

## **Gamification and attitudes in engaging children in the learning process: A case of online math games**

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**Abstract:** Over the years, children's mathematics performance is becoming a prime focus of concern due to the continuously changing culture of education. This specific research investigates with particular attention the modern sphere of online math games and how they could change the very nature of children's participation in this academic discipline as well as the way it is perceived. Focusing on the interaction's perspective, this study aims at investigating the effect of attitudes together with gamification on children's academic achievement. The primary goal of this research is to examine, within the context of the educational system of Jordan, the contribution of the intensity of use of online math games to the understanding of the relationship between theoretical and practical elements of mathematics. The subsequent findings provide valuable knowledge on how to incorporate technology and gamification for positive changes in attitude towards mathematics, which in turn leads to improved performance in the subject.

**Keywords:** Attitudes, Children's achievement, Gamification, Learning process.

### **1. Introduction**

Conventionally, the education system adopted a standardized approach to promoting children in schools and any other institution, expectations of parents were of the areas of focus for policymakers (Saini & Mir, 2023). However, with increased complexity in societies today, there is an added emphasis on learning, problem solving as well as other skills that would assist in meeting new challenges and even advanced society changes. Further, it is still a trend using gamification and some specific didactics for the meta-analysis of children. These studies collect data on children's key performance indicators (KPI) such as (Cui, Zhao, Zhang, Guo, Guo, Zheng, Zhang et al., 2021). The 21st century is the most advanced technologically of any time in human civilizations whereby the information technology is part of the civilization and there are challenges in the integration of education systems with technology tools which will be the most challenging (Ellis, Wong, Nye, Sable-Meyer, Cary, Anaya Pozo, Hewitt et al., 2023). Changes in new methods emerge where people can play math games to assist in performing calculations which have elements of technology. Many of these online games make use of the distinct aspects of the new technology and have some aspects of games whereby there are points to earn or live competitions with instant feedback just like video games. This revolution is an important development in the field of education since numerous educators and guardians are aware of the online math games as tools not only for improving the efficiency of advanced math learning for children but making the learning process fun as well.

#### *1.1. Attitudes*

Children's academic achievement is greatly influenced by their attitudes when playing online math games as part of their educational program, with the right attitudes towards learning and technology, a child can be quite motivated, actively, and effectively engage with these online educational tools. When math games are viewed positively and as helpful, children do not hesitate to spend extended hours using

them as an effective learning tool. Positive attitude towards Mathematics as a subject is in fact a decisive factor, as it relates closely to a child's disposition to deal with mathematics challenges (Zhang, 2015). Once these attitudes such as anxiety or negativity toward math or emotions toward technology, they can be effective barriers in children's academic success and their desire to use online mathematics games. Hence, understanding and hence managing such emotions becomes a pivotal part in realizing the full potential of gamification as a successful educational tool for improving children's mathematical skills (Lampropoulos, Keramopoulos, Diamantaras, & Evangelidis, 2022; Sarkar & Roy, 2023).

### 1.2. Gamification

Gamification which means applying game-like features to non-game situations, has proved to be an effective way of improving the educational performance of children (Antonopoulou, Halkiopoulos, Gkintoni, & Katsimpelis, 2022). Gamification, when used appropriately, can create a rich and rewarding environment in which students develop a love for learning in areas such as mathematics, natural sciences and languages (Eslit, 2023). This approach increases motivation to learn and aims to win by incorporating points, badges, leaderboards and rewards into the educational process. Such a higher order of participation may increase knowledge retention as well as comprehension of the topic. Moreover, gamification often enhances problem-solving, critical thinking and persistence skills which are crucial for one's academic performance (da Silva, 2023).

