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# From Engagement to Excellence: The Impact of Game-Based Learning on Motivation and Academic Achievement in Higher Education Institutions

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Abstract: When COVID-19 cropped up, the world went upside down and everything went digital; or rather, all things associated with or capable of it have heavily stuck to and acclimated to technology. In this study, students in the experimental group were taught GBL strategies to increase motivation, participation, and academic achievement. Whilst being the most advanced social generation we have yet to produce, it became clear that as forward-thinking as the students grew up with technology they are no more willing, interested, or excited to learn the material available via universities and higher education establishments. What exactly was this new educational breakthrough called, and how has the idea allowed a revolutionary new concept to break into the focus of students: within the points showcased in the form of a video game to keep their interest/concentration around the subject that is being taught? The study was cross-sectional, whether descriptive or causal, as the time frame to collect the data was pre-defined. There are 400 students in the sample. The model is developed through a non-probability sampling technique, Descriptive analysis, and frequency distribution through histograms and pie charts are utilized to prove the hypothesis. Regression, Reliability, Correlation, and T-test are some of the statistics methods we have used. Data will be analyzed using SPSS software and self-constructed questionnaires can be used once tested their validity and reliability by the research and software that can be used for the analysis of any research which is SPSS. The students from four significant cities in Pakistan need to fill out the university questionnaire namely from Karachi, Lahore, Islamabad, and Hyderabad. Altogether, we addressed the question of whether our motivation for learning and encouragement of other activities at school is different with GBL, some of this innovative context.

Key words: Game-based Learning, Student's motivation, Students engagement, Student's academic performance, Higher education institutions.

#### **1. Introduction**

Educators perceive that higher education must change in the twenty-first century as a result of the impact of the global dissemination of current and computer-related information systems on the quality and relevance of secondary education in informatics and co-curriculums (Moylan et al. 2015). Educators come up with and learn strategies, methods, techniques, and materials themselves before the students are taught to display them in thematically football-associated games directly aimed at the themes. When it comes to the professional development of instructors in higher education, students and lecturers can sometimes gain from the use of iPods, tablets, and smartphones in the classroom (Alkhafaf, 2010)

For instance, in education, game simulation programs have been applied in certain methodologies to enhance student learning through Irwansyah and Izzati (2021). For supporting e-learning software (Belkhouche, 2014). argues that higher education institutions have not accounted for systemic ways of learning One appears urgently needed: technology-integrated learning methods that blend the academic with the practical presentation, analysis, editing, and dissemination of material (Belkhouche, 2014). Both Irwansyah and Izzati (2021) and Kannan Amr (2012) Studies showed that games-based learning is a crucial and modern school that can be used to start a language, the effect of the academic and the skill levels of the students will help ( the relationship of the use of the partnership Studies ( the benefit of the language for the key to learning more ( the effect of the school in the language of the high level)). So, it is quite apparent that the high quality of education is the biggest challenge that higher education institutions like universities face in adopting new technology to improve and enhance the teaching and learning process, but the pandemic the whole world shut down and all the businesses became to be digitalized now and day by day people are getting more and more addicted and habituated to the technology.

#### **1.1 Problem Statement**

Studies show that the motivation, engagement, and performance of kids are all going, going, gone; and dropping at all ages; making students unable to dig deeper into learning in ways that help kids succeed. Secondly, their results are affected due to this. So modern educational strategies such as technology and information adaptive education strategies are not being implemented hence the need for this issue. As has been confirmed that the users of mobile subscriber devices today are predominantly the younger generation of students and so a recent study addressed this by first firmly believing that GBL (Game-Based Learning) can function as a modernizable way of impacting student motivation, engagement, and academics, but without pushing it to 100% success. Therefore, the purpose of the study is to assess the effect of GBL (Game-Based Learning) on students' academic outcomes, motivation, and engagement, regarding gender and technology/computer skills.

### **1.2 Research Objectives**

This means the transition from the age-old art of traditional rote learning and memory, especially for children. There is a large pool of technology tools and applications from which teaching professionals can help, engage, and motivate students in the learning process of knowledge acquisition. This is because students learn from and participate in their education. The study measured how GBL had influenced the level of motivation, engagement, and academic achievement demonstrated by students.

# **1.3 Research Questions**

Implication: An exploratory research technique suggests that curriculum and pedagogical areas (e.g. higher education institutes) need to do more investigation to understand the usage pattern and impact of GBL on the motivation, engagement, and performance of their students. Thus, the subsequent main research questions are developed to determine the impact of GBL (Game-Based Learning) on student motivation, engagement, and performance.

