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Research Article

The Impact of Microsoft Mathematics Visualization on Students Academic Skills

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The purpose of this study is to examine whether there is a relationship between academic skills and Microsoft Mathematics Visualization as a result of the use of Microsoft Mathematics Visualization in the classroom. Specifically, when it comes to academic skills, Microsoft Mathematics Visualization is considered an independent variable, and academic skills are considered a dependent variable that has been influenced by the negative or positive characteristics of various instructional methodologies. The quantitative research approach has been used in the development of this document. Approximately 300 responses were collected during data collection, and, following correction, the sample size was decreased to 268 responses, which were mined in SPSS to generate the results. In the findings of the model summary, it is shown that the selected model has a very good above-average value of adjusted R^2, suggesting a good fit, in accordance with the results of model summary. Microsoft Mathematics Visualization is regarded to be a predictor for academic skills since its coefficient of 0.794 on conversion explains up to 79.4 percent of the variance of the model when converted. We have "B" = "0.892" as the value of the predictor's beta in our first regression. For example, a one-unit change in Microsoft Mathematics Visualization will result in an 89.2 percent change in academics skills, which may be interpreted as follows: Aside from that, the correlation coefficient between Microsoft Mathematics Visualization and student caliber ($r = 0.840$) indicates a positive relationship between student caliber and Microsoft Mathematics Visualization. 0.963 indicates that formal schooling has been significantly influenced by Microsoft Mathematics Visualization training, which might be further elaborated as that formal education has been boosted by Microsoft visualization training, according to the results of the test.

1. Introduction

1.1. Defining Microsoft Mathematics Visualization (MMV). Microsoft Mathematics is a piece of software developed by Microsoft that is available for free download. This program allows users to do computational mathematical operations with the assistance of the program. Simple instructions can be used to write, calculate, and manipulate mathematical expressions, as well as to create graphical representations in 2D, 3D, and animation [1]. Microsoft Mathematics, a free piece of software developed by the multinational corporation Microsoft Corporation, was put through its spaces as part of an experimental study to determine whether or not it could be used to teach and learn Calculus. This study, which employs an experimental methodology, investigates how Microsoft Mathematics is used in Calculus classrooms, as well as how students feel about their progress and how their use of Microsoft Mathematics influences their opinions about the application. The study's participants were all first-year students at the University of Serang Raya, and all of the participants were female. According to the findings of this study, children who were taught using Microsoft Mathematics had higher exam scores and felt more confident in their math abilities than their peers [1].

Additionally, this strategy enhanced student involvement and created positive effective results in addition to assisting students in improving their arithmetic performance on standardized tests. According to the findings of

their research, students who learned mathematics using Microsoft Mathematics performed higher on exams than their peers and using Microsoft Mathematics increased students' confidence in mathematics. This study investigates the impact of a hypermedia tool (Hipatia) on three important areas: the mathematical learning process of students, their self-management, and affective-motivational variables such as perceived utility, perceived competence, intrinsic motivation, and anxiety towards mathematics [2]. One of the most efficient methods for teaching arithmetic topics is the concrete representational abstract (CRA) instructional style. Images are used to depict items to answer a math problem at the "seeing" stage. The abstract stage is the last step in this process. As students progress through CRA, they move from dealing with real materials to creating representational drawings to employing abstract symbols. Evidence shows that the CRA instructional approach is "an intervention for math instruction that research demonstrates can improve children' arithmetic performance." An instructional technique known as the approach is a "three-part instructional strategy, with each portion building on the preceding lesson to increase student learning and retention as well as to address conceptual understanding." The following are the three sections.

The teacher begins instruction by using concrete materials to model each mathematical idea. To put it in another way, this is the "doing" stage, in which problems are modelled using real-world things. It is now time to go from the concrete model to a representational one, which may involve drawing drawings, utilizing circles, dots, and tally marks, or even employing stamps to imprint images for the purpose of counting. To put it in another way, this is the "seeing" stage, in which representations of the things are used to model the issues at hand. The teacher uses only numbers, notation, and mathematical symbols to represent the number of circles or groups of circles in this stage of the process. Students are shown how to multiply and divide by the use of operation symbols (+, −, ×, /). "Symbolic" learning occurs when students can use abstract symbols to represent complex problems. Using this method in the classroom allows students to connect across physical, representational, and abstract levels of thinking and comprehension. For students to gain a foundational understanding of mathematics, teachers use a variety of teaching methods, including visual, tactile, and kinesthetic experiences. From there, students progress to the abstract level of thinking, where they exclusively use mathematical symbols to represent and model problems. Study has demonstrated that "children who use concrete materials create superior mental models, often show higher motivation and on-task behaviour, understand mathematical principles, and better apply these theories to real-life scenarios."

