

Mathopoly bagatelle an alternative instructional tool in teaching mathematics ess...

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Mathopoly Bagatelle an Alternative Instructional Tool in Teaching Mathematics Submitted as an entry for the Division Math Fair: Karyl S. Cabanos Maricar Bianca V. Juen Raymond P.

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Appendix3 ABSTRACT Games are a fun way to learn and reinforce math skills. In this study, the old Bagatelle game is innovated as Mathopoly Bagatelle to enhance skills in writing equation of the line in slope-intercept form, determining the length of the sides of a triangle; and identifying types of triangle. Thirty (30) students were randomly selected. Two sets of assessment tools were prepared. The students answered the first set (pretest) before playing the Mathopoly Bagatelle and the second set

(posttest) after the game. The time to finished the given tasks were recorded in minutes. The time difference in the pretest and posttest design was analyzed to determine if Mathopoly bagatelle reinforced the math skills delineated in the assessment tool.

Result shows that the average time to finish the task in the pretest is 15. 8 min and 4. 35 min in posttest. Analysis of data suggests that there is significant difference between the time to finish the given before and after the use of Mathopoly Bagatelle. This suggests that the pretest and posttest results statistically differ. Students finished the task significantly faster after using Mathopoly Bagatelle. Based on this result, it is concluded that Mathopoly Bagatelle can reinforce the math skills in writing the equation of the line in slope-intercept form, determining the length of the sides of a triangle, and identifying types of triangle. This paper reports the potential use of Mathopoly Bagatelle as an intervention material in improving the selected mathematics concepts.

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It is because without him, we can't do anything. With the strong cooperation of the persons above, we are able to produce a good output. To them, thank you and God Bless. DEFINITION OF KEY TERMS •Alternative- an opportunity for deciding between two or more courses or propositions.

- Persistent- existing for a long or longer than usual time or continuously.
 - Slope- upward or downward slant or inclination or degree of slant
 - Coordinates- any of a set of numbers used in specifying the location of a point on a line, on a surface, or in space
 - Hypotenuse- the side of a right-angled triangle that is opposite the right angle
 - Manipulate- to manage or utilize skillfully
 - Y-intercept- the y-coordinate of a point where a line, curve, or surface intersects the y-axis
 - Equation- a usually formal statement of the equality or equivalence of mathematical or logical expressions
 - Vertices- a point where an axis of an ellipse, parabola, or hyperbola intersects the curve itself
 - Bagatelle- any of various games involving the rolling of balls into scoring areas
- CHAPTER I Introduction Background of the Study Mathematics is one of the subjects that often employ intervention materials, such as games, that increases a student's interest in a subject matter. Games provide a visual media as to which one can easily understand mathematical

concepts. Another advantage of using intervention materials is that it can increase the proficiency of the students in solving math problems because it will entail them to actively participate in the activity. The Mathopoly Bagatelle is a derivation of the original bagatelle game, a pub game that is similar to that of the modern pinball machine. It is formulated to address problems concerning mathematical concepts, specifically in Algebra and Geometry.

The players are confronted with problems that will test their comprehension of the subject. In Algebra, one can identify a set of coordinates by simply launching the two balls. The student is then required to find the slope of the line as is dictated by the points without having to do long calculations. The students are also obligated to find the slope intercept form of the line that has been formed. On the other hand, the Geometry aspect of the game revolves on the triangle. A triangle is formed with the points and the origin. The player must then identify the triangle that is formed before determining the length of the sides of the triangle by simply looking at the board.