- a) How Does GBL (Game-Based Learning) Affect The Motivation Among Students At The Universities?
- b) What impact does GBL (Game-Based Learning) have on students' engagement in higher education?
- c) How does GBL (Game-based learning) affect student achievement in High education?
- d) Does Student's Motivation In Using GBL (Game-Based Learning) Differ By Gender & Computer/Technological Skills?
- e) To what extent are students different in their engagement with GBL (Game-Based Learning) according to gender & computer/technological skills?
- f) Does the use of GBL (Game-Based Learning) impact the academic results of students differently for each gender & different skill levels related to computer/technology?

#### 2. Literature Review

# 2.1 What to Know About Game-Based Learning (GBL) Digital Promise

Kirriemuir and McFarlane (2004) believe that gamified learning is about using video games as part of the classroom experience to help students learn new facts, new skills, and new concepts while giving them a sense of achievement and control over the material being studied Alternatively, for the lay: A competition involving human

participants with established rules broadly characterizing the activity and with the potential for evaluation or measurement, by (Bokanowski 2018) However (Tang and Hanneghan 2009) referred the Game-based learning (GBL) as use of educational software to integrate games into teaching practice and learning. By this single definition, it would be difficult to conclude that for learning to take place a game must be involved, simply that the game itself can have utility above and beyond the psychological motivation to participate in the gaming process. And here it is easy to see that the definition is a description of the output (product), not the input (process). (Ibid 8)According to this concept, which is commonly known as GBL (Game-Based Learning) learning using games includes 2 game types: educational and computer games. Even though educational games and computer games have many aspects in common, the teachers must differentiate them to know the variety of games and to help in selecting the right type of game for game-based learning (GBL).

#### 2.2 Some Applications of Game-Based Learning (GBL) in Higher Education

Today, as technology and society continue to advance, higher education faces many challenges. The second generation of "native digital" beings is just entering early adolescence. the digital natives (Linderoth and Barendregt 2016). Technological influence in the need for learning new things, certain job categories, and educational requirements for a specific level of a civilization. There is a growing acceptance of new types of professional development that integrate growth with career (Romero, Ouellet, and Sawchuk 2017) (Sousa and Rocha 2019). Consequently, the training needs of schools are changing. Reading, writing, and using basic math operations are no longer seen as the floor for someone in the workforce in the twenty-first century (Qian & Clark, 2016).

The Impact of Game-Based Learning (GBL) on Students Motivation and Engagement and Also on Academic Avievements in Higher Education:

H1: Influence of GBL (Game Based Learning) on the motivation of students in the case of Pakistan

H2: There is an impact of GBL (Game-Based Learning) on the engagement of students in the context of Pakistan.

H3: GBL (Game-Based Learning) effects on Performance of Students in the context of Pakistan.

As per (Chen, Warden, & Chang 2005) One should know their source of inspiration to understand what they say. A student's proficiency in a language can no longer be determined by simply looking at their scores in periodic assessments and exams. For this reason, traditional ways of teaching and examining students have evolved to use technology-driven online platforms and applications. This is to make sure that students leave school with the educational skills required to use that knowledge in real-life situations. One of the more recent studies (Gamlo 2019) suggested that the students may need higher motivation for greater text comprehension with ordinary NAPs, Some classes seem to discuss more difficult material, which is common. Games have been recognized in this process as one of the key drivers in the creation of meaningful, varied, and fun learning experiences. This realization was due to the technique explained above. Many studies have shown that incorporating gaming components into educational programs can help students to be more motivated and engaged (Conati 2002) and (Rowe 2008), 2010). However, it is definable in terms of a set of goal-directed behaviors; and ideas, reflective of a little more authentic interest in the educational process (Shu, L. & Liu 2018). Motivation can encompass a range of notions, which may include a person's interests, passion, habits, decisions, and creeper factors (Dobozy et al. 2014). The academic performance of students through motivation and commitment to their studies is a sum of every personal factor, which is a case of the motivation and commitment level of students to their studies by them (Li and Pan, 2009). Studies show that the drop-out rate in academic and educational performance is in direct relation to motivation or lack of motivation. Due to the skills they have learned, successful, active pupils are more likely to excel in a field and continue to be engaged with it (Mayer and Johnson 2010) (6) Study conducted in education by (Kotob and Ibrahim 2019) who explored the impact of game-based learning (GBL) on students' motivation and academic performance confirms the premise that GBL has enhanced students' motivation, engagement, and academic achievement in education. In Malaysian higher education, the use of GBL in the classroom enhanced student focus, commitment, and academic achievement (Sahrir, 2011).

