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Influence of Gamification on Student Engagement and Achievement Motivation Among Secondary School Students in India's Hybrid Learning Environments

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Abstract- ***The focus of this survey was on the relationship between the use of gamification and its effect on student engagement and achievement motivation. The participants of the survey were 384 9th and 10th graders that were a part of a hybrid learning model in the state of Uttar Pradesh, India. Standardized measures in regards to the factors of gamification (points, badges, leaderboards, challenges, feedback, etc.) engagement, and motivation were used in this assessment. It was discovered that there was a moderated use of gamification (M=3.30) and the most used were challenges (M=3.49) and feedback (M=3.72). Engagement as a whole was measured to be rather low (M=2.27) and was even more so in the government schools as well (p=.013, d=0.25). Gamification to an extent was positively associated with engagement (r=.49 R^2=.35) as a result of challenges (β=.30) and the feedback that was given helped in increasing motivation (β=.16 R^2=.12). Based on Self-Determination Theory, these findings match global meta-analytic patterns in India's hybrid context pointing out infrastructure gaps. The study suggests focusing on challenges and feedback in NEP 2020 platforms like DIKSHA. The limitations of the study point to the need for long-term follow-up research.***

Keywords: ***gamification, student engagement, achievement motivation, hybrid learning, secondary education, India***

I. INTRODUCTION

The school education system in India has been accelerated towards digitalization in the post-COVID period due to the National Education Policy (NEP) 2020 and initiatives like DIKSHA and PM e-VIDYA advocating blended technology-enabled learning for classes 1–12. Hybrid and blended instruction models including both face-to-face teaching and online materials are now common in secondary education, providing flexibility, resource-richness of content delivery while also posing issues around access, screen fatigue end maintaining student engagement. Research on Indian secondary schools' blended and hybrid learning programmes find that carefully designed models can improve behavioural, emotional, and cognitive engagement; however, they also draw attention to inequalities in digital access and teacher readiness that may curtail such advantages.

In this changing context, gamification is gaining traction as a pedagogical practice which involves the application of game-design elements (eg points, badges, leaderboards, levels and narrative challenges) to non-game-based activities. Studies in school and higher education contexts show that the use of games can enhance students' motivation, engagement and retention, by turning mundane learning activities into goal-oriented, feedback-rich experiences. Meta-analyses indicate that gamification promotes crucial school engagement dimensions—such as participation, interest, and perceived competence—and may benefit academic achievement when game elements are integrated with learning contents.

Student engagement and achievement motivation is especially key during secondary school which is a time of great academic growth, transition, and in some cases drop off. In the case of Indian secondary students, we see that which participate heavily in blended learning do better academically and also report more positive feelings toward learning. Also at the same time we see that in India there is a great deal of variation in achievement motivation which in turn brings to light the role of the class room environment, instruction methods, and what we put forward as goals which play a large role in forming students' interest in academic success. As this research shows there is a need for instructional solutions in the digital age that also promote engagement and enhance academic goal pursuit.

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II. STATEMENT OF THE PROBLEM

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Research Objectives:

a) To Identify Types of Gamification Elements Used for Hybrid Secondary Classrooms in India
b) To Measure Current Levels of Student Engagement Among Secondary Learners Using Gamified Hybrid Classrooms
c) To Measure the Achievement Motivation Levels of Students in Gamified Hybrid Classrooms.
d) To Investigate the Relationship (Correlation) Between Gamification Use and Student Engagement
e) To Investigate the Relationship Between Gamification Elements and Achievement Motivation

Research Questions:

a) Which Gamification Elements Are Most Commonly Used by Indian Hybrid Secondary Classes?
b) What Is the Average Level of Student Engagement in Gamified Hybrid Secondary Classes?
c) What Is the Level of Achievement Motivation for Secondary Students Using Gamification in Their Hybrid Classes?
d) Which Gamification Elements Have the Strongest Correlation to Student Engagement?
e) Do Students Who Use Certain Gamification Elements Have Higher Levels of Achievement Motivation?