1.2. Improvement in Students Attitude and Conceptual Understanding. A student is a person who is involved in academic pursuits, someone who is enthusiastic about learning or one who is enrolled in school or who seeks knowledge from professional teachers or from literature, for example, pupils at an academy, a college, or a university; a learner; a pupil; a scholar; a medical student in training; or a student who works really hard. The effects of students' attitudes, conceptual knowledge, and procedural abilities in Differential Calculus were investigated in this study, which was conducted using Microsoft Mathematics. To compare two different learning settings, a quasi-experimental research approach was adopted, and the findings were published. In the study, students from two different Electrical Engineering classes, each of whom was taking a Differential Calculus course, took part in the investigation [3]. To conduct the studies, the students were divided into two groups of 30 each: one group was used for control purposes, and the other group was used for experimental purposes. Control group students were traditionally taught Differential Calculus, and the experimental group was taught using Microsoft Mathematics embedded activity sheets, which were designed to teach the same topics as the control group (see Figure 1). As a result of investigating and discovering new concepts, the experimental group gained new knowledge [4].

Participants' past knowledge of Calculus concepts and procedures was evaluated, with it being determined that they had just the most rudimentary understanding of these concepts and processes [5]. In conclusion, it was discovered that the subjects' talents had significantly risen as a result of the investigation. Students in Differential Calculus benefit from utilizing Microsoft Mathematics, since it helps them obtain a stronger conceptual knowledge of the subject matter as well as procedural skills. When it comes to teaching and learning calculus, Microsoft Mathematics is just as effective as the traditional method. According to the MTAS attitude scale, the experimental group had a "favorable" to "extremely favorable" attitude in all five areas in which they were evaluated. Pretest and posttest results reveal a statistically significant difference in the attitudes of the subjects toward "learning Mathematics with technology" when comparing the two groups [4].

1.3. Role on Overall Academics Improvements. The findings of the study revealed that participants had just a rudimentary comprehension of Calculus' principles and procedures after the investigation. In conclusion, it was discovered that the subjects' talents had significantly risen as a result of the investigation. Microsoft Mathematics is now being used in schools, and there is evidence to support this practice [6]. Differential Calculus assists students in the development of both their intellectual and procedural skills. When it comes to teaching and learning calculus, Microsoft Mathematics is just as effective as the traditional method. According to the MTAS attitude scale, the experimental group had a "favorable" to "extremely favorable" attitude in all five areas in which they were evaluated. Participants' attitudes toward "learning Mathematics with technology" differed statistically significantly before and after the study. Several research on the integration of technology in mathematics teaching and learning have yielded a diverse variety of findings. But while some experts agree that using technology in the traditional

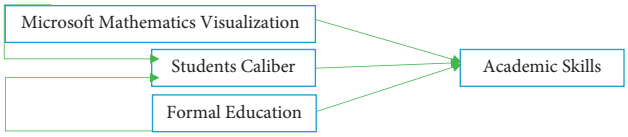

Figure 1: Framework of research.

way of teaching calculus does not aid students in their comprehension of the fundamental concepts, others disagree and believe that it is beneficial. Calculus education has to be improved, with a greater emphasis on conceptual knowledge of the topic and the development of problem-solving skills in the students. In mathematics instruction and learning, there have been no significant numerical advancements [4].

1.4. Parts of Academics Influenced by MMV. Essentially, a lesson plan is a period during which learning is expected to take place. Experienced and effective teachers systematically prepare their classes, ensuring that everything they do is preplanned. Once the students are in the classroom, they are not allowed to deviate from their plan [7]. When students bring up nonissues, they keep an eye out for them because they are not crucial to the plan and so do not cause a disturbance to their learning process.

Students and parents have a prevalent notion that teachers have complete control over the educational environment and group dynamics. This is incorrect. Different sorts of activities in the ESL classroom, such as parts of speech in the form of worksheets, pedagogical lessons, rehearsal activities, language exercises, and communicative activities, should be approached through the use of educational games. Students will be engaged in every exercise and worksheet by using Microsoft Mathematics Visualization, which will be implemented in collaboration with the experimental group [4]. The following are the major skills that must be considered when employing MMV. We will now conduct a comparative analysis of the data presented below to determine whether or not Microsoft Mathematics Visualization has had an impact on academics. Software developed by Microsoft Corporation that uses a symbolic computing architecture and works with mathematical expressions is known as Microsoft Mathematics Visualization. Linear Algebra, Statistics, Calculus, and Trigonometry are some of the math problems that Microsoft Mathematics can help students with. Understanding concepts, reasoning, building and exploring knowledge, solving issues, and generating new information can all benefit from the usage of technology. Mathematical concepts are easier to grasp when pupils can see them in action. Visualization-aided activities have been shown to aid in the learning of mathematics, according to prior studies.

2. Methodologically Implementing MMV

This study's goal is to see if there is a link between academic skills and Microsoft Mathematics Visualization in the classroom. In terms of academic skills, Microsoft Mathematics Visualization is an independent variable, whereas academic skills are a dependent variable influenced by various instructional approaches' negative or positive features. This document was created using quantitative research. After rectification, the sample size was reduced to 268 replies out of 300; these students nested within 10 math classes which were mined in SPSS to get the results. Processes used at a professional level are defined systematically, and then specific statistical formulas like 1-Regression, 2-Reliability, or 3-Descriptive Analysis are applied to determine whether or not MMV has had an impact on the academic skills of students in the field of study based on the ground realities. Microsoft Corporation has developed Microsoft Math, a free program. Computational mathematics can be performed by means of this software. Math expressions and graphical visualizations of 2D, 3D, and animation can all be written and manipulated with a few simple steps. Problems can be solved in the same step-by-step fashion using Microsoft Mathematics as they can be manually.