### 1.3. Children's achievement

The achievement of children is an indicator of their natural talent and the enabling conditions provided by their families, schools, and communities (Peng & Kievit, 2020). More broadly, these attainments have a wide range of scopes that include, success in studies, in the realms of art, sport, and self-improvement as well. These successes are manifestations of their resolute will power, unending creativity and make an appeal of personal significance as well as motivational to the people around them (Lara & Saracosti, 2019). Jordan is another crucial place where a country has put significant effort towards the development of its young people. In Jordan, there has been focus on education as an area in which there is a concerted attempt to ensure that good quality education is available, regardless of the people of different backgrounds (Al-Hassan, 2019). The efforts of the government continue to enhance the education system, improving the capability of the students further with the most needed resources. Moreover, local agencies and community organizations greatly supplement children's successes by providing valuable after-school programs, mentors, and skill development opportunities (AlHeresh, Bryant, & Holm, 2013; Conwell & Ye, 2021). As a result, Jordanian children grow up achieving important targets in different areas adding value to the economy of the state. Their successes point out the determination of Jordan in fostering and developing its young talents (AlHeresh et al., 2013; Othman, Shaheen, Otoum, Aldiqs, Hamad, Dabobe, Langer et al., 2020).

## 2. Problem Statement and Research Gaps

A major concern presently, in terms of math education in Jordan, is how effective the teaching methods used aid children's learning in that subject. Despite all the educational programs and interventions, a huge gap still exists in the area of motivating children and nurturing their interest in mathematics (Abuhammad, 2020; Olanrewaju, 2019; Tursunovich, 2022). It underscores the necessity to explore the influence of attitudes and gamification within the scope of online math games as an innovative teaching method in the Jordanian education system (Abuhammad, 2020). One of the main deficiencies is the limited use of gamification in the education system of Jordan. The applicability of instructional online math games in teaching mathematics as a strategy for increasing motivation and activity has not been widely practiced (Russo, Bragg, & Russo, 2021). There is a shortage of study on the role of online math games, for instance, in changing students' attitudes towards mathematics in Jordan (P. S. Moyer-Packenham, Lommatsch, Litster, Ashby, Bullock, Roxburgh, Shumway et al., 2019). Moreover, the bulk of current research on attitudes and gamification in education stems from Western countries, possibly explaining the inability to accommodate Jordan's specific cultural and educational characteristics (Al Khateeb, 2019). It is necessary to examine the contextual relevance and

efficacy of online math games in Jordanian classrooms. Besides this, only a minimal investigation has been carried out on the link between attitudes, gamification and real learning achievement in mathematics in schools of Jordan. It is important to consider whether changing attitudes through gamified math games leads to any real changes in math performance (Al Khateeb, 2019; Cohrsen & Niklas, 2019). This study seeks to fill the identified gaps by exploring empirically the impact of attitudes and gamification in online math games and how change is offered to the levels of Jordanian mathematics education. The scholar hopes that is a way forward to enhance the teaching of mathematics in Jordan's schools and pupils' success in this important subject.

### 3. Online math games in Jordan

Online math games are becoming more and more accepted as contemporary math education interventions in the Jordanian educational system. They appear to have great promise for improving arithmetic learning for pupils of all ages. Through the efficient use of technology and game components, these games transform the way mathematics is taught and mastered in different educational settings throughout Jordan (Alqiam, 2021; Anggraini & Mahmudi, 2021; Es-Sajjade & Paas, 2020). The Math Playground's online is a well-known example. This dynamic resource provides pupils interactive (math problems) and adaptable activities which advances the diverse method of teaching mathematics. These exercises afford students the opportunity to engage in numerous mathematical concepts in a fun, hands-on, and individualized manner that caters to their varying levels. As students' progress through the curriculum, Math Playground's online equips Jordanian children with the tools they need to build a firm understanding of mathematics while at the same time, nurturing their confidence and sense of achievement (Alqiam, 2021; H. K. Lee & Choi, 2020).

