Math Challenges: Making Learning Attractive and Challenging

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A R T I C L E I N F O	A B S T R A C T
    	The phenomenon of mathematics phobia is a widespread concern within the field of education, which can be attributed to its perceived level of complexity and lack of inherent attractiveness. Nevertheless, the adoption of mathematics is of utmost importance, given its fundamental role in the advancement of scientific and technological disciplines. In order to mitigate concerns, it is imperative to employ pedagogical approaches that are well-organized and captivating. The utilization of mathematical games has been found to be an effective strategy for attracting the attention of kids. This study utilizes a comprehensive analysis of existing literature, focusing on pertinent theoretical sources. Mathematical games play a crucial role as a foundational framework and a valuable tool for research purposes. The study, which was carried out at State High School 1 Sinunukan and the author's place of residence, encompasses the period from the initial semester of 2021 to the final semester of 2023. The results of the study emphasize the potential of utilizing math games as a means to increase students' interest towards the subject. Educators are advised to customize their instructional methods, taking into account the unique abilities of each student, and dedicating much time and effort with compassion and conscientiousness. It is crucial to foster kids' curiosity in mathematics in order to maintain their engagement.

1. INTRODUCTION

Mathematics, as one of the academic subjects, serves as the fundamental basis for both the exact sciences and the social sciences. The disciplines of physics and macroeconomics employ mathematics as a fundamental tool in their problem-solving methodologies. The role of mathematics extends beyond theoretical studies, as it directly contributes to various practical domains such as business, finance, and health.

Paradoxically, within the context of high schools, there was a purported manifestation of mathematics phobia, characterized by a challenging and anxiety-inducing instructional experience. The existence of mathematics phobia is a prevalent occurrence experienced by numerous individuals within the realm of schooling. Commencing from the premise that mathematics is a challenging subject, lacking appeal for acquisition, and evoking apprehension regarding the development of mathematical anxieties. According to several research findings (Anita[1], Kurniawati[2], Risnawita[3], et al.). Kurniavati (year) conducted a study to identify the various components that have an impact on the development of phobias in mathematics. These factors were categorized into three main groups: personality characteristics, encompassing psychological and emotional aspects; environmental or social factors; and intellectual considerations. Risnawita et al. presented a series of critical viewpoints, asserting that mathematics anxiety predominantly manifests as apprehensions linked to diverse examination scenarios. Moreover, in certain cases, students' fears towards mathematics might be attributed to a broader apprehension of failing tests, whilst in other instances, these anxieties are both mathematically specific and emotional in nature.

Moreover, Anita's research revealed that the observed enhancements in the mathematical anxiety score were attributed to concerns related to the acquisition of mathematical knowledge. These concerns, in turn, influenced the anxieties experienced during mathematics assessments and numerical calculations. Consequently, there was a reciprocal relationship between the students' math connectivity score and their levels of anxiety in mathematics.

Nevertheless, educators should not be unduly concerned or distracted. Research findings indicate that mathematical phobia can impact a student's mathematics learning achievement, both directly and indirectly. Additionally, Syarien elucidates that the aforementioned hint is only unfamiliar and hence disregarded. The lack of an engaging presentation of mathematics has contributed to its perceived lack of appeal. Hence, it is incumbent upon the educator to present mathematics in a manner that engenders student interest and motivates them to engage in its study.

The origins of this phenomenon exhibit a range of factors, encompassing the inherent nature of the mathematical topic, the pedagogical challenges associated with its instruction, and the educator's less conducive approach. Within the realm of education, mathematical anxieties can arise due to several factors, including: (1) Anxiety related to numerical counting; (2) Challenges associated with memory retention; (3) Apprehension regarding public performance in the classroom setting; (4) Fear of the National Examination; and (5) Concerns about parental involvement and potential communication with parents.

One of the fundamental characteristics of mathematics is its inherent nature as an abstract entity. The presence of abstract mathematical entities can frequently contribute to the reluctance of pupils to engage with the subject of mathematics. Not all students possess the

inclination to engage in contemplation of abstract concepts. It is challenging to comprehend the rationale behind the multiplication of a negative number by another negative number resulting in a positive number.

The manner in which the pupils conceptualized the demonstration of the "hypothesis". The question is a challenge for a student with exceptional cognitive abilities. However, for students whose cognitive abilities are at a post-pass level, it appears that this level of mental capacity is predominantly observed among our student population. Therefore, it is not surprising that a significant number of students sense apprehension about mathematics. Is it not the case that the model's abstraction will not be dominated by all students?

For instance, quantifying the dimensions of a non-uniform parcel of land. The proposed approach for measurement should involve the derivation of the formula from a calculus equation, particularly one related to antiderivatives or integrals. How can it be perceived as not being challenging? Regrettably (or thankfully), the field of mathematics is inherently intertwined with the domains of natural sciences, social sciences, and even linguistics. Sebagai contoh, penggunaan rumus teori paruh senyawa digunakan untuk memperoleh informasi mengenai waktu paruh suatu bahasa. Consequently, students that experience apprehension towards mathematics challenges must confront significantly more daunting numerical concepts.

