria and traditional student satisfaction surveys for judging their professional competences (Hartt et al., 2024). In conclusion, the results showed that the gap in implementation must be more than just a training event; it must be addressed by a re-engineering of the institutional reward systems, infrastructure funding and assessment

philosophies, to validate and reinforce gamified digital pedagogy in Higher Education.

VII. Conclusion

This empirical study has systematically studied and measured the multi-dimensional barriers obstructing the introduction of GBL in the higher education faculty. It is clear from the research findings that while many see the theoretical advantages of GBL, its use is very restricted. Technological instability and infrastructure deficits are readily identified as most critical in terms of operational friction from the descriptive statistical analysis, with severe financial constraints and absolute lack of instructional design time coming in close second.

Various methods and strategies have been suggested to close the existing disconnect between the theory of active learning and its practical application in the classroom, however, these are only superficial and need to be accompanied by more structural and comprehensive interventions in higher education institutions. First, it is important to systematically upgrade the IT infrastructure on campus, and to create specialized digital learning labs on campus. Second, it is important to provide enterprise-level licenses for educational simulation software in a particular field, and to subsidize the software. Second, professional development models need to be radically reshaped; there is a need for intense and long-term instructional design collaborations that involve staff and ed-tech support personnel to co-construct and holistically integrate gamified curricula. Last, institutional policy needs to incorporate pedagogical innovation into the framework and criteria of formal faculty promotion, tenure, and annual review procedures, and to design flexible, multi-faceted measures that reflect the complex learning outcomes that can be attained through the use of game-based methods.

This study provides useful, though specific, quantitative information regarding faculty perceptions, but there are a few methodological constraints to note. The results cannot be the absolute generalizations in highly different institutional or global settings because a non-probability snowball sampling strategy was used. More large-scale, stratified random sampling needs to be done across different geographic regions in the future and compare barriers in public, private, and specialized vocational universities. Furthermore, it would be valuable to conduct longitudinal mixed-methods studies to examine faculty attitudes over time in the context of the inclusion of generative AI-powered mini-games and adaptive simulation tools. Finally, it is critical to tackle the systemic barriers that emerged from this research to make higher education class spaces dynamic, resilient and rich learning spaces.

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