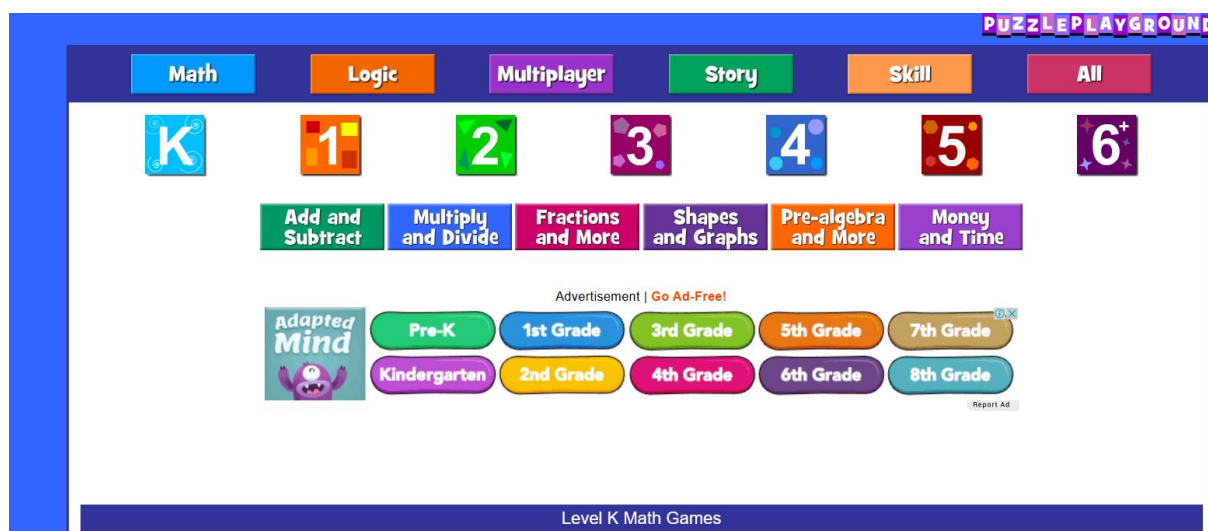


Figure 1.

A clear case is the site “Math Playground.” This website has a variety of math games that can be personalized which helps students appreciate math through an innovative means. Students have fun when engaging a variety of mathematical concepts after class while feeling free to advance at their own learning pace that is appropriate for their level of skill as provided for in Math Playground's practices. As a result of going through these interactive exercises, children from Jordan are in the position to confidently build a strong base of mathematics skills and sense competence as they get to be good at different skills (Z. W. Lee, Cheung, & Chan, 2021). Prodigy is yet another major example of a math game that is played online. Fantasy and lessons are blended in vintage forms making it possible for Jordanian learners to appreciate the sites while concentrating on the basic concepts of mathematics. The way Prodigy is designed encourages students to use math in order to accomplish objectives in the game

thereby making the game feel like a quest instead of a tedious task often accomplished in classes. Education and Prodigy blend and in so doing aids in the reduction in proctored math tests anxiety among children in Jordan and increases the love for the subject (Cañares & Dioso, 2023). Homework in Math Playground and Prodigy aims to improve one's mathematical abilities and develop some positive feelings towards the subject. These sites offer an interactive and vibrant environment that helps students bridge theoretical concepts in mathematics with practical applications in the society. Such a strategy not only improves the perception and understanding of math by students but more importantly gives them the tools and the self-belief that will enable them to perform well in this important subject and thus extends the coverage of mathematics teaching in Jordan (Bullock, Roxburgh, Moyer-Packenham, Bektas, Webster, & Bullock, 2021; P. Moyer-Packenham, Ashby, Lister, Roxburgh, & Kozlowski, 2020)

#### 4. Research Hypothesis

The research aims at providing an in depth understanding of the connections between attitudes, gamification and achievement in the scenario of online math games in Jordanian schools, with the end goal of improving the instruction and the outcomes of mathematics content in Jordan. Therefore, this study suggests that the introduction of the online math games as "Math and Prodigy" into the education system of Jordan will boost the pupils' performance in mathematics and make the pupils to have more favorable attitudes about the subject. We assume that:

*H<sub>1</sub>: there is a positive relationship between attitudes and achievements in online games*

*H<sub>2</sub>: there is a positive relationship between gamification and achievements in online games*

This study aims to test these hypotheses in order to provide empirical data on the usefulness of online math games in the Jordanian educational setting, providing important insights into their potential to revolutionize mathematics instruction and raise student achievement in the subject.

#### 5. Methodology

The research used for this study adopts a quantitative perspective which includes data collection through structured surveys and questionnaires. Using this approach makes it easy to obtain numerical data that reflects the views and attitudes of the participants. Online questionnaires are very convenient and make it easy to reach a large number of respondents with minimal effort.