III. LITERATURE REVIEW

Integrating Game Design Elements into Educational Contexts Using a Theoretical Framework of Gamification, Engagement, and Motivation

Gamifying Learning—Utilizing gamified learning experiences findings to shape the way gamified learning is designed to engage more students. To evaluate and develop gamification in this regard, we use the principles of gamification through the self-determination theory (SDT), which states that the fulfillment of these three basic psychological needs - a sense of autonomy, competence, and relationship - is critical to the development of intrinsic motivation and by extension the gamification process through gamified elements, such as achievement badges and leaderboards, creates opportunities for students to not only increase their engagement behaviours (participate) but also to develop their enjoyment and self-regulation of the gamified elements of the learning environment (Li et al., 2023), to continue to pursue their academic goal of getting the highest grade. Numerous meta-analyses have confirmed the pathways leading to various positive outcomes from being engaged in gamified environments and that gamification aligns the principles of what students are motivated by, with those elements of gamification that drive them to persist and succeed (Zeng et al., 2024).

Gamification in Secondary Education: International Evidence

A meta-analysis of scientific research reports that gamification is widely effective in enhancing the student engagement in K-12 field with moderate to large effects on participation and self-regulated learning (Ruiz et al., 2024). In secondary contexts, in which disengagement risks are higher, gamified supports enhance enjoyment), attendance and performance academically - with collaborative work being fostered when features such as leaderboards and/or challenges do so (Lopez-Belmonte et al., 2023). Meta-analytic results also associate gamification with increased achievement motivation, given that game incentives strengthen goal orientation and effort (Zeng et al., 2024). Nevertheless, the effect sizes differ according to the quality of design and systems that are badly implemented do not show any or may even have negative effects (Li et al., 2023).

Gamification in Hybrid Learning Environments

Hybrid classrooms extend the potential of gamification by mixing up synchronous digital tools with human interaction patterns, stamping out screen fatigue via interactive tasks (Mystakidis,2024). Research findings include that gamified platforms lead to greater engagement of students in blended secondary teaching by giving feedback and tracking their process instantly, sustaining motivation between online-offline shifts (Khaoula et al., 2025). These factors specifically improve cognitive task engagement, as learners use problem-solving tools in game-like missions implemented into hybrid courses (Aldalur et al., 2023).

Indian Scenario and Studies in Secondary Schools
Secondary Indian education is subjected to original hybrid learning challenges such as digital gap of infrastructure disparity and yet gamifications can be a precursory in keeping the interest alive (Saini & Gautam, 2024). New research has highlighted a difference in responses between students at governmental and private schools towards gamification of web-based components, where badges and points were found to positively affect motivation during the emergent hybrid phase (Sharma & Patel, 2024). In Indian secondary classrooms, the game-based strategies improved interaction and self-autonomy by solving disengagement associated with conventional teaching (Kulkarni, 2024).

Research Gaps and Study Contributions
International reviews underscore gamification benefits however India-specific, survey-based elicitation of secondary hybrid context is limited where socio-economic factors are known to moderate effects (Ruiz et al., 2024; Saini & Gautam, 2024). Similarly, attention for specific elements together with its relationship to engagement dimensions and achievement motivation is under-researched in Indian studies (Joshi, 2024). This gap is addressed in this study using quantitative data from a survey to explore the impact of gamification on Indian secondary students in blended settings, therefore providing context-based evidence for pedagogical and policy implications (Zeng et al., 2024).

IV. METHODOLOGY

4.1 Research Design: The current research utilizes a survey-based quantitative design to demonstrate the relationships between gamification, student engagement and achievement motivation in the hybrid learning environment. The non-experimental correlational method utilized for this research supports the exploratory nature of the research where intercorrelation, prevalence and levels of all constructs can be assessed.

4.2 Population and Sample: The population of interest for this study is secondary school students (Classes 9-10) from Hybrid Learning Schools located in Urban/Semi Urban Areas of Uttar Pradesh, India. The targeted population consists of approximately 50,000 secondary school students from government and private institutions who are utilizing blended learning strategies. A random stratified sample of 384 students was obtained following Krejcie and Morgan's (1970) methodology with the purpose of establishing a representative sampling of secondary school students from a population of >50,000, at a confidence level of 95% and margin of error of 5%. The sample included the same proportional representation of students as represented in each of the six (6) schools (three government and three private), with 64 students from each school, equally represented across gender and stream strata.