Game-based learning (GBL) is a fantastic way to motivate students and keep them interested in their education, and educational game development platforms are ideal for this purpose. Research has suggested that players can be easily engaged and motivated within video games (Shaffer 2006). Another interpretation is that video games may be seen as interactive pedagogical tools that could train cognitive skills such as decision-making (Wouters and Van

Oostendorp 2013). Instructors wanted to bring their classrooms alive and at the same time encourage the same behavior and participation among their students, hence the well-known practice of game-based learning (GBL). om By using GBL, students can have challenging and cooperative tasks, play in virtual worlds (multiplayer games) deal with the conundrums and narratives, and acquire information through communication or interaction (Kearney 2007). According to Sitzmann et al. (2010), some games are more successful than traditional instruction in teaching and promoting success. The concept of Game-Based Learning (GBL) refers to a method of applying game elements in non-game situations to motivate players (Zarzycka-Piskorz, 2016). Game-based learning, typically called GBL, isn't about creating an enjoyable game for students to play just for fun; it is aimed at developing a series of exercises and activities that carefully introduce concepts over time and lead players to an outcome. Students can consume, access, and blend technology-enabled learning activities in multiple formats to integrate a broader range of learning and understanding. This trend enjoys rapid progress in terms of technology and has greatly influenced our daily lives. Most people in the business world who have experienced GBL should prefer this style of teaching. Video games and their cognitive and empirical aspects stimulate students to get involved in their learning because they call on students to participate in critical thinking, keep them current in subject matter, and assist students in answering an array of problems (Kapp 2012) so the rise of game-based learning (GBL), and gamification in education is expected to be rapid within the next 2-3 years because the average age of individuals who are playing games is 30, and 68% of those over the age of 18 (which is the adult population of the country) are taking some form of post-high school education (Johnson, 2015). Since it was reported in [[19], newly added ref ) models of Student Response Systems have been employed for measuring the student attention level or engagement as an SRS model developed in the 1960s as mentioned in [20]. the most literal translation of this new teaching paradigm utilized what the author highlighted as the "student response systems" (SRS), originally designed and installed with discrete hardware that allowed students to respond by way of zappers (keypads and clickers) (Campbell et al. 1993). Some are weeded out at first glance: the need for administration, maintenance of hardware and software as well and the exploitation of devices and services are all significant sticking points for a core system. Student response systems (SRS) are in place due to a successful campaign titled, Bring Your Device. Systems such as these allow the students to answer questions using their own electronic devices (McGraw et al. 2009). Last, but not least, Fully developed ones can be used as an instructional aid on video gaming systems (AP News 2018). A considerable amount of research indicates when video games are used in elementary-higher education classrooms, students' academic achievement increases, and also this form of learning increases motivation and cooperation in the classroom. This phenomenon has been demonstrated in other educational settings, including colleges (Rosas et al. 2003) and (Sharples 2000).

#### **3. Research Methods**

Game-based learning, as a novel approach to teaching and learning, has emerged in the wake of emerging technological concepts, and researchers in Pakistan are quantitatively studying the direct impact of GBL on student motivation, engagement, and academic performance. So in the Pakistani context, we want to find the best combination of the GBL component (game-based learning) which is highly correlated with the variables (student motivation, engagement, and academic achievement). This is a "descriptive" study. It details the issue and how to get a complete solution to the solution but provides no background as to why the solution is needed. All types of respondents including age, sex, computer knowledge, educational level, and other demographic features specific to the target of the study-literature are exhaustive on these characteristics of the respondents. This study is based on very little performance time work for a researcher. Because we used a questionnaire to obtain the information, the researcher's was at a minimum, since a correlational survey utilizes a self-report in a naturalistic whereby questionnaires are used. It is reasonable because it is not an intervention, which means participants are not under the control of the researchers. Because all the data were acquired simultaneously, the research occurred over a single cross-sectional period. This allowed the entire data collection, testing, writing and analysis to be executed in real-time. This is because of course the researchers do not have the time to look up stuff, they have research to conduct and so they cannot be going back and forth. Even though the majority of the population is composed of college students.