2.1. Research Design. The researchers used a quantitative research design in this study; interviewing and recording each respondent's responses against the questions against the below variables are drawn in Figures 1 and 2:

(1) Microsoft Mathematics Visualization
(2) Students caliber
(3) Formal education
(4) Academic skills

2.2. Instrumentation. An SPSS database will be used to instrument each questionnaire against a 5-point Likert scale assessing whether MMV is strongly effective or not effective. To conduct a population-based correlation study, you must select a representative sample of the population at a single point in time. In statistical terminology, this is referred to as the correlation survey study design. The data analysis and gathering methods utilized in this study were quantitative, which resulted in a more precise outcome. Specifically, researchers employed standardized questionnaires and closed-ended questions to obtain information from study participants as shown in Figure 3.

2.3. Variable View of Data Instrumented in SPSS. The variable view of data instrumented in SPSS is as follows.

2.4. Type of Analysis. Different types of tests have been performed on data that has been instrumented.

2.4.1. Correlation. Check the relationship between the Variables.

2.4.2. Regression. Analyze impact of MMV, formal education, and students caliber on academic skills, using Std. Beta. R^2 will highlight goodness of fit of the research model.

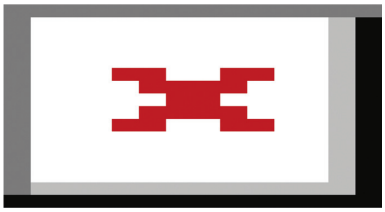

Figure 2: Framework of research.

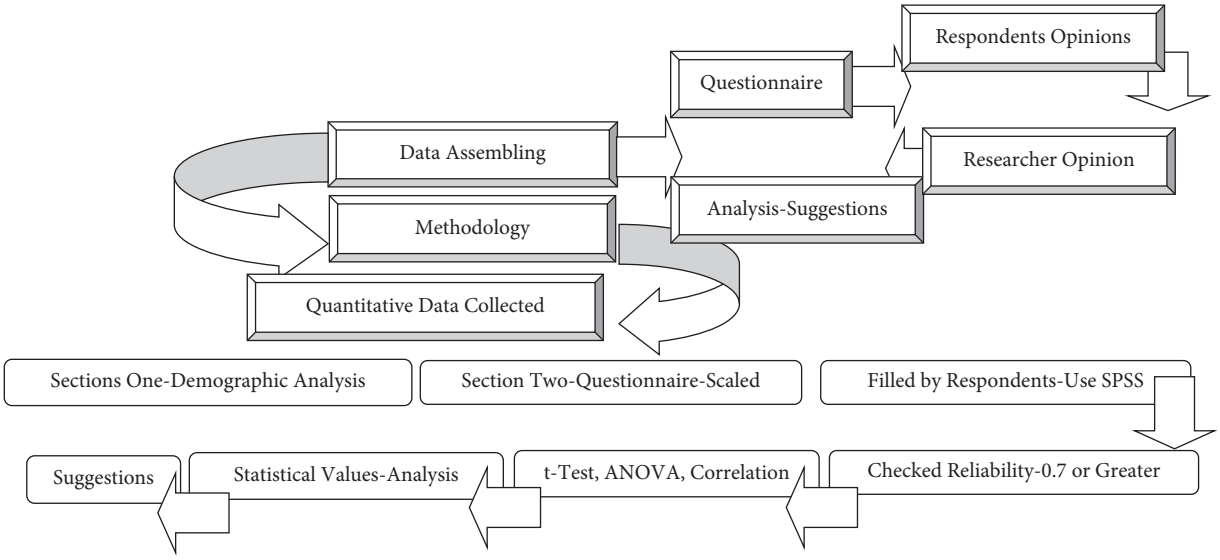

Figure 3: Algorithm for tests.

2.4.3. Single Linear Regression. Calculate the single impact of each variable on academic skills.

2.4.4. Multiple Linear Regression. Check the impact of all variables on academic skills collectively.

2.4.5. Reliability. Find if the data is reliable or not.

2.4.6. Descriptive Analysis and Normality. Highlight Mean, Std. Deviation, and Data Normality.

2.5. Likert Scale. To collect quantitative secondary information, we distributed questionnaires with items graded on a five-point Likert scale to a sample of people. According to the researchers' thoughts, the respondent's decision to answer questions in a certain way will not be impacted at all.

2.6. Analysis Algorithm. The algorithm for tests is shown in Figure 3.

3. Results of Data

Following a thorough examination of the data, we arrived at some interpretations, based on which we arrived at some findings, which we will discuss below. Having arrived at some conclusions, it is now necessary to acknowledge them and move forward with the resolution process. Some ideas have been made to make things even better in the future.