This, in theory, decreases the time it takes for students to solve for the sides and slopes of the triangle. This is also able to increase comprehension of the student regarding a subject matter. This study is formulated to create a Mathematical Intervention Material that is able to increase proficiency among the performance of students in Algebra and Geometry. Furthermore, this aims to augment the interests of students in tackling mathematical concepts. Objective of the Study The general objective of this study is to determine if “ Mathopoly Bagatelle” can be use to enhance the skills in

determining the equations of the line, identify the length of the side of the triangle and identify the type of the triangle. Statement of the Problem The general problem of this study is, “ Does the Mathopoly Bagatelle can be use to enhance the skills in determining the equations of the line, identify the length of the side of the triangle and identify the type of the triangle? ”

Statement of the Null Hypothesis There is no significant difference in using Mathopoly Bagatelle to enhance the skills in determining the equations of the line, identify the length of the side of the triangle and identify the type of the triangle. Significance of the Study The study endeavors to determine the effectiveness of “ Mathopoly Bagatelle” as an alternative instructional tool for learning the Basic lessons in Algebra (linear function) and Geometry (triangle), particularly on determining the equation of the line in slope-intercept form that relates to linear equations and to determine the length of the sides of the triangle. The study is beneficial to students and teachers.

It will provide new and interesting way to learn basic lessons in Mathematics in an enjoyable manner as much as possible. Hence, the result of the study will give advantages to students and teachers Scope and Limitations The study focuses on the effectiveness of Mathopoly Bagatelle as one of the alternative instructional tool for teaching basic lessons in Mathematics especially on Algebra (linear function) and Geometry (triangle) particularly on determining the equation of the line in slope-intercept form that relates to linear equations. The study will be conducted at Barangay 5, San Francisco, Agusan del Sur, particularly in Agusan del Sur National High School. The scope and implementation of the study are the junior and senior students as

well as the freshmen and sophomore could also play if they want to.

Assumption The Mathopoly Bagatelle will help improve the skills and knowledge of the students on the subjects: Algebra, Geometry, and Trigonometry, particularly on determining the equation of the line in slope-intercept form that relates to linear equations. Review of Related Literature Old English Bagatelle The game of Bagatelle is a pub game of skill that is closely related to the games of Billiards, Pool and Snooker.

Modern derivatives include Children's Bagatelle, Bar Billiards, Western Pinball and Japanese Pachinko. A competition Bagatelle table is of a similar form to a Billiards table, slate bed, cloth covered with cushions and measuring 6 – 10 feet long and 2 – 3 feet wide. The first major difference from a billiard table is that one end is rounded instead of square.

The second diversion is that instead of pockets around the edge, the semi-circular end features nine holes (in the manner of Bar Billiards), one in the middle of the semi-circle and the rest surrounding it evenly in a ring. The hole in the middle is numbered nine, the others are numbered 1 – 8 in a semi-random order. Rather like a Billiards table, Pool table or Darts board, a variety of games can be played with it but all involve the players standing at the square end of the table and hitting the balls with a cue towards the holes at the other end. James Master, 1997) The origins of Bagatelle are even less clear than most games of a similar history although, since the name is a French one, the most obvious guess is a French derivation. Anyway, from 1770 to 1850, it seems that the Bagatelle was just as popular as Billiards throughout England and Britain. The journals of John Thurston, one of the

leading manufacturers of Billiards tables in the 1800s, show that he made a large number of Bagatelle tables between 1818 and 1845.

To add to the mystery further, the French version of his catalogue refers to the game as “ Billiards Anglais”, from which this author deduces that the French connection is either much older or is a red herring. In this latter year, the game joined the long list of restricted and banned games when a Gaming Act decreed that there should be “ no play on a public billiard table or bagatelle table from 1 am to 8 am and on Sundays, Christmas Day and Good Friday”. (James Master, 1997) Bagatelle became very fashionable during the Victorian era and numerous games were produced for the home. These tended to be smaller than the pub games and often folded up for easy storage but most were high quality articles. The table is without legs or any sign of them ever having existed so the table presumably rested upon a dinner table or other amenable surface. When unfolded, the table top looks identical to the picture lower right. However, included with the table are the set of arches shown.

These arches could be used to play other Victorian games of the same family – most are no longer played as far as the author is aware. In “ Trou Madame”, also known as “ Small Trunks”, players gain points for going through the arches as well as into the the cups but it’s not permitted to go through the same arch twice in a turn. “ Mississippi”, was another version of the game in which proceeding directly through the arches was not allowed – a ball had to bounce off a cushion first.