##### 5.1. Participants

Through the purposive sampling approach, we randomly selected a sample of 100 primary school teachers from the wider pool of primary school teachers from this locality for study participation. After proper consideration for cases such as undelivered and delivered but incomplete questionnaires, a total of 95 responses were included for further analysis of the selected sample. This selection was carefully selected in terms of even distribution of sex with 70 females and 30 males in order to ensure equity. All subjects in the sample provided their testimonies in the research. Such as, how enjoyable do you find the experience of learning mathematics, have you ever delved into the world of online math games, What are your emotions when engaging in math games as opposed to traditional learning approaches, Have you observed any alterations in your math grades since incorporating online math games into your learning routine. We collected includes average 100 responses that were fully completed questionnaire items, QUESTIONNAIRE MATH PHAB. Through adopting this method, not only gender balance was achieved but also a broad diversity in educational background was ensured which in turn pooled to enhance reliability of the research (Alawamreh, Obeidat, Alsalti, Ramadneh, Al-Majali, Al fares, & Nasseif, 2023; Ikhide, Timur, & Gunmokun, 2022; Landers & Sanchez, 2022).

##### 5.2. Instrument

In this study, we utilized a five-point Likert scale in measuring the responses of the participants. This scale provided five options to select from, namely: "strongly agree", "agree", "neutral", "disagree", and "strongly disagree," with values of 5, 4, 3, 2, and 1 respectively. The reason for the adoption of this particular Likert scale design was to allow for the wide range of measurement of participants' attitudes



and perceptions on the issue at hand. This also allowed in-depth assessment of participants' opinions on the relevance of particular items in regard to national Self reaction and its core importance. Further, this distinctive scale was used in conjunction with the standard modification in Likert scales to separate items that were negatively worded from neutral items so as to ensure a minimum variation in the response understood for optimal productivity (Almaiah & Nasereddin, 2020; Fernandez, Ten Hoor, Van Lieshout, Rodriguez, Beidas, Parcel, Ruiter et al., 2019). This study proposes the integration of interactive math games through Math Playground as the primary strategy to develop students' comprehension of mathematics as well as their attitudes towards the subject. Math Playground features an impressive collection of games focused on the major skills necessary for math success – addition, subtraction, fractions, and geometry all presented in a fun and exciting way which makes math enjoyable. With this integration, this study plans to provide additional in class reinforcement by having students play Math Playground games that are closely related to the moth topics learnt in lessons. For example, games such as those teaching fractions, exercising the application of lives, and that enhance classroom applied knowledge by making the concepts easy instead of abstract (INDRAVATHY & ABD RAHIM, 2024). This strategy takes advantage of the opportunities provided by gamification to enhance learning, where students integrate both practice and repetition in order to improve their performance in math. This strategy provides a combination of both engagement and traditional ways of learning in achieving set goals, giving an insight of the role that mathematics video games can play in improving the mathematics skills and the attitudes of the students. This strategy attempts to improve the students' levels of success in the math subject and their interest and desire to learn mathematical concepts through the combination of game-oriented approach-based learning platform.