3.1. Reliability. It is necessary to use Cronbach's alpha to evaluate the inherent consistency and dependability of a system. Cronbach's alpha is a reliability and consistency coefficient. Hatcher [8] defined a coefficient that is used to determine whether or not the provided data is internally consistent; values greater than 0.60 and 0.70 are considered satisfactory; values greater than 0.70 and 0.90 indicate reliable data; values greater than 0.90 are exceptional; values greater than 0.60 and 0.70 are considered exceptional [9] Cronbach's alpha is a system dependability test that uses Cronbach's alpha formula to determine system dependability. In our SPSS reliability test, we discovered that the best DV values were those that were greater than 0.9 when all DVs were determined to be greater than 0; the worst DV values were those that were less than 0.9 as shown in Table 1.

3.2. How Much Reliable Is Microsoft Mathematics Visualization? Among the six categories tested, the Cronbach alpha values for "MMV education," also known as "Microsoft Mathematics Visualization," were 0.928 for "Microsoft Mathematics Visualization," 0.881 for "students caliber," and 0.914 for "formal education." MMV education, also known as "Microsoft Mathematics Visualization,"

Table 1: Data reliability.

Variables	Cronbach's alpha	No. of items
Microsoft Mathematics Visualization = MMV	0.928	5
Students caliber = SC	0.881	9
Formal education = FE	0.914	6
Academic skills = AS	0.869	4

showed a range of dependability from 0.872 to 0.928 for academic skills, with the highest being 0.928. Following the figures provided, all of the information has demonstrated consistency and appears to be significantly more dependable to carry out the remaining testing procedures. It was determined that the AS values were greater than 0.700, which were regarded to be favorable values.

Table 2: Correlation analysis.

	MMV	SC	FE	AS
MMV	1			
SC	0.840**	1		
FE	0.963**	0.913**	1	
AS	0.892**	0.870**	0.931**	1

3.3. Association of MMV with Academics. There are two approaches to conducting a correlation analysis to determine whether our variables have a positive or negative association with one another. In other words, the question is whether they are interfering with one another and how they are interfering with one another. We have a correlation range ranging from 1 to 100 percent. If you receive a value of 1, it indicates that they are completely correct. Divide these two items by the correlation coefficient −1 to determine that they are opposed to one another. Because their values lie in the middle of the range from 1 to 0, there is a link between them as shown in Table 2.

Following the signals shown in the preceding section, the variables have an impact on MMV educational outcomes. At the 0.000 level of significance, it demonstrates a statistically significant positive association with all of the parameters listed above. Specific events can now be linked to the causes of both the positive and negative correlations, allowing for more precise analysis. To account for this, when $r > 0$, an increase or decrease in one value has the same effect on both the upstream and downstream values. Negative indications, on the other hand, indicate that a reduction in one variable has also resulted from an increase in another one. The correlation coefficients and connections between all of the variables are depicted in the following table.

Higher academic achievement may be achieved by the implementation of a more complete MMV education program. According to this assertion, using Microsoft Mathematics Visualization can help students improve their mathematical ability. A favorable correlation between MMV and student caliber is demonstrated by the "r" value between MMV and student caliber = 0.840, showing that general abilities have increased as a result of adopting this visualization. 0.963 indicates that formal schooling has been substantially influenced by MMV training, which might be further developed as indicating that formal education that has been supplemented with Microsoft visualization has had a significant impact. As a result of these considerations, it has been established that providing students with an engaging educational experience may be the best option for their academic development. The value of "r" for AS and FE was 0.931, with "**" significant results indicating that if formal education has been enhanced with MMV caliber skills, the level of enhancement skills will increase, and if the level of enhancement skills is decreased, the level of enhancement skills will fall.

When looking at the means of all items in Table 3, the minimum value for a student's caliber is 2.2005, and the maximum value is 2.8294 and 2.5363 when looking at the mean of all items for FE versus "MMV." As the maximum value of the mean has been projected, it follows that the education that is entertaining for students should be given a high priority. This is especially true in the context of formal education, which should include a fundamental portion of MMV education. Students' ability to perform is more dependent on "MMV" than on "FE." The values of skewness and kurtosis were in the range of +2 and −2, indicating that the data was normal.

3.4. Checking Succession of Model of Microsoft Mathematics Visualization. Now regression analysis is used to determine how closely one of the dependent variables (usually denoted by Y) is related to another modifying variable (known as independent variables or predictors). The correlation between the two variables that are part of our thesis's regression is used for the majority of the examples in this section. Correlation is a statistical function in Excel which examines two sets of data to determine how closely they are related to one another. First and foremost, we will look at the R-Square in Table 4 to determine whether or not the model is valid and whether or not regression should be included in the model in the future. For our study, on the other hand, a specific type of regression is used, in which only one predictor and two dependent variables are considered. Using their combined regression results, a step-by-step regression test will be performed to determine whether or not the model is a good match for the data set.