(James Master, 1997) In the 1970s there were a number of pubs playing Bagatelle in Bristol and Walsall and, most particularly, thriving Bagatelle leagues in Coventry and around Chester in the North West. At the turn of the millennium, the game is known still to be played in Chester, Coventry, Bristol, North Wales and Liverpool at least but its popularity has declined. The game played in the North is directly descended from the older game and starts with a black ball spotted in front of the nine holes. Eight white balls are then struck in succession by a player in an effort to get the balls to fall into the holes with the restriction that the ball being played must cannon off another ball before falling into a hole. The black scores double points so the aim is normally to try to roll the black ball into the central nine point hole. In the South, the tables tend to be larger - up to 10 feet long - and feature two side pockets about three quarters of the way up on either side. The game is played in a similar way but instead of one black, two reds are used. (James Master, 1997) Parlour Bagatelle The name Bagatelle these days is far more likely to conjure up the image of the children's pastime wherein marbles or ball bearings are shot onto a board which features areas fenced in by nails hammered into its surface.

Each container scores different points depending upon the likelihood of a ball finishing in it. An entertaining game, generally considered to be for children, the resemblance to the original pub game is not overwhelming. This smaller version began to appear in the late 19th century. The similarities are that the players shoot balls from the square end of the board towards the semi-

circular end of the board with the objective of getting the balls to land in scoring holes and areas on the board surface.

However, the whole board has been miniaturised to a tabletop size (in the same way that Shovelboard became Shove Ha'penny and Skittles begot Table Skittles). Presumably because aiming the balls was too difficult for youngsters, the balls run up a channel on the right hand side. The targets are enlarged by virtue of surrounding nails and the elements of skill have generally been almost replaced by that of luck. No points are scored if the balls roll right back down to the bottom edge of the board. Early boards required the balls to be struck up the channel by a cue in the same way as for the adult game.

Modern games usually feature a sprung plunger as an alternative or a replacement to the more traditional stick. This author has read that Montague Redgrave patented a spring loaded plunger mechanism to launch the ball in the year 1870. (James Master, 1997) Pinball and Pachinko It takes less of a leap of imagination to jump from Children's Bagatelle to modern-day Pinball machines of the sort that have graced any self-respecting amusement arcade from the 1930's onwards. The traditional quiescent scoring mechanism is replaced by transient electronic method whereby the balls score points as they travel around the games surface, rather than scoring when they come to a halt.

And the skill level is greatly increased because the balls can now be knocked back into play by flippers at the front of the game. But the plunger knocks

the ball into play up a chute on the right, the balls are dead when they roll down to the area at the front of the game and scoring is achieved by getting the ball to roll into scoring holes and areas on the game surface itself in exactly the same way. (James Master, 1997) The other modern electronic derivative, the Japanese version of Pinball is called Pachinko. These games tend to stand vertically and balls tend to be shot into the game from the bottom right hand underneath the playing area and then around to drop in from above left. The reward for placing the balls in scoring areas is to receive more balls to shoot into the game and eventually exchange the points for prizes. As time progressed, computerised versions and all sorts of clever entertainments have been merged into the basic game so that a Pachinko machine is often more like a Fruit Machine or slot machine than a ball game. The Pachinko industry is absolutely huge in Japan but it isn't known whether it originally arrived from Western Europe or America.

(James Master, 1997) Early Bagatelle's used cue sticks to launch marbles in a manner similar to billiards. In 1870, Montague Redgrave patented a spring loaded plunger mechanism to launch the ball setting the stage for 'pinball'. Most 1898 Redgrave models included a wooded cover to place over the game for transport. Pinball. It's a term we all know to one degree or another and has been part of Americana for as long as most of us have been alive. Over a 75 year period it has gone from a table top game played with a marble, to the wood bordered classics of the 1950s, to the electronic, digitized, licensed game it has become today. It has always been a classic. It

always was able to create a certain magic connection between player and ball.