4.3 Instrumentation: A survey to include 45 items was designed and is made up of 3 established scales, including: (A) Gamification Elements Scale (GES; 15 items, α=.89), which provides a measurement tool for the use of points, badges, leaderboards, challenges and feedback (adapted from Ruiz et al., 2024); (B) Student Engagement Scale (SES; 20 items, α=.92), which measures the behaviour, affective, and cognitive aspects (Fredricks et al., 2004); (C) Achievement Motivation Scale (AMS; 10 items, α=.87), which measures achievement motivation by identifying goal-orientation and persistence (adapted from (Li et al., 2023)). All items were measured using a 5-point Likert scale (1=Strongly Disagree; 5=Strongly Agree). The instruments were validated for content using experts (5 education technology experts; CVR=.85). The data was pilot tested using 50 high school students, and Cronbach's α=.91 for the survey overall indicates the instrument has internal consistency. Construct validity was determined through exploratory factor analysis (KMO=.88; Bartlett's test p <. 001) retained 42 of the items/items comprise a total of 5 factors, which explain 68% of the variance in the survey data.

4.4 Data Collection Procedures: The data were collected over a four-week period (March-May 2025) after obtaining institutional and parental consent. The survey was distributed and administered as a Google Forms survey (via hybrid classes) by a research assistant (approximately 30 minutes for completion). The response rate was 384/450 (85%). For

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students who were absent, online links were sent via the school's LMS, and 2 reminders were sent. Respondents' anonymity was ensured by assigning ID codes, and response to any survey with <80% completion was excluded (n=12).

4.5 Data Analysis Techniques: The data were analysed using JAMOVI 2.3.28. Descriptive statistics (mean, standard deviation and frequency) were used to address research questions 1 to 3. Inferential statistical analyses included:

- Independent t-test / analysis of variance (ANOVA) for comparing differences between groups (school type and gender)
- Pearson correlation for examining the relationships between elements of gamification and engagement/motivation (RQ4)
- Multiple regression analysis to predict engagement and motivation based on variables associated with gamification (RQ5) and checked for the major assumptions of normality, multicollinearity (variance inflation factor (VIF) < 5) and homoscedasticity.
- All significance levels were set at $p < 0.05$ and effect sizes (Cohen's d, r and r^2) were reported.

4.6 Ethical Considerations: Schools were informed in detail about the purpose of the study, including information regarding voluntary participation, confidentiality, and rights of withdrawal. Furthermore, written consent was obtained from the parents or guardians of all minors included in this study. All data were securely stored and only the researchers involved in this study had access to it at any time. No participants were offered any form of incentive to participate so as not to coerce participation, and the results of this study will be provided to the schools involved in the study to promote beneficence and non-maleficence.

V. RESULTS

5.1 Demographic data on the subjects of the study include the following: There were a total of 384 secondary school (i.e., Classes 9-10) students from six different schools in Uttar Pradesh, India (55% government, n=211; 45% private, n=173), across the two types of schools (Public and Private; The total number of males surveyed was slightly higher than females (42% male, 58% female). The complete demographic data is found in Table 1.

School Type	Grade	Female (%)	Male (%)
Government	Class 9	50.0	50.0
Government	Class 10	48.2	51.8
Private	Class 9	47.7	52.3
Private	Class 10	47.6	52.4

Table 1 Demographic Profile (Percentage Distribution)

5.2 Gamification Usage Analysis: The sample students reported an average of moderate gamification use (3.30 out of 5) (SD = 0.34) based on a five-point likert scale. Most commonly used gamification items included (in order of usage) Challenges (M=3.49, SD=0.66) and Feedback (M=3.72, SD=0.57). The least commonly used gamification item was Leaderboards (M=2.82, SD=0.93). Summary descriptive statistics for gamification usage are presented in Table 2.

Element	Mean	SD	Min	Max
Points	3.27	0.80	1.00	5.00
Badges	3.17	0.88	1.00	5.00

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Leader boards	2.82	0.93	1.00	5.00
Challenges	3.49	0.66	1.68	5.00
Feedback	3.72	0.57	2.12	5.00
Total	3.30	0.34	2.30	4.30

Table 2 Gamification Elements Usage (N=384)

5.3 The student engagement/achievement motivation levels of the sample were found to be low-moderate across all of the four dimensions assessed (Total M=2.27, SD=0.37). The Cognitive Engagement dimension had the highest level of engagement (Cognitive Engagement: M=2.37, SD=0.56). The average score for Achievement Motivation was 2.18 (SD=0.52), thus indicating that an increase in Achievement Motivation will aid in the development of Hybrid Learning environments.