It was discovered, via the use of a model and a study framework, that educational environments that include games have an impact on academic skills. Formal education provides a function, and the quality of the students also serves a purpose. Now, to verify our model, we will do regression tests in three phases.

Table 3: Descriptive analysis of MMV.

Mean	Std. Deviation	Skewness	Kurtosis
MMV 2.8294	1.15269	−0.574	−1.106
SC 2.2005	0.75021	−0.598	−1.025
FE 2.5363	0.96649	−0.555	−1.073
AS 2.4963	0.92787	−0.552	−0.933

In the first regression step, AS operates as DV against MMV; in the second regression step, (a) AS operates as DV against SC and (b) SC operates as DV against AS

Step 3, AS acts as a DV in the face of FE.

Step 4, at the end of the process, a thorough regression will be carried out in SPSS to determine whether formal education is a factor that hurts our students' abilities and whether it should be improved or changed to provide more enjoyable instruction for the students.

They were going to be a little time-consuming because they required running one-by-one regressions while keeping all IVs in a sole position against AS. However, this is required to obtain an accurate elaboration for the selected model. Because an IV may be significant on its own but nonsignificant in a collective result, it may be necessary to reverse the model from significant to nonsignificant. Because of this, we should run both of them to receive a more detailed explanation. It has been decided to conduct regression in both directions to investigate the influence of individuals and groups as a result of this.

3.4.1. MMV as Predictor of Academic Skills. Table 4 demonstrates that the selected model has a very good above-average adjusted R^2 value, indicating good fit, as demonstrated by the model summary. According to Microsoft Mathematics, 0.794 on converting can explain up to 79.4 percent of the variance of the model. As previously mentioned, visualization is considered to be a predictor of academic skills. Following the model, our first variable is appropriate.

In Table 5, the fact that F 1031.099 > 10 and sig = 0.000 > 0.050 are both greater than 10 indicates that the impact of IVs is statistically significant. "B" = "0.892" is now the beta value of the predictor in our first regression, and the second regression has the same value. For example, a one-unit change in Microsoft Mathematics Visualization will result in an 89.2 percent change in academics skills, which may be interpreted as follows: The conclusion that can be drawn is that academic skills can be significantly improved based on education delivered in a fun and engaging manner, for example, playing multiple games or watching multiple videos for the sake of hymens or improving other skills.

We will now perform a regression analysis, with the students caliber serving as both a predictor and a dependent variable. The regression model is shown below, which illustrates how SC exhibits duality in nature.

3.4.2. Students Caliber as Predictor of Academic Skills. Table 6 demonstrates that the selected model has a very good above-average adjusted R^2 value, indicating good fit, as demonstrated by the model summary. When converted to percentages, the coefficient of 0.757 can explain up to 75.7 percent of the variance of the model. This means that students caliber can be improved by up to 76 percent (rounded off) if they have strong academic skills. In reverse regression, where caliber is assumed to be the dependent variable, as a general rule, the higher the students caliber, the better their ability or intelligence. The statement could be correct because the same values of beta and even R^2 can be obtained by using the same caliber (obtained by explaining the above-mentioned statement).

From Table 7, the fact that F 831.099 > 10 and sig = 0.000 > 0.050 are both greater than 10 indicates that the impact of IVs is statistically significant. Now, the beta value of the predictor in our first regression is "B" = "0.870," which indicates that the predictor has a positive beta value. This could be explained by the fact that a single unit change in academic skills will result in an 87 percent change in the caliber of the student. In the second regression step, there were two ANOVA tables. In the first case, where the ANOVA model was found to be nonsignificant, it means that we must reverse the regression for the analysis of variance, and, as expected, in the second case, where SC = DV, the sig at 0.000 is found for both the constant and the predictor.

3.4.3. Reverse Regression with Students Academic Skills as Predictor. Table 8 is understandable because the abilities of students are dependent on their academic skills and even more so because, as previously stated, almost 90 percent of their abilities are dependent on their academic skills. Caliber could be significantly raised in this manner based on academic skills, which could be enhanced through the use of gaming devices in conjunction with a fascinating educational experience, for example, playing a large number of games or watching a large number of films to improve hymens or develop other talents. Snake and Ladder, a board game, and a vocabulary game were among the games played.

3.4.4. Regression for Comparison of Formal Education with Education Based on MMV. Based on the information provided in Table 9, it can be concluded that academic skills are statistically significant at 0.000 with a beta value of 0.931. This means that a single change in academic skills will result in a 93.1 percent change in formal education, which is a significant change. However, the value of the overall model appears to indicate good fit, as indicated by the value of R^2 being 0.061 > 0.05. According to current thinking, academic skills are not dependent on formal education, which is why the model is nonsignificant.

3.4.5. Full Regression with Students Academic Skills as Predictor. In this step, we will run the final regression, in which all variables will be treated as IVs/predictor variables.

IV-1 equals MMV, IV-2 equals SC, IV-3 equals FE, and DV equals academic skills .

Table 4: Model summary.