This includes demographics (e.g., gender, age), education (degree), major (e.g., Computer Science or Psychology), computer skills, and more. The survey participants were the voters of the 4 biggest cities of Pakistan (Karachi, Hyderabad, Lahore, and Islamabad). We tried to sample from a diverse selection of schools so that the findings would be generalizable. The sample consists of students from higher learning institutions. Our sample is drawn

from four major cities of Pakistan (Karachi, Hyderabad, Lahore, and Islamabad) comprising N = 400. We selected from a large variety of given educational levels to have more diversity of results. The non-probability sampling technique is also used which is known as the convenience sampling method. We used this method of sampling due to the convenience of the researcher and purposive sampling as we interviewed mostly students of higher institutions. Material and Method Data was entirely obtained from the main records (obtained utilizing the study questionnaire), and secondary records were achieved from associated research, books, papers, and articles indexed in the advent part. On the other hand, the questionnaire that the researcher has designed and tested to measure the components of GBL can also be used to investigate student motivation and, student engagement, as an antecedent of academic success. It was developed following the examination of the content validity and the reliability of the questionnaire. The data was then analyzed on SPSS-new software for which the data is accessible. Next Cronbach alpha frequency; bootstrapping; t-tests for group comparison; Regression analysis; Correlation analysis and Hypothesis testing on  $R^2$  were used to test the reliability of the items (Hair, Ringle, & Sarstedt, 2011) Conclusion Demographic characteristics data summary was collected from SPSS to generate frequency distributions and histograms for the data. We also employed the same test to perform an in situ test of the latent variables.



#### 4. Findings of the Analysis 4.1 Descriptive Analysis

Table 1: Frequency Table of Demographic Data of the model are displayed below in Frequency and Percentage form. Compute Skills peoples

			Frequency	Percent	Valid Percent	Cumulative Percent
	have compu	iter skills	107	31	30	28
Valid	Don't ha skills	we computer	293	69	70	101
			400	100	100	

Table 1 shows Computer skills (sample 400) The data showed that 107 of the total sample, corresponding to 31 %, had computer skills. This is 30% if only getting the correct answers, On the other hand, 293 residents, accounting for 70% of the valid responses, indicated that I have no computer skills which also reflects the 69.58% of the sample. Note: The cumulative percent for none (%) is 101 and it is not an error in the table. In general, the results stress that an overwhelming majority of the sample docs do not possess computer skills and point out a possible problem area for educational or training interventions.

		Frequency	Percent	Valid Percent	Cumulative Percent
	Female	180	40	45	45
Valid	Male	220	50	55	105
	Total	400	100	100	

 Table 2. Gender-Based Frequencies

Table 2 shows research about the impact of GBL on students' motivation, engagement, and academic performance in federal higher education institutes in Pakistan genders gender-wise distribution of responders of a total of 400 participants, 180 are women- it is 40% of participants and 45% of valid responses. Of these, 220 are male which represents 50% (55% including no response) of the sample. These values are notably inconsistent with the male population summing to 105%, potentially indicating that an error exists in either data calculation or data reporting within this particular set of data. The data despite showing an imbalance between genders is most useful for understanding how GBL impacts girls and boys because it represents near gender parity, marginally more male than females.

#### Table 3: Reliability analysis

#### **Reliability Statistics**

Cronbach's Alpha	# of Items
0.821	20

Table 3 displays the statistics on survey reliability for the study "The Impact of Game-Based Learning (GBL) on Students' Motivation, Engagement, and Academic Performance in Higher Education Institutions: A Quantitative Study on the Education Sector of Pakistan." The 20-item questionnaire's Cronbach's Alpha coefficient is 0.821, which denotes a good degree of internal consistency. This score implies that the questionnaire's components accurately gauge students' academic achievement, motivation, and engagement concerning game-based learning. Therefore, the instrument is judged reliable for examining the impacts of GBL in the educational setting of Pakistani higher education institutions.

Table 4:	Item-Total	Statistics
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	Scale-Mean-if Item-Deleted	Scale-Variance if Item- Erased	Modified Item-Total- Correlation	Cronbach's-Alpha if Item Removed
Que-1	35.28	70.51	0.15	0.74
Que-2	35.31	70.06	0.22	0.74
Que-3	35.32	70.16	0.18	0.74
Que-4	35.32	67.59	0.32	0.73
Que-5	34.69	62.65	0.42	0.73
Que-6	34.85	65.45	0.34	0.73
Que-7	35.49	68.24	0.38	0.73
Que-8	35.24	63.59	0.52	0.72
Que-9	35.28	65.74	0.45	0.72
Que-10	35.34	66.98	0.46	0.72
Que-11	35.34	65.80	0.50	0.72
Que-12	34.87	63.34	0.46	0.72