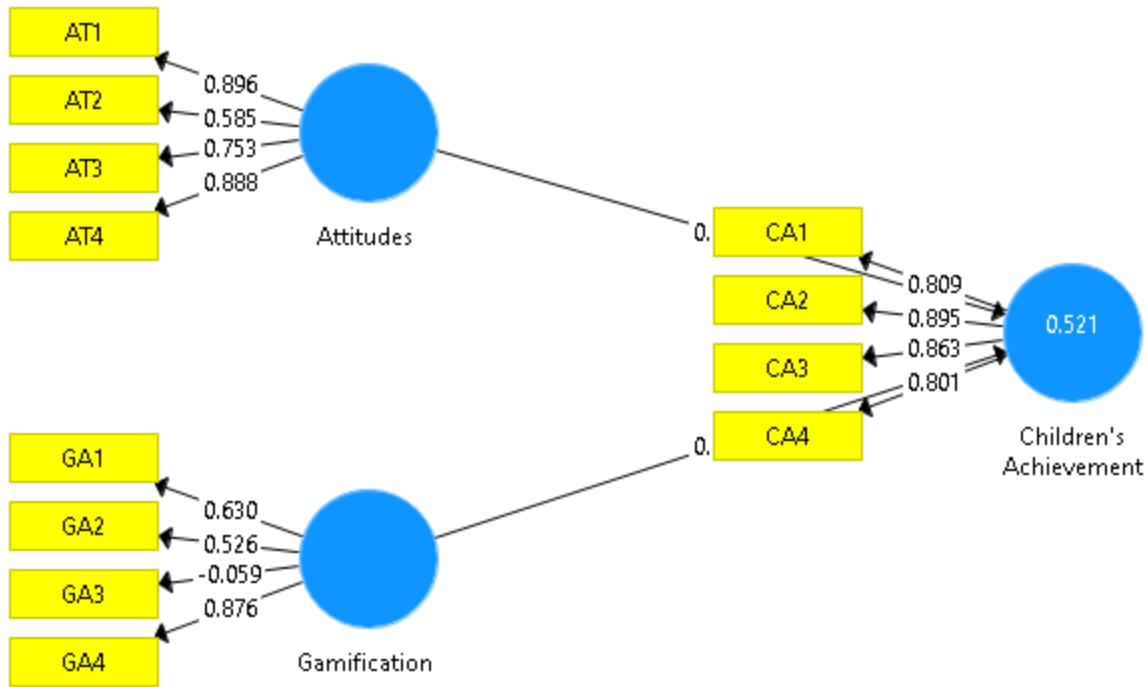
## 6. Data Analysis and Findings

The data analysis for this research was done in Smart PLS 3. More precisely, we are using the former software to extract the required statistics pertaining to the sample. Also, the latter software was used to investigate the constructs that were hidden within the causal system. We will present the results of the statistical analysis in the following subsections (Sekaran and Bougie, 2010).

### 6.1. Evaluation of the Measurement Model

As highlighted by Hair Jr, Hult, Ringle, and Sarstedt (2016) the validation of the survey for the measurement model constituted a fundamental step in the Preceded by a survey validation process both reflective and formative constructs were in place. Validity and reliability were two of the supreme criteria adopted to determine the standard of the measures. Reliability in this case refers to the evaluation of a measuring device, more so its degree in addressing the specific issue or aspect it was designed to measure. On the other hand, Validity is the assessment of the extent to which a tool fulfills its objective of measuring a specific idea (Sekaran & Bougie, 2016). In this study, the evaluation on the side of the measurement model was conducted with a uniform three-step process comprising the reliability of indicator items, convergent validity and discriminant validity.

The evaluation of the measurement model has been done with a set of 12 reflective indicators as shown in Figure 2. From the results, it was observed that the factor loading for items GA3 was below the required threshold of 0.50. In accordance with Hair, Ringle, and Sarstedt (2011) and Henseler, Ringle, and Sinkovics (2009) For items with factors' loadings in the range of 0.40 to 0.70, whether or not to remove an indicator depended on the quantum of rise in composite reliability (CR) more than the accepted level with removal of that indicator. In this respect, many of these indicators in this study were successively removed by means of execution of the PLS algorithm test.



**Figure 2.**  
Measurement model.

The information presented in Table 1 is the evaluation of the convergent validity carried out for each of the constructs and the method used to Evaluate the Convergence Validity of Constructs was the Average Variance Extracted (AVE). In cases where the researcher bodied the study wherever AVE was at the minimum threshold of 0.50 in a region which was set on the basis of past findings. Such means, in their particular order, involve the original study by Hair et al. The purpose of these constructs is described by many researchers converging on the similar overall assessment aiming on the same target to which all the measures are very much relevant (Hair Jr et al., 2016). The findings revealed that Children's Achievement had the maximum AVE value of 0.711, Gamification on the other hand, managed to have the AVE value of 0.361 which was the lowest but acceptable level. With regards to these variables' AVE values, they were all noted to be satisfactory given their convergence.

The internal consistency of each construct was also measured using the CR values as presented in Table 1. Ponzanelli (2001) recommends eyeing the CR's value ranging on or above 0.70, but an even higher CR is more desirable. Regarding the CR values for each construct under consideration, they ranged from 0.603 to 0.90, all of them were above the required minimum. In accordance to the specified benchmark values, the variables were able to satisfy the requirements for convergent validity.