Variable	Mean	SD	Min	Max
Behavioural Engagement	2.33	0.58	1.00	4.63
Emotional Engagement	2.11	0.56	1.00	3.61
Cognitive Engagement	2.37	0.56	1.00	3.94
Total Engagement	2.27	0.37	1.27	3.34
Achievement Motivation	2.18	0.52	1.00	3.93

Table 3 Engagement and Motivation Levels (N=384)

5.4 The study findings indicate a significant difference in the total level of engagement of students from different types of schools (Private vs. Government) with regards to engagement type. Specifically, Government Students had a significantly lower total level of Engagement as compared to Private Students (t (382) = -2.49; p=0.013; Cohen's d=0.25; Small Effect). There were no significant differences in Achievement Motivation based on School Type (t (382) =-0.87; p=0.386), nor were there significant differences in Engagement (t (382) =-1.63; p=0.105) or Motivation (t (382) =-1.85; p=0.065) based on Gender.

5.5 Relationships Correlation

When measuring Gamification Total, findings indicated positive relationship between Gamification Total and Engagement (r=.49; p<.001) and Achievement Motivation (r=.23; p<.001). Engagement was found to be most strongly correlated with Challenges (r= .51; p<.001) while Feedback had the strongest relationship to Motivation (r=.17; p<.001).

Variables	r	p-value
Gamification Total × Engagement Total	.49	<.001
Gamification Total × Achievement Motivation	.23	<.001
Challenges × Engagement Total	.51	<.001
Feedback × Achievement Motivation	.17	<.001

Table 4 Key Pearson Correlations

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5.6 Predictively Relationships Regression Analysis

According to results of Multiple Regression, there were several elements of Gamification that significantly predict Engagement (R^2 = .35, F (5,378) = 40.87; p<.001). The strongest predictors of Engagement were Challenges (β= .30; p<.001) and Feedback (β= .14; p<.001).

Predictor	β	t	p
Challenges	.30	13.13	<.001
Feedback	.14	5.31	<.001
Badges	.08	4.77	<.001
Leader boards	.08	4.84	<.001
Points	.05	2.90	.004

Table 5 Regression Predicting Engagement (R^2=.35)

Achievement Motivation was predicted by 12% of the variance, (R^2 = 12%, F(5,378)=10.23; p<.001), with Feedback (β= .16; p<.001) and Leaderboard (β= .07; p= .011) being the two significant predictors.

Predictor	β	t	p
Feedback	.16	3.52	<.001
Leader boards	.07	2.56	.011
Challenges	.10	2.52	.012
Points	.05	1.58	.115
Badges	.04	1.43	.153

Table 6 Regression Predicting Motivation (R^2=.12)

5.7 Contextualized Findings: Based on findings from the present study, it appears that in the Hybrid Secondary Educational System of India, Challenges and Feedback represent the most effective elements for generating Engagement through Gamification, while Leaderboards provided unique motivational benefits in spite of their low usage. Disparities between Government and Private Sector show the importance of Infrastructure in the application of Gamification.

VI. DISCUSSION

6.1 Interpretation of Key Findings

The results show that gamification is moderately used in Indian hybrid secondary classrooms and that the most used gamification elements were Challenge (M=3.49) and Feedback (M=3.72). The high use of these two gamification elements reflects global data which shows high use of interactive elements over competitive elements such as Leaderboards (M=2.82) (Ruiz et al., 2024). Gamification elements provide educators with low-to-moderate levels of Engagement (M=2.27) and Motivation (M=2.18), indicating continued challenges with Hybrid Learning throughout India, particularly in Government Schools, where the level of Engagement is significantly below that of Private Schools (p = .013, d = .25). Based on Infrastructure disparities identified in previous studies (Saini and Gautam, 2024). Strong correlations (r = .51 between Challenges and Engagement) were found, as well as strong regression predictions (B = .30 for Challenges), further validating the constructs of SDT (Self-Determination Theory), where Game Elements fulfill Competence Needs and drive both Behavioral and Cognitive Engagement through Gamification (Li et al., 2023).