Pinball pioneer Harry Williams said, “ The ball is wild! ” That is the essence of pinball. It can’t be programmed, it can’t be directed, it can’t be controlled, at least not completely. Even designers who have played their own games time and time again are often surprised at a wild jump or hop that sends the ball in a totally unexpected direction. James Master, 1997) Pinball of today is a Chicago creation developed around the time of the Great Depression, but it can trace its roots back to an eighteenth century parlor game called bagatelle. French nobility, using a small cue, shot balls into holes located around the playfield. Bagatelle was brought to America by French allies and the game became so popular a political cartoon depicted President Lincoln playing one. But it wasn’t until 1870 when Cincinnati toy manufacturer, Montague Redgrave replaced the cue with a spring-powered plunger that the game came into its own.

At the time of the Depression, the country was ready for an escape and pinball meant to fill the void. Whiffle produced in Ohio and Whoopee in Chicago were among the first. But when pioneer David Gottlieb made Baffle Ball it became a sensation, in no small part due to its amazingly low \$17.

50 price. Baffle Ball sold 50, 000 pieces in six months. Gottlieb distributor Ray Moloney decided to go out on his own and produced his version, Ballyhoo, leading to the creation of the Bally Manufacturing Company.

While by 1932 there were about 150 pinball manufacturers, two years later only 14 were left. Enter Harry Williams who invented the tilt anti-cheat mechanism and by 1942 would form Williams Electronics, Inc. and pinball was on its way. (James Master, 1997) Pinball has always tried to improve and better itself to appeal to a new and broader market.

In the thirties, some manufactures began experimenting with payout games which lawmakers came to see as gambling devises. During WWII pingame factories supported the war effort but when the fighting was over, pinball returned. When D. Gottlieb's Harry Mabs created the first flipper on a game called Humpty Dumpty in 1947 and classic designer Steve Kordek put two of them at the bottom of his game Triple Action, the transformation changed pinball forever.

There have been banana flippers, long flippers, short flippers, really short flippers, automatic flippers, digital flippers and sometimes only one flipper—but flippers, in some form, have been a part of every pinball produced since. (James Master, 1997) The 1950s is called the golden age of pinball and Gottlieb was king. Nearly every game produced by designer Wayne Neyens, especially when pared with artwork from Leroy Parker, was an instant classic. The 1960's saw the development of many new features in the game including drop targets, different types of bumpers and improved scoring including score wheels which allowed two and four player games. The release of the Who's rock opera Tommy in 1969 gave a boost to the popularity of the game. While the movie of the same name is not considered a success in any way, it did spawn at least two classic Bally games in 1976

from designer Greg Kmiec and artist Dave Christensen: Captain Fantastic and Wizard.

A few years before, a Playboy article on pinball in the December, 1972 issue is often credited for much of the popularity of Fireball, another Bally classic. (Jim Schelberg, 2009) 1932 Rock-Ola Juggle Ball. Once the ball was launched on to the playfield, the only possible control the player had was nudging the machine.

In 1932, David Rockola devised a game whereby players could directly control the ball via sliding arm mechanism with metal bumpers. 1947 Gottlieb Humpty Dumpty. Harry Mabs invented and included a new feature in Humpty Dumpty which forever changed pinball. Six ‘ Flipper Bumpers’ were added allowing far more player control of the ball than had been previously possible.

1936 Bally Bumper. Bumper is the first game to use bumpers for scoring. A ball is shot and as it works its way down the playfield, the player nudges the machine and try to hit as many bumpers as possible.

Each bumper is has a spring which activates a switch and adds points to a score which is projected from the rear by a projection bulb and stencil.

(Wayne Namerow, 1999) CHAPTER II Methodology Materials Bagatelle Board – made up of wood and plywood. A Cartesian coordinate system is drawn on its plane and it has holes for some coordinate points and nails as barriers to the marbles. Marbles – is launched on the bagatelle board that determines the coordinate points on the plane. Cue – placed on the right side of the

bagatelle board that will drive the marble towards the plane
General Procedure The researchers select thirty students from third year section namely, Lavoisier and Dalton. The total population is 80; the researcher used the random sampling in selecting the thirty respondents.