Model	R	R-Square	Adjusted R-Square	Std. error of the estimate	Change statistics					Durbin-Watson
					R-Square change	F change	df1	df2	Sig. F change	
1	0.892[a]	0.795	0.794	0.42097	0.795	1031.099	1	266	0.000	2.062

[a]Predictors (constant), Microsoft Mathematics Visualization. [b]Dependent variable: academics skills.

Table 5: ANOVA.

Model		Unstandardized coefficients		Standardized coefficients	F	Sig.
		B	Std. error	Beta		
1	(Constant)	0.466	0.068		1031.099	0.000
	Microsoft Mathematics Visualization	0.718	0.022	0.892		0.000

[a]Dependent variable: academics skills.

Table 6: Model summary part (a).

Model	R	R-Square	Adjusted R-Square	Std. error of the estimate	Change statistics					Durbin-Watson
					R-Square change	F change	df1	df2	Sig. F change	
1	0.870[a]	0.758	0.757	0.45757	0.758	831.910	1	266	0.000	2.092

[a]Predictors: (constant), students caliber. [b]Dependent variable: academics skills.

Table 7: ANOVA.

Model		Unstandardized coefficients		Standardized coefficients	F	Sig.
		B	Std. error	Beta		
1	(Constant)	0.444	0.065		831.910	0.000
	Academics skills	0.704	0.024	0.870		0.000

[a]Dependent variable: students caliber.

Table 8: Reverse regression.

Model		Sum of squares	df	Adjusted R^2	Beta[b]	Sig.
1	Regression	113.864	1	0.757	0.870	0.000[a]
	Residual	36.407	266			
	Total	150.271	267			

[a]Predictors (constant), academics skills. [b]Dependent variable: students caliber.

Table 9: Comparative regression.

Using formal education as predictor		Unstandardized coefficients		Standardized coefficients	Sig.	Model summary		
		B	Std. error	Beta		R	R^2	Adjusted R^2
1	(Constant)	0.117	0.062		0.061			
	Academic skills	0.970	0.023	0.931	0.000	0.931	0.867	0.866

The overall Model in Table 10 is significant but our main variable has been reversed to nonsignificant; it means formal education is a predictor that is not going to explain our model. Now the model is ideal with students caliber and Microsoft Mathematics Visualization as shown in their single regressions against academics skills. But, in collective regression, Microsoft Mathematics Visualization has been replaced with formal education. As an example, formal education should be replaced with some fun education to improve academic skills and thus the abilities of students. Now the beta values with formal education as ideal for academic skills to enhance students caliber were Microsoft Mathematics Visualization = −0.001, students caliber- = 0.121, and formal education = 0.822, respectively. This means Microsoft Mathematics Visualization does not trigger any change in academic skills, whereas the students caliber unit change will cause a 12.1 percent change in academic skills and formal education unit change will cause an 82.2

Table 10: Full regression.

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	Model summary		
	B	Std. error	Beta			R	R^2	Adjusted R^2
(Constant)	0.168	0.064		2.622	0.009			
Microsoft Mathematics Visualization	−0.001	0.071	−0.001	−0.016	0.987			
Students caliber	0.149	0.073	0.121	2.059	0.041	0.932	0.869	0.868
Formal education	0.789	0.113	0.822	6.954	0.000			

percent change in academics skills. But the overall model is nonsignificant, which means the above results cannot be trusted and are not reliable.

3.4.6. ANOVA to Check Impact of Microsoft Mathematics Visualization on Each Class. It is applied based on classes to check the impact of Microsoft Mathematics Visualization on academic skills and split the file into the class level from 1st standards till intermediate. Now after running regression keeping Microsoft Mathematics Visualization as a predictor and academic skills as a dependent variable against each class has been generated.

The maximum values were shown in Table 11 by 1st, 2nd, 4th and intermediate standards with values of adjusted R^2 of 0.901, 0.910, 0.915, and 0.965. It indicates that when MMV is used, pupils of intimidation explain 96.5 percent of the variation. The academic skills of intermediate students were found to be impacted more as compared to the other classes. Classes of 5th to 7th standard have been showing the least value, that is, 80%+, with 5th standard class explaining 88.4% and 7th 81.6%. All the results were significant with p value $0.000 < 0.050$.

4. Discussion

In this section, we are going to consider our results in the light of several types of research. It is feasible to increase one's grammatical skills by incorporating additional MMV lessons. Using Microsoft Mathematics Visualization in the classroom may help students improve their skills. Additionally, the "r" value of 0.845 reveals a positive association between students caliber and overall abilities, indicating that overall abilities have improved. According to the PISA test, a score of 0.972 suggests that formal schooling has been highly influenced by MMV training. According to the aforementioned principles, delivering students a learning experience they find engaging may be a superior alternative for their long-term academic performance. This means that when "r" was divided by "r," the results were considerably different. The strengthening of grammatical abilities should be a part of formal education.