Que-13	34.62	62.40	0.48	0.72
Que-14	34.69	64.63	0.39	0.73
Que-15	35.30	68.99	0.26	0.73
Que-16	35.26	67.46	0.39	0.73
Que-17	35.30	68.18	0.34	0.73
Que-18	35.42	69.16	0.24	0.73
Que-19	35.45	69.58	0.24	0.73
Que-20	35.45	69.71	0.21	0.74

The detailed statistics in the table provide insight into the reliability of the individual items on the 20-question survey used in the investigation titled "The Impact of Game-Based Learning (GBL) on Students' Motivation, Engagement, and Academic Performance in Higher Education Institutions: A Quantitative Study on the Education Sector of Pakistan." Metrics incorporated scale mean if the item was deleted, scale variance if the item was deleted, corrected item-total correlation, and Cronbach's alpha if the item was removed. The overall Cronbach's alpha of 0.821 signals high reliability across the scale. Corrected item-total correlations vary between 0.15 to 0.52, suggesting different levels of association between each question and the total measure. Notably eradicating any single item does not substantially inflate the Cronbach's alpha, which lingers around 0.72-0.74, demonstrating that all parts make a positive contribution to the comprehensive reliability. Questions like Que-8, Que-9, and Que-11 exhibit stronger correlations, implying robust harmony with the scale's overarching concept. These statistics substantiate the stability and consistency of the questionnaire in evaluating the impact of GBL on students' inspiration, participation, and academic results.

Table 5: Cronbach's Alpha

	Cronbach's Alpha if Item Deleted
Learning from game	0.791
Engaged students	0.675
The Motivation of the Student	0.845
Student Education Output	0.685

Table 5 examines Cronbach's alpha statistics if specific entries within the questionnaire administered as part of "The Impact of Game-Based Learning on University Pupil Motivation, Participation, and Educational Results in Pakistan: A Quantitative Analysis of the Nation's Educational Sector" were omitted. Generally, deleting entries differently affects the overall measurement of internal consistency, reflected by an alpha of 0.821. Removing the entry "Knowledge Acquired via Games" in particular decreases the alpha to 0.791, showing this component adds to the scale's reliability. On the flip side, eliminating "Engaged Learners" and "Pupil Academic Achievements" raises the alpha to 0.675 and 0.685 respectively, indicating these entries align quite well with the entire scale. However, scrapping "Motivation of the Learner" results in a significant boost in Cronbach's alpha to 0.845, proposing that the component may not strongly link to the other entries. These conclusions suggest that while most entries are integral to scale consistency, tweaking the "Motivation of the Learner" component could potentially strengthen the instrument's overall ability to gauge game-based learning's impact on Pakistani university student motivation, participation, and academic performance.

Model	R	$\mathbb{R}^2$	Adj R <sup>2</sup>	S. Error
1	.371ª	0.14	0.129	2.189

Note: Predictors: (Constant), Game-based learning

Table 7. All	OVA					
Model		Sum of Squares	D-F	Mean Square	F	Sig.
	Regression	289.361	1	294.357	60.311	0.000
1	Residual	1909	389	4.809		
	Total	2211.36	395			

Table 7: ANOVA

a. Dependent Variable: student engagement: b. Predictors: (Constant), Game-based learning

The ANOVA table 7 provides statistical analysis for the study titled "The Impact of Game-Based Learning (GBL) on Students' Motivation, Engagement, and Academic Performance in Higher Education Institutions: A Quantitative Study on the Education Sector of Pakistan." The analysis examines the variance in academic performance outcomes explained by the regression model. The table indicates that the regression model accounts for a significant portion of the variance, with a Sum of Squares of 289.361, a Degrees of Freedom (D-F) of 1, and a Mean Square of 294.357. The F-value is 60.311 with a significance level (Sig.) of 0.000, indicating that the model is statistically significant. The Residual Sum of Squares is 1909 with 389 Degrees of Freedom, and the Total Sum of Squares is 2211.36 across 395 degrees of freedom. These results demonstrate that game-based learning has a significant impact on the dependent variables of students' motivation, engagement, and academic performance in the higher education sector of Pakistan.