The principle of systematic thinking can also be identified as a significant source of mythological apprehension inside the realm of mathematics. According to the Syrian, the acquisition of mathematical knowledge necessitates the development of systematic thinking skills. This entails the ability to approach issues in a manner that involves simplification of difficult concepts and effective problem-solving. Subsequently, by the application of lateral thinking, the individual will be capable of dissecting the problem into several more manageable components, resolving each one, and ultimately devising a comprehensive solution. Systematic thinking is a cognitive process that may be cultivated via habitual practice. However, it is commonly observed that this mode of thinking tends to be more prevalent among those from highly educated and privileged backgrounds.

The necessity for employing systematic thinking in the field of mathematics is well-founded due to the prevalent utilization of a spiral teaching approach. This pedagogical method entails an interconnected and interdependent sequence of concepts, resembling a spiral. Consequently, failure to grasp one principle adequately may impede the mastery of subsequent principles. The student's failure to grasp the fundamental ideas (prerequisites) may have led to the development of a phobia, hence exacerbating the challenges he faced.

However, it should be noted that the teacher's "capability" in selecting and implementing instructional tactics, educational resources, presentation style, and personal disposition can also contribute to a student's aversion to mathematics, despite the subjective nature of this phenomenon. During the process of acquiring knowledge, it is the responsibility of the instructor to assume the role of a "doctor" who diagnoses and remedies the educational challenges faced by the student.

2. METHOD

The present study can be classified as a literature review research, wherein the author conducts a comprehensive search for theoretical references pertaining to the specific situation or issue faced inside their educational institution. The research

practice has relied on theoretical references pertaining to mathematical games and their appeal to students as its fundamental framework and major methodology. The present study was carried out at State High School 1 Sinunukan, as well as at the author's place of living, spanning from the initial semester of 2021 to the first semester of 2023. The author of this research utilized a combination of primary and secondary data sources. The primary data was acquired by direct observation, while the secondary data was gathered through various scholarly publications, documentation books, and online resources.

3. RESULTS AND DISCUSSION

Choosing to have an affinity for mathematics is a prudent choice, as it serves as the fundamental underpinning for both scientific and technological advancements, hence warranting its rational pursuit. In order to mitigate the apprehension that students may have towards mathematics classes, it is imperative to present the material in a structured and engaging manner. This approach will help alleviate any perceived intimidation and foster a more positive learning experience for the students.

Novikasari's revelation highlights the intriguing notion that mathematics possesses the capacity to exert a significant influence on individuals' lives, serving as a catalyst for transformative change. Consequently, mathematics emerges as a viable means of escape or liberation for those who embrace its power. It serves as one of the indicators that can be utilized as a reference for determining mathematical proficiency.

Counting is a fundamental aspect of mathematics that possesses the potential to serve as a strength or source of attraction. This assertion is substantiated by findings from a number of studies conducted by Frengky, Yatini, et al.

Yatine's findings indicate that the act of counting through visual media holds a distinct appeal for children. In his research, Frengky discovered that pupils perceive mathematics as a subject that teaches them the concepts of addition, subtraction, multiplication, and division, which are fundamental operations in numerical computation. This observation reinforces the student's perception that proficiency in mathematical computations is indicative of success in mathematics instruction.

Based on the perspectives of certain pupils, mathematics lectures are perceived as engaging. Through this specific fascination, the kids articulate their curiosity in things that are commonly regarded with apprehension by students at large. The motivation for students to pursue the study of mathematics stems from their aspirations that necessitate proficiency in this discipline. Hence, it is crucial to establish a connection between mathematics and the ambitions of the pupils. In addition, students exhibit a keen interest in the acquisition of mathematical knowledge due to their inherent inclination towards numerical counting. Furthermore, the pursuit of mathematical proficiency is perceived as a manifestation of intellectual acumen. Moreover, the subject of mathematics offers a diverse range of challenges, encompassing both straightforward concepts and intricate problem-solving scenarios. Hence, the appeal of mathematics to students exhibits considerable variation, and it is well acknowledged that mathematical instruction is highly engaging for students.

One intriguing game involves the utilization of mathematical principles to deduce individuals' ages. The game is structured in the following manner: As an illustration, one may attempt to estimate the age of a someone who is 60 years junior. Arrange the numerical values ranging from 1 to 60 onto six distinct

cards, adhering to the subsequent sequence:

I

1	3	4	7	9
11	13	15	17	19
21	23	25	27	29
31	33	35	37	39
41	43	45	47	49
51	53	55	57	59

II

2	3	6	7	10
11	14	15	18	19
22	23	26	27	30
31	34	35	38	39
42	43	46	47	50
51	54	55	58	59

III

4	5	6	7	12
13	14	15	20	21
22	23	28	29	30
31	36	37	38	39
44	45	46	47	52
53	54	55	60	

IV

8	9	10	11	12
13	14	15	24	25
26	27	28	29	30
31	40	41	42	43
44	45	46	47	56
57	58	59	60	

V

16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	48	49	50	51
52	53	54	55	56
57	58	59	60	

VI

32	33	34	35	36
37	38	39	40	41
42	43	44	45	46
47	48	49	50	51
52	53	54	55	56
57	58	59	60	

Figure 1. Math game cards

The numerical values ranging from 1 to 60 are representative of the anticipated age progression within the context of the game. The age range for participation in this game is from one year to sixty years.