This piece was written by Thomas Hainey [10]. For this reason, MMV-based learning may be a viable technique for dealing with some of the challenges linked with typical ways for selecting and reviewing instructional criteria. These problems include those linked to lack of time. The absence of scientific facts to support MMV is one of the most critical concerns. Pedagogy is not expressly addressed in MMV assessment methods, which is another concern. Even though MMV has been employed in many sectors, the focus of this study will center on its usage in the selection and analysis of tertiary education teaching criteria.

Three studies at the EC level were done by the Education Commission, and the results reveal that a large proportion of students are interested in utilizing MMV at the EC level. Using a newly created assessment system, the effectiveness of an MMV game for assembling and modifying teaching criteria was proved by comparing it to standard teaching methods at the HE and EC levels.

Prior quantitative statistics demonstrate that MMV is as productive and, in some instances, even more effective than a paper-based exercise when it comes to fulfilling tasks. When it comes to boosting awareness among students at both the HE and FE levels, the MMV application has been extremely beneficial. Because of this, it is shown that MMV may be a more successful technique for teaching software engineering topics at the HE level than at the FE level in some cases. Using game-playing behaviours and motives as a focus, this research provides a key beginning step in increasing our understanding of MMV by presenting a huge amount of empirical evidence that is required in the field.

This study paradigm is backed by the authors of [11] who argue that researchers have picked one variable that was changed by MMV learnings, namely, students' grammatical skills, and have employed various resources. There were essentially no changes between the components in their analysis and those in the initial correlation. According to studies, class size reduction is to blame for the deterioration in student quality, notably in academics. Microsoft Mathematics is a tool that is applied in the classroom. The Education Commission's weak guidelines have made it difficult to envision national resources, which has become a severe impediment.

Increasing game-based education could increase academics capabilities. This demonstrates that student abilities might be boosted not only by education based on Microsoft Mathematics Visualization but also by boosting overall abilities as the caliber of the student reveals "r" value of "0.845" which is a clear association. Formal education had the highest value of 0.972, suggesting that formal education was strongly affected by game-based education.

In the next results, the lowest value is 2.2005 for the caliber of the student and the greatest values against "EDUT" are 2.8294 and 2.5363 for FE. It means that education that is entertaining for students should be given considerable attention as it has been projected that the largest benefit of average is a fundamental component of game-based

Table 11: ANOVA.

Class	Model	R	R-Square	Adjusted R-Square	Std. error	F	Sig.
1st standard	1	0.901[a]	0.812	0.810	0.41303	462	0.000[b]
2nd standard	2	0.910[a]	0.828	0.826	0.34581	290	0.000[b]
3rd standard	3	0.820[a]	0.672	0.649	0.44248	29	0.000[b]
4th standard	4	0.915[a]	0.836	0.826	0.4509	82	0.000[b]
5th standard	5	0.884[a]	0.781	0.769	0.48268	61	0.000[b]
6th standard	6	0.887[a]	0.788	0.772	0.40386	52	0.000[b]
7th to matriculation	7	0.816[a]	0.665	0.641	0.61774	28	0.000[b]
Intermediate	8	0.965[a]	0.931	0.924	0.29814	135	0.000[b]

education in the sense of formal education. Students caliber is depending more on "EDUT" lesson "FE." The values of skewness and kurtosis were between +2 and −2 suggesting data normalcy.

A teacher-facilitated pedagogical strategy to incorporate online game-based constructivist learning into standard school curriculum teaching was employed by [12] to confirm the findings of the previous study. This study used the VISOLE (Virtual Interactive Student-Oriented Learning Environment). The results of a case study on the usage of VISOLE in secondary geography instruction are described in this report.

As a result, the amount of knowledge students received was compared to that of a traditional classroom teaching technique, and VISOLE was determined to be more successful. When 198 students were chosen to take part in the study, they were divided into three experimental groups, with the experimental groups receiving greater attention than the control groups.

Data demonstrated that VISOLE had a favorable educational effect on low and intermediate academic achievement students compared to the conventional approach but had no such effect on high academic achievement students. Thus, it is expected that this research will be of service to academics and educators as it will illuminate the evolution of VISOLE's current design and provide new insights into the actual implementation of online games in official school instruction.

In the first regression, we observed that academic skills are being interpreted by education based on Microsoft Mathematics Visualization. Beta value of education based on Microsoft Mathematics Visualization was 0.892, greatly altering academic skills. An 89.2 percent change in academic skills would cause a single unit change in education based on Microsoft Mathematics Visualization. It might be subtracted as academic skills may be greatly increased on the basis of delightful format instruction, like using different games or films to improve for the sake of hymens or other talents.

Reference [13] found that results of the studies indicate that the writing skills of students have improved. It can be noticed that writing transformations might be implemented well by the students. They wrote the capitalization and punctuations appropriately. Their academics changed, the past tense could be better utilized, and they produced fewer fragments. In addition, the contribution of students to teaching and learning initiatives has also expanded. They often engaged in community discussions and passionately carried out the assignments. They were thrilled about learning through board games. Additionally, the findings of this study reveal that students' writing talents grew when the teaching and learning processes were improved.