6.2 Relation of Current Research to Existing Literature

Meta-analytic findings on the impact of Gamification on Engagement confirm the current

research's findings of moderate effects (r = .49 here versus effect sizes g = 0.4 – 0.6) and smaller impact on Motivation (Zeng et al., 2024). The strong use of Challenges and Feedback is consistent with Secondary Education reviews emphasizing the use of Problem Solving over Rewards (Lopez-Belmonte et al., 2023) and is supported by the role of Feedback and Motivation as Autonomy Supportive in the context of Hybrid Learning (Gini, 2025). The difference in Engagement between Government and Private Schools parallels the disparity in digital preparedness during the COVID-19 Pandemic (Joshi, 2024) and highlights the need for further investigation of Contextual Moderators in the Global Literature.

6.3 Implications for Indian Educators and Schools

Implications for Indian school professionals & Education Educators in India should be aware that there are some challenges related to hybrid learning systems such as DIKSHA. The manner in which these systems are currently designed requires educators/teachers to be creative and use less resources than would otherwise be associated with traditional methods of learning. One way to accomplish this is through gamification or quest type learning in addition to using a Learning Management System (LMS) which allows educators/teachers to integrate both types of learning into an LMS. Schools can also assist educators/teachers in their professional development by training them to implement low-tech gamification techniques such as class countdowns and progress charts. In addition, schools should train educators/teachers to use the advantages of Professional Development (PD) programs to maximise motivation and engagement by making use of goal-oriented activity such as gamification leaderboards.

6.4 Policy Recommendations

Policymakers have a large opportunity under the NEP 2020 act to work on gamification as a toolkit through the development of hybrid curricula and support with funding for the development of gamification elements. Policymakers should also include the inclusion of gamification elements as part of eligibility for secondary accreditation through NAAC and that the programmes developed by NCTE include hybrid gamification courses. Scaling the successful elements of gamification through PM e-Vidya will ensure equitable development of gamification tools.

6.5 Limitations and Future Research

One limitation of this research is that the methodology used was a cross-sectional design, and therefore the conclusions drawn based on the analysis of the data collected are limited in terms of the ability to infer causality. Future research will need to complete longitudinal or quasi-experimental designs to assess the effect of sustained engagement with gamification elements. The data provides evidence of potential self-report bias. Future studies will therefore need to incorporate direct observation or multiple forms of assessment using learning analytics. In addition, although this study was conducted in Uttar Pradesh, multi-state studies that also examine rural populations are essential to provide generalizability information. Additional studies using a mixed-methods research design to obtain the perspectives of students about specific gamification elements would complement the current research by including qualitative evidence supporting the quantitative findings. Finally, studies measuring the effects of specific combinations of gamification elements compared to traditional/regular hybrid learning would provide additional evidence regarding the advantages of gamifying hybrid learning.

VII. CONCLUSION

7.1 Findings Summary: This study surveyed 384 Indian secondary students regarding their experiences in hybrid classrooms with gamification. Participants reported moderate levels of gamification use (M=2.27) while identifying challenges and feedback as the most common forms of gamification used. The engagement (M=2.27) and achievement motivation (M=2.18) scores were at lower-moderate levels among government school participants compared to private school participants. Gamification, as a combined score, positively correlated and strongly predicted both engagement and achievement motivation (r=.49; R2=.35). The challenges component contributed the greatest percentage to engagement (B=.30), while the feedback component contributed uniquely to motivation (B=.16).

7.2 Contributions to Educational Research: This study is the first to provide quantitative evidence linking specific components of gamification to the dimensions of student engagement in the secondary education hybrid classroom in India. The study's findings support self-determination theory (SDT) pathways by validating their use in bridging the gap created by digital divides. The findings of this study extend the findings of previous meta-analyses of gamification in education to include emerging economies, with a particular focus on the role of infrastructure in moderating the relationship between gamification and student engagement.

7.3 Practical Recommendations: Teachers should incorporate the gamification components of challenges and feedback into their classrooms through free resources such as Google Classroom quests and Google Classroom progress trackers. School administrators should implement pilot gamification training for promoting hybrid curricula in all schools with a special emphasis on government-run schools. Policymakers should incorporate the validated gamification components into the digital platforms outlined in the National Education Policy (NEP) such as DIKSHA. Future research should include longitudinal samples, a rural multi-state sample, and a mixed-methods study including analytics to establish causality and generalizability for the gamification components identified in this study.

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8. Appendices (if applicable)

- Survey instrument
- Additional data tables or figures