**Table 1.**  
Results of measurement model.

| Variable               | Items           | Factor loading   | Composite reliability (CR) | Average variance extracted (AVE)>50% |
|------------------------|-----------------|------------------|----------------------------|--------------------------------------|
| Attitudes              | AT1             | 0.896            | 0.867                      | 0.626                                |
|                        | AT2             | 0.585            |                            |                                      |
|                        | AT3             | 0.753            |                            |                                      |
|                        | AT4             | 0.888            |                            |                                      |
| Gamification           | GA1             | 0.630            | 0.603                      | 0.361                                |
|                        | GA 2            | 0.526            |                            |                                      |
|                        | <del>GA 3</del> | <del>0.059</del> |                            |                                      |
|                        | GA4             | 0.876            |                            |                                      |
| Children's achievement | CA1             | 0.809            | 0.907                      | 0.711                                |
|                        | CA2             | 0.895            |                            |                                      |
|                        | CA3             | 0.863            |                            |                                      |
|                        | CA4             | 0.801            |                            |                                      |

The present work applied the Fornell and Larcker (1981) and Henseler, Ringle, and Sarstedt (2015) The criterion employed to assess the discriminant validity of the studied constructs relied on the comparison of the average square root of the extracted variance to the correlation values among all variables. If a certain construct showed an average square root of extracted variance that is higher than all the correlation values between the various variables, then such a construct was said to have discriminant validity (Hair Jr et al., 2016).

Employing the Fornell-Larcker criterion, the answer to the question can be said from the findings interpretation presented in the table that all of the constructs have sufficient discriminant validity because the squared correlation for each construct lies below the average variance extracted. Moreover, the Heterotrait-Monotrait Ratio (HTMT) is the measure of the correlation between constructs, which is also consistent with the formation of disattenuated construct scores. Setting a value of 0.9 as a cut-off point (see Table 2), this study has confirmed that there exist no demonstrable deficiency in terms of discriminant validity, as all the constructs in the study were found to have met the criteria.

**Table 2.**  
Assessment of discriminant validity (Fornell & Larcker, 1981).

|                        | Attitudes | Children's achievement | Gamification |
|------------------------|-----------|------------------------|--------------|
| Attitudes              | 0.791     |                        |              |
| Children's achievement | 0.572     | 0.843                  |              |
| Gamification           | 0.582     | 0.692                  | 0.601        |

**Table 3:**  
Assessment of discriminant validity (HTMT) (Henseler et al., 2015).

|                        | Attitudes | Children's achievement | Gamification |
|------------------------|-----------|------------------------|--------------|
| Attitudes              |           |                        |              |
| Children's achievement | 0.984     |                        |              |
| Gamification           | 0.622     | 0.787                  |              |

The outcomes regarding all constructs related to Organization, Environment, and Artificial Intelligence are credible measures of their constructs. For the totality of the findings, it can be concluded that the measurement employed in the study has a solid empirical support giving evidence of its reliability, convergent and discriminant validity.

### 6.2. Evaluation of the Structural Model

As highlighted earlier, the inner model or the so-called structural model explains the relationships in terms of the cause-and-effect between the variables that were examined. Hence the evaluation of the