#### Table 8: Standardized and Un-Standardized Coefficients (Model-1)

	В	Std. Error	Beta	Sign
(Constant)	3.219	0.39		0.000
Game-based learning	0.241	0.04	0.371	0.000

a. Dependent Variable: student engagement

Table 8 Model-1 Coefficients of Study "The Impact of Game-Based Learning (GBL) on Students' Motivation, Engagement and Academic Performance in Higher Education Institutions A quantitative Study on Education Sector of Pakistan" The unstandardized constant term coefficient is b = 3.219, SE = 0.39, p < 0.001 Game-based learning has an unstandardized coefficient (B) of 0.241 with a standard error of 0.04, meaning that for one more unit of game-based learning our outcome variable increases by 0.241 units. The Beta value for game-based learning is 0.371, which explains that there is a positive moderate relationship between game-based learning and the dependent factors (students' motivation, engagement, and academic performance). Thus, the probability (p-value) of game-based learning in the dependent variables is statistically significant, with a significance value of 0.000. The results indicate that game-based learning positively impacts both academic experiences and outcomes of students studying at higher education institutes in Pakistan.

Table 9: Model Sum	mary			
Model	R	$\mathbb{R}^2$	Adj R <sup>2</sup>	Std. Error of the Estimate
1	0.321	0.11	0.098	3.0123

Table 9 summarizes the results of the regression analysis done i.e., the Impact of Game-Based Learning (GBL) on Students' Motivation, Engagement, and Academic Performance in Higher Education Institutions: A Quantitative Study on the Education Sector of Pakistan. The correlation coefficient (R) is 0.321, and it suggests a weak/ positive relationship of statistical significance between game-based learning and the total scores harvested from students' motivation, engagement, and academic performance scales.  $R^2 = 0.11$  Game-based learning: 11% of the variance across outcomes This is slightly worse than the adjusted R-squared of 0.098, which offers an estimate of how useful the model is in explaining variation while factoring in the number of predictors in the model. This means the average distance of observed values from the regression line is 3.0123...the standard error of the estimate. This suggests that as much as game-based learning matters, it can only explain the minimal variance in student

motivation, engagement, and academic performance, pointing to the influence of extraneous variables not represented in the model.

Table 1	10:	ANO	VΑ
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Model		Sum of Squares	D-F	Mean Square	F	Sign.
	Regression	401.869	2	401.869	45.07	0.000
1	Residual	3611.03	397	9.081		
	Total	4012.9	399			

a. Dependent Variable: student Motivation: b. Predictors: (Constant), Game-based learning

Table 10 provided ANOVA for Model-1 which illustrates the variance the model has explained: This is important as it is the Sum of Squares (401.869) and 2 degrees of freedom (D-F) that results in a Mean Square of 401.869 which the regression model is accounting for. On the F-value of 45.07, with the level of significance (Sign. < 0,01%) 000, then the model is significantly different which makes the game-based learning significantly influence the dependent variables. Residuals 3611.03 with 397 Df, and the Total Sum of Squares 4012.9 on 399 Df. It can be inferred from the results that the regression model successfully explains the differences in the variables of motivation, engagement, and academic performance among the students due to game-based learning, providing further evidence for the importance of GBL in higher education in Pakistan.

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Model		β	Std. Error	β	Std. Error	Sign
	С	4.601	0.564		8.152	0.000
1	Game-based- learning	0.277	0.042	0.316	6.638	0.000

a. Dependent Variable: Student motivation

Table 11 with unstandardized and standardized coefficients from the regression analysis of "The Impact of Game-Based Learning (GBL) on Students' Motivation, Engagement, and Academic Performance in Higher Education Institutions: A Quantitative Study of Education Sector in Pakistan" The constant (C) has an unstandardized coefficient (B) of 4.601 (standard error 0.564, t-value 8.158, p-value 0.000), which means that a significant baseline effect. The final model for game-based learning shows the unstandardized coefficient (B) = 0.277, a standard error (SE) = 0.042 (Table 11), meaning that every unit increase in game-based learning results in an increase of 0.277 in the dependent variable. Game-based Learning 0.316 \*\*0. 000 6.638 \*\*\*Table 5: Direct Impact of Game-based Learning on students' motivation, Engagements, and Academic Performance. This study contributes to the growing areas of game-based learning as far as the higher education institutions in Pakistan are concerned.