For the quantitative assessment of the students' writing skills, the mean writing scores earned before the acts were compared to the Cycle 1 action and the Cycle 2 action, respectively. The mean writing exam scores of students have increased from 73.84 before the events of Cycle 2 to 79.81 following the events of Cycle 2. The students' writing competence score climbed by 5.97 points on the exam.

The caliber of students can be increased by academic talents to 76 percent (rounding off). According to the foregoing statement, the caliber is to be handled as a dependent variable in the reverse regression in which the same beta value of even R2 is obtained.

Reference [14] provided an action study project in the fourth-grade classroom meant to include practical academics. This thesis focused on applying research-based ways to describe how language functions inside the text to boost the caliber of the student. Research investigations have demonstrated that, in the written work of students, the standard technique of teaching academics shows no positive value. The results of this study demonstrated that this strategy had a good impact on the output of writing by students. A genre-based approach to writing has a high potential to raise the awareness of genres among students.

It is statistically significant that IVs have an impact on the outcome when the values of F, $831.099 > 10$, and $\text{sig} = 0.000 > 0.050$ are used together. Our first regression now has a beta value of "0.870" for the predictor, which is the beta value of our second regression. This could be expressed as a single unit change in academic skills which will generate an 87 percent change in students' caliber.

In phase 2 regression, two ANOVA tables were present. For analysis of variance, we need to reverse the regression in the first GS = DV where the ANOVA model was not applicable and, of course, as anticipated in the second one, where SC = DV is sig for both constant and predictor at 0.000.

The students' abilities rely on 90 percent of the academic skills as described before. Gradually, students' grammatical abilities will increase as a result of engaging teaching that includes involvement in games. Playing video games or viewing movies, for example, can help you enhance your hymens or other talents. Snake and Ladder, a card game, and a vocabulary game were examples of the other activities.

It has been noted from the preceding information that academic abilities demonstrate importance at 0.000 with a

beta value of 0.931, although a formal education is not relevant. It suggests a single adjustment in academic skills would produce a 93.1 percent change in formal education drastically. But the worth of the whole model by the value of R^2 of 0.061 > 0.05 also seems to indicate good fit. It has since been interpreted that those academic skills do not rely on formal schooling, which is why the model is meaningless.

Reference [3] observed some faults informal education. The way education is seen has been transformed throughout Europe amid the recent economic crisis. Education has, of course, been viewed as one of the cornerstones that might push Europe toward economic stability. Consequently, we have seen increased spending on education in recent years.

The much-needed money flows have had an impact, but as many important issues have been overlooked and continue to exist, the situation is less than ideal. Europe faces the dilemma of economizing schools, not supplying students with 21st-century skills, and decreasing the quality of teaching. It is our belief that the utilization of developing technology in education, teaching digital skills, and ultimately highlighting preferences in learning styles to engage students in learning are three variables that will have a good influence. The purpose of this paper is to give proof that the addition of the three principles would contribute to better educational achievements in Europe.

In the last regression overall model is significant but our primary variable has been reversed to nonsignificant; it suggests formal education is a predictor that is not going to explain our model. Now the model is excellent with students caliber and education based on Microsoft Mathematics Visualization as exhibited in their single regressions against academic skills. But in collective regression traditional learning methods have superseded Microsoft Mathematics Visualization as the main mode of Mathematics. In order to increase kids' grammar skills and consequently their capacity, formal instruction should be replaced with something joyful, for example.

Reference [7] observed certain faults in formal education. Traditionally, interactive game-based learning has been examined from an "artifact-centric" viewpoint that focuses on understanding how game design and learning ideas are or can be interconnected. Such forms of assessments have resulted in many explanations of the educational usefulness of games, which has subsequently led to different kinds of assertions as to why games should be employed more broadly. On the other hand, relatively little study has been done to characterize the educational experiences that are designed to be extended to other game-based learning methodologies and educational games.

Given the lack of studies on formally educated learning environments, we have arrived at a situation where the educational potential of games is well detailed through theory and understood independently of their real-world contexts of use, but active instances of "making good" games on their promises as educational instruments are still rare to come by.

Education based on Microsoft Mathematics Visualization = −0.001, students caliber = 0.121, and formal education = 0.822, respectively, were in the last regression, considering the beta values of formal education as acceptable for academic skills to improve the caliber of the student. This means education based on Microsoft Mathematics Visualization does not activate any change in academic skills, although the change in the caliber unit of the student will cause a change of 12.1 percent in academic skills and a change in the formal education unit will cause a change in academic skills of 82.2 percent. But the entire model is nonsignificant, so it is impossible to rely on or accurately trust the conclusions above.

The thesis of [15] describes the many barriers posed by the realities of formal education to developers and educators who strive to work with educational games. To study the multifaceted nature of teaching games, the quantitative method approach has been applied in the analysis, which comprises extensive literature reviews coupled with several case studies including educators, students, and developers. Interviews were carried out to evaluate the diverse opinions of these actors toward, and impressions of, educational games and game-based learning.

Data Availability

The information was supplied regarding data availability.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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