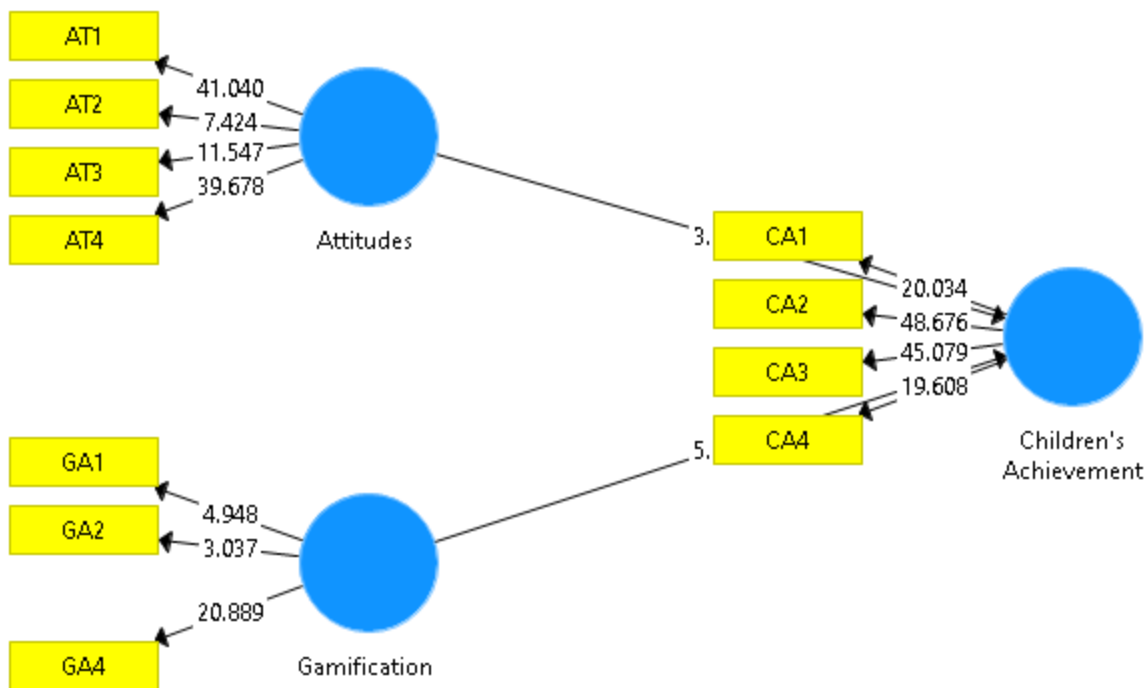
structural model is by testing the research hypotheses that justify the proposed constructs or relationships and /or effects among them. It was also the aim of the current investigation to pursue assessment of the structural model through path coefficient ( $\beta$ ) criteria which pertained to the six research hypotheses. Path coefficients are standard measures running from -1 to +1. One of the constructs has a large positive path coefficient which is close to +1, while the other has a negative path coefficient which is close to zero; negative path coefficients are indicative of the opposite (Hair Jr et al., 2016). For other circumstances, a path coefficient that approximates zero denotes no linkage between the two constructs. Attention should be given to the fact that if the t-value surpasses a threshold, say,  $t > k$  or equals to  $k$  a given p-value, then the coefficient in question demonstrates a significance at the given level of error probability. In this regard for t-value  $> 1.96$  implies a significance level with p value less than 0.05. The minimum criteria to be measured in order to judge the effectiveness of the structural model were the determination coefficient and the respective significance level of path coefficients (beta values). The observed strength of the relationship between the endogenous and exogenous variables improves with an increase in the Adjusted R-squared value.

As a result, a model of structural equations is considered stronger when this value is higher than is, the model explains a greater amount of the variation in that statistic (Hair, Ringle, Sarstedt, & Practice, 2011). The results that were obtained as a result of the study of hypotheses tested and illustrated in Figure 3 and Table 4 endorse the endorsement of both research hypotheses proposed. There are additional findings which indicate that Attitudes are significantly and positively related to Children's Achievement ( $\beta = 0.259$ ,  $t = 3.130$ ,  $p < 0.05$ ), hence supporting H1. Furthermore, Gamification has a substantial and positive effect on Children's Achievement ( $\beta = 0.522$ ,  $t = 5.882$ ,  $p < 0.05$ ), thus supporting the operationalization of H2.

**Table 4.**  
Hypothesis testing.

|  | <b>Original sample (O)</b> | <b>Sample mean (M)</b> | <b>Standard deviation (STDEV)</b> | <b>T statistics ( O/STDEV )</b> | <b>P values</b> |
|--|----------------------------|------------------------|-----------------------------------|---------------------------------|-----------------|
| Attitudes -> Children's achievement    | 0.259                      | 0.272                  | 0.083                             | 3.130                           | 0.002           |
| Gamification -> Children's achievement | 0.522                      | 0.521                  | 0.089                             | 5.882                           | 0.000           |





**Figure 3.**  
Structural model.

## 7. Discussion

The findings of this study provide convincing evidence in support of both research hypotheses. In particular, Hypothesis 1 suggested a substantial impact of attitudes on children's mathematics achievement. At the same time, Hypothesis 2 stated that gamification is beneficial and positive towards the achievement of children in the same subject area. Hypothesis (1): The Positive Influence of Attitudes on Children's Achievement in Mathematics (Landers & Armstrong, 2017; Sarour, Allinjawi, Alyahiwi, & Albeshri, 2023).