The game commences by engaging in the selection of six cards, whereby the individual to be identified is requested to opt for cards bearing numerical values that align with their age. This may encompass the selection of one, two, or even multiple cards that possess numbers that correlate to the individual's age. Next, it is advisable to conduct a thorough verification to ensure that all the selected cards do consist of numbers that correspond to the ages of the individuals involved. This verification process should be carried out by the relevant individual, who should retain the numbers shown on each respective card.

Based on the chosen cards, it is possible to precisely infer the age of the individuals. To initiate gameplay, it is necessary to identify and enumerate the numerical values situated in the upper left quadrant of each individual card.

Let us assume that Aulia's age is 26 years. Therefore, it may be inferred that Aulia deliberately selected cards II, IV, and V in order to obtain the numbers 2, 8, and 16 displayed in the upper left corner of these cards. Upon calculating the total of the given integers, namely 2, 8, and 16, the resultant value is determined to be 26 years.

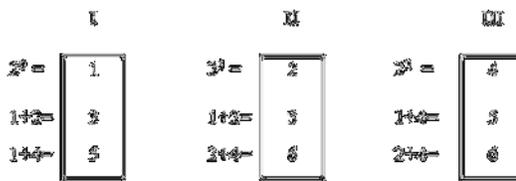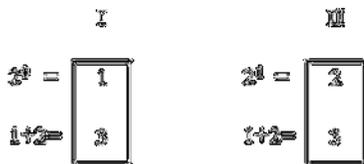Assuming a hypothetical individual named Mr. Muhammad, his age is stated to be 45 years. Therefore, it is necessary for Mr. Muhammad to select cards I, III, IV, and VI in order to obtain the numerical values situated at the top left corner of those cards, specifically 1, 4, 8, and 32. Upon calculating the total of the given integers, namely 1, 4, 8, and 32, the resulting value is determined to be 45 years.

Based on the aforementioned game example, one may readily identify a mathematical game. This game should not be regarded as a means of leisurely rejuvenation. According to Abdillah, teachers assume the roles of directors and facilitators, offering support and opportunities to students for the implementation of teaching concepts and tactics that align with the subject matter. This approach aims to enhance students' receptiveness to the lessons. Teachers play a crucial role in not only imparting knowledge to pupils, but also in actively cultivating their capacity to independently acquire knowledge. In order to facilitate the expression of students' thoughts, it is imperative for educators to possess the ability to excite and stimulate their pupils. One such approach involves the utilization of suitable pedagogical techniques to enhance students' motivation towards the acquisition of mathematical knowledge.

The confidentiality of the numerical values encoded on these cards can be derived through the utilization of base numbers. In this study, we employed the binary number system (base 2) with

variables n and n representing the number of dwarves. The card numbers, denoted as I, II, III, and so on, are organized in a sequential manner from left to right, corresponding to the required degrees.

The sequence provided demonstrates an exponential growth pattern, where each subsequent term is obtained by doubling the previous term. For instance, the value of 2^0 is associated with the number 1, while the value of 2^1 corresponds to 2, and so forth. This pattern continues, with each term being twice the value of its predecessor.

Each numerical value is added to the corresponding value, and the resulting sum is recorded below. If one were to construct cards with a grade of zero, the resulting cards would be numbered in sequential order.

This card is exclusively intended for the purpose of estimating the age of an individual who is one year old. When employing degree 1, the outcome will consist of two cards, specifically labeled as cards I and II, arranged in the following manner:

These cards have the capacity to be utilized for the purpose of estimating the ages of individuals ranging from 1 to 3 years old.

When employing the second degree, the individual will receive a total of three cards, specifically labeled as cards I, II, and III, arranged in the following order:

These cards have the capacity to be utilized for the purpose of estimating the ages of individuals ranging from 1 to 6 years. Subsequently, the process continues iteratively until the desired numerical values are achieved, at which point the numbers are systematically organized within their respective cards.

The aforementioned game example is constrained by a maximum value of 60 (sixty) and a degree of 5 (five). Age estimation games represent a specific category of mathematical games that can be incorporated into educational settings. The primary objective is to cultivate students' interest in mathematics by means of engaging them in straightforward game-based activities.

4. CONCLUSION

Based on the findings of a comprehensive review of existing research, the author ascertained that the utilization of mathematics games presents a viable alternative approach aimed at fostering students' inclination to engage more actively in the study of mathematics. Hence, it is anticipated that other mathematics educators will endeavor to

present their instructional content in a manner that considers the unique attributes and proficiency levels of their students. Additionally, they should be prepared to invest considerable time, effort, and cognitive resources, demonstrating empathy, meticulousness, and perseverance in their pedagogical practices. Educators must make a concerted effort to cultivate the existing interest that students possess, as it necessitates the application of appropriate measures to ensure its sustained growth and prevent its dissipation.

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