Table	12:	Model	Summary	

Model	R	R <sup>2</sup>	Adj R <sup>2</sup>	Std. Error
1	0.359	0.31	0.27	2.304

Table-12 Model Summary Analysis The model summary table provides crucial statistics of the regression analysis in the study, "The Impact of Game-Based Learning (GBL) on Student's Motivation, Engagement, and Academic Performance in Higher Educational Institutes a Case Study on Education Sector of Pakistan". The reappraisal of case-based learning showed a small positive relationship may also demonstrate the impact of case-based learning as a part of game-based learning with student motivation, student engagement, and education; here it did not relate to academic performance solely, as opposed to Qian & Torse et al. (2014) conducted a meta-analysis on case-based learning, finding that it overall presented no detractions or advancements over traditional curriculum.  $R^2 = -0.31$ , the 31% variance can be explained by game-based learning. The Adjusted R<sup>2</sup> (which takes into account the number

of predictor variables) is a bit lower at 0.27, meaning the model does an OK job of explaining the data when considering sample size. The standard error of the estimate is 2.304 which represents the average distance that the observed values deviate from the regression line. Results highlight game-based learning as a significant and statistically meaningful predictor of students' motivation, engagement, and academic performance in Pakistani HEIs with a significant part of the educational achievement varieties.

Table 13: A	NOVA					
Model		Sum of Squares	D-F	Mean Square	F	Sign.
	Regression	57.721	2	56.714	10.691	0.001
1	Residual	2110.9	397	5.306		
	Total	2168.62	399			

a. Dependent Variable: student Academic performance: b. Predictors: (Constant), Game-based learning.

Table 13, ANOVA Sum of Squares D.F Mean Squares F Sig. From the table, it is evident that dependent variables can be significantly explained by the regression model. Between This is 57,721 on 2 D-F leaving a mean square of 56,714 The F value is significant. (sign= 0.036) = 0.036 and F (df1, df2) =10.691 in which P = 0.001 shows that the model is significant Residual sum of squares deviation is 2110.9 with 397 freedom degrees and the total sum of squares is 2168.62 across 399 freedom degrees. Our findings reveal that game-based learning, as a potentially successful educational intervention, affects students' motivation, engagement, and academic performance in HEIs of Pakistan as game-related activities significantly contribute to variance in all of these educational outcomes.

Table 14: Un-Standardized & Standardized Coefficient

Model		В	Std. Error	Beta	t	Sig.
1	С	6.48	0.432		15.017	0.000
	Game-based-learning	0.104	0.032	0.162	3.269	0.001

a. Dependent Variable: Student academic performance

Table 14, Unstandardized and Standardized Coefficients for this Regression Analysis of this study (Dependent variables in the study "The Impact of Game-Based Learning (GBL) on Students' Motivation, Engagement, and Academic Performance in Higher Education Institutions: A Quantitative Study on Education Sector of Pakistan ") For the constant (C), the unstandardized coefficient (B) is 6.48, a t-value of 15.017, and p-value of 0.000, and it has a standard error of 0.432, indicating the baseline effect is significant. Additionally, the unstandardized coefficient (B) for game-based learning is 0.104 with a standard error of 0.032, which implies that for each additional unit of game-based learning (ranging from 1 to 5), the expected score in the dependent variable should increase by an estimated 0.104 units. Game-based learning 0.162 3.269(\*).001 significantly improved students' motivation, engagement, and academic performance, with a Pf-value of 0.001. The results of the study advocate for the viability of game-based learning as a pedagogical strategy for the improvement of educational outcomes in the higher education organizations of Pakistan.

#### **4.2 Discussion**

In the present study, the researchers set out to investigate the influence of GBL on student motivation, engagement, and academic performance at the college level using a survey. GBL was seen to increase student engagement, participation, and self-confidence. As shown from our study, more students favor poor-skilled students in being interested in and involved in GBL. Again, gender-specific traits significantly differed. You could trust studies similar to the one by Kotob and Ibrahim (2019), who examined how game-based learning (GBL) affected student activation, motivation, and academic success in academic institutions. The researchers concluded that GBL had a positive influence on each of these aspects. Family support, life satisfaction, and study-load significance were also shown to be intertwined with academic achievement students' involvement and motivation in our investigation on higher education institutions. Additionally, (Eltahir et al. Learning in Higher Education (Chryssafidou et al., 2021) indicates that gender and computer skill influenced gender on GBL (game-based learning), as well as performance

in the academic field at the university level.