The consequences from this study strongly support the central significance of attitudes in the achievement of children in mathematics. It has been known within educational psychology that a subject has a high impact to the learning results of the students. This study shows that a positive attitude of the students towards mathematics has significant and vigorous influence on children's success in this subject (Prados Sánchez, Cózar-Gutiérrez, del Olmo-Muñoz, & González-Calero, 2023). These results support the idea that developing a positive attitude toward mathematics is important at an early age in a child's education. Young children engage in the content, work hard to get over any challenges faced and, in the end, succeed in their mathematical related activities when they possess a good perception towards the subject (Landers & Armstrong, 2017; Prados Sánchez et al., 2023; Sarour et al., 2023). Thus, H2: Gamification Increases Students' Success In Mathematics. In addition, the results of the research also provided strong support for the second hypothesis, which aimed to analyze the effect of gamification on the mathematical skills of young children (Obeidat, 2022; Rahman, Ismail, Noor, & Salleh, 2018). The contemporary educational strategy of gamification has garnered significant interest

due to its ability to boost student engagement and improve educational results (Rahman et al., 2018; Şahin & Namli, 2016).

The findings of this study suggest that adding gamification features to online math games has a significant and favorable effect on children's performance in mathematics. This means that the constituency of the gamified learning approach which consist of game elements such as rewards and challenges and immediate feedbacks, enhances the motivation of students and thus information and retention of mathematical knowledge is improved (Brezovszky, McMullen, Veermans, Hannula-Sormunen, Rodríguez-Aflecht, Pongsakdi, Laakkonen et al., 2019; Priyanka, Bokhare, Paul, & Dsilva).

## 8. Implications and Educational Significance

It is important to highlight that it is possible to endorse both hypotheses at the same time since they clearly have a bearing in online mathematics education as well as math education on gamified platforms. It brings forth the fact that learning is much more than delivering content – it is about shaping emotions and using elements of game design in an intentional manner so as to make the process of learning more enjoyable and effective (Divjak & Tomić, 2011; Otair, Abualoush, Obeidat, & Bataineh, 2022; Shin, Sutherland, Norris, & Soloway, 2012). It would be advisable for educators and policy makers to take into account these research results and think about including game-like mechanics into mathematics instruction. Such measures would include the development of further online math games that are not only intended as educational materials but also as fun for learners (Habgood & Ainsworth, 2011; Hwa, 2018). The concept of gamification can motivate students to thoroughly and lastingly understand mathematics and educators could utilize this concept. Moreover, the results from the study clearly indicate an equally important factor, that of creating a conducive environment for students to enjoy their mathematics learning. Such approaches like emphasizing the usefulness of mathematics or the interesting or entertaining aspects of mathematics problem solving can assist teachers (Hwa, 2018). To conclude, the results of this study confirming both hypotheses stress the power of everything attitudes, especially gamification, in helping children improve their performance in mathematics. It spells out the need to encourage learners to develop positive ways of thinking about the subject and combine it with entertaining gamified elements during the teaching process to improve the learning results of children at young age (Alam, 2022; Antonopoulou et al., 2022; Garcia-Cabot, Garcia-Lopez, Caro-Alvaro, Gutierrez-Martinez, & de-Marcos, 2020).

## 9. Conclusion

This study highlights the role of the right attitude and gamification in changing the children's perspectives regarding math learning. It shows that instilling positive emotions about the subject and using enjoyable math games on the web can greatly improve students' understanding and level of interest in the subject. Once they are incorporated in the educational system, not only will the teachers be able to enhance the academic outcomes of their students but they will also be able to evoke a true and enduring love for math. It highlights the creation of a motivating and encouraging climate as one of the most important factors for student achievement.

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