Literature has also recognized a strong relationship between students' engagement in game-based learning and medical student academic successes [1, 3, 12, 11, 19-26], as well as the variety of effects on student engagement (positive, negative, or no effect) due to students' engagement in games & game-based learning in their learning [1, 3, 4, 18-31] [34]. The paper also covers research design and measurement aspects. The last part of this section gives insight into the potential implications of the results. Game-based learning (Smith and Mann 2002) and student engagement. Due to the emphasis on participation, GBL creates a natural incentive that boosts the willingness to try again, and can "motivate participants to get actively involved in tasks with which players have virtually no previous experience," he said. The Nexus between game-based learning and student motivation Mantenika (2018): Based on research (Smith and Mann 2002) (Gandawijaya 2017) (Rosas et al. 2003) (Sousa and Rocha, 2019) (Al-Azawi et al. 2016). Given the central role of student inspiration in their work, researchers have also conducted studies to verify the survey results as well as research on social gaming and game-based learning experiences of students (Zarzycka-Piskorz 2016). So it is very important to go deep into motivation. One study involved the components of intrinsic motivation. The single player aspect of online games is as important as a batch player, where humans play against humans, not against the AI required for AI programming, because humans, let me put it this way if a game was completely unbalanced (think starcraft crazy), but a way to break the game was discovered, say 20k mineral for 1 gas geyser (destroy balance), even if 1 in 100,000 players used it to get an advantage THEY WOULD, and with thins in mind it is for sure no Bad Thing. One cannot possibly overstate the importance of winning language contests. This capability could be used to much more effectively craft and adjust learning sites to the needs of students, the type of knowledge being advanced, or course material. As reported by the researchers (Turan and Meral 2018), among the gains for students using a game-based Student Response System are reduced test anxiety and enhanced motivation. Though we could not explore the classes of game-based learning systems for high school required social studies courses), the game-based student evaluation systems for similar results using social studies classes may prove to be of use (note that so far as we can tell concern about tests does not factor into the analysis). According to researchers (Gandawijaya 2017), the relationship between GBL and educational success has been affected negatively. Ultimately we discovered that GBL was effective. Furthermore, the Mindtool-integrated collaborative educational game that allows teachers to collectively manage knowledge is likely to reinforce students' educational motivations and promote effectiveness, academic performance, and self-efficacy (Felszeghy et al. 2019)(Sung and Hwang 2013)). About Kahoot®, the app was introduced as a game to motivate children to learn better (Felszeghy et al. 2019). Gamification showed better learning/motivation outcomes as a total of 124/160 students stated that due to gamification they found more interest in their studies, hence the level of kahoot user engagement is very high. Among other benefits of the activity, there was the gamification (109/160) and helping students overcome personal obstacles (139/160); (146/160) the immediate feedback from expert seniors. A vast proportion of students (23/41) answered an open-ended poll about their experience by highlighting collaborative teamwork and gamification, which was praised by most of the students. A survey involving 400 students on high education outcomes related to student achievement, engagement, and motivation due to GBL was undertaken.

# 5. Conclusions and Recommendations

GBL is truly a hot new 21st-century approach that is reinventing how students and teachers learn of all the genres of blended learning used by today's educators. Higher education institutions are instituting innovative teaching and learning methods to provide students with the best possible education and to meet global standards. This study aimed to investigate affective issues relevant to students' motivation, engagement, and habits of mind in college courses. The data gathered suggest that students participated more in GBL and they are interested as well in GBL but only students with poor skills. However, as the study was small, future research could use larger samples and different sampling methods to gain more precise results. Unfortunately, we were unable to include the full range of GBL variables in our study because of constraints on class time. This is quite easy to see considering the study has its constraints as well as potential uses. To mitigate this, some suggest that people in the industry will bring enough human verification, while others say that it is neutralized with such a small sample scale and industry population. Currently, the study is only being conducted in four cities across Pakistan. There are numerous other elements of GBL and these factors can be played in different cities of Pakistan and other countries for future studies. To explore the unemployed impression of GBL on student concentration, amusement, then, at that point, you will demand to add fresh variables to the model.

This study being exploratory with the inherent limitations of the methodology and potential future directions,

resulted in us having to bound the GBL (game-based learning) variables we were able to encompass. GBL has only a correlation with four factors i.e. student engagement, motivation, and academic achievement (GBL). This research is also limited by its small population and industry sample. This research will just be conducted in Pakistani universities. Further research may investigate other GBL characteristics for evaluating learner engagement, motivation, and academic achievement Future researchers. They can even consider the same variables across the globe with different countries and cities. The structure can also easily be replicated across multiple businesses. The studies have not been done in, say, the service sector, and, therefore, new academic turfs can be explored by budding researchers. This research can have an advantage in other cases, cultures, races, and religious affiliations. More variables can be added to characteristics that contribute to GBL game-based learning. Due to the study's small sample size, future researchers can use larger samples and other kind of sampling techniques to obtain more accurate conclusions.

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