The 30 students were given questions to be answered without the Mathopoly Bagatelle. The researcher records the time until the students get the correct answer. To compare the result whether the Mathopoly Bagatelle can be an alternative tool in teaching Mathematics. The researcher conducted a post test where the entire respondent student will answer the same type of questions but with Mathopoly Bagatelle. The average time of pre-test and post test were recorded. Furthermore, the players/students place 2 marble on the right side of the bagatelle board where the Cue is located. The player launches the ball and lands on the coordinate plane. They will use the two points to determine the slope and give the equation of the line in slope-intercept form.

When the two points are identified, the student is asked to solve a triangle by considering the origin as the third point and let them to identify the kind of triangle. By using the gadget, it is reported that the students can give the length of the sides of the triangle by simply counting the rails and holes and apply the Pythagorean Theorem. Once the student is done, the time is recorded to make the comparison on the average time the student answers the questions without the gadget and with the Mathopoly Bagatelle.
Safe Keeping of Device It will be placed on a clean and safe carton or be placed in a cabinet. Testing the Device In making the device, it considers the number

of holes and the number of rails on barrier. The degree of elevation it plays the most important role with regards to the movement of marbles. If the slope of bagatelle is the tendency that there will be no marbles that will be shot to the holes.

All the point of the intersection without holes is placed with a rail to ensure that the marbles will not directly go down. The holes were limited to the number of grid to give enough space to the marble to avoid repetitive coordinate points. The holes are placed alternatively. Data Collection During the course of the acting out of the Mathopoly Bagatelle device, several types of data were collected. Data and analysis include: • Pre and posttests - Pre and posttests were collected from a total of 30 students who completed both tests. The test contained of solving the slope, y-intercept and slope-intercept form of the equation of the line.

Moreover, the students will determine the length of the sides of a triangle and identify the type of a triangle. The items were aligned with the objectives of the Mathopoly Bagatelle. Student gains were analyzed using Correlated T-test for students who completed both a pre- and posttest. Significance was determined for differences with $\alpha = 0.05$.

05. • Student work - Guide Questions designed to aid and assesses knowledge and understanding in determining the slopes, y-intercept and slope-intercept form of the equation of the line, length of the sides of a triangle and identify the type of a triangle and such activities as well as student activity sheets were collected. The student guides are reviewed to

determine the students' level of understanding and ability to communicate effectively about slopes. CHAPTER III Results and Discussion This chapter reveals the results of the testing of the Mathematical Intervention material. It also shows the interpretation of the raw data gathered. Table 1. Raw Data for the Pretest and Posttest Scores of the 30 Students from sections Lavoisier (15) and Dalton (15) Name of the Students Pre test (min.

) Post test (min.) Abragan, Reuben 29. 428. 20 Abucay, Lloyd Justin 29. 521. 60 Agleron, Paul Anthony 34.

488. 75 Bacas, Harvie John 28. 277. 27 Banog, Mary Grace 34. 186.

87 Cadiz, Michael Vince 30. 567. 50 Canda, Jezza Magne 35. 389.

05 Clemeno, John Randale 30. 257. 75 Constantino, Christopher 34. 928. 25 Corro, Jeszel Diane 27. 627. 17 Cubillas, Ernest Jay 33. 428.

50 Dela Pena, Jonalee 27. 27. 30 Fadriquela, Raymart 34. 758. 75 Guisona, Joshua 34. 25.

97 Jubane, Micha Mae 29. 87. 50 Lademora, Miguel Paolo 7. 586. 57 Lara, Keirmarc 35.

6221. 63 Lauron, Crystal Mae 28. 757.

25 Luzon, Chris Bryan 30. 227. 25 Miana, Ezsa Mae 34. 78. 87 Nakila, Claudine Ann 35.

488. 58 Obillos, Ciande Marie 33. 24.

7 Odango, Princess Eve³⁰. 257. 87 Panganoron, Louren Pabria³⁰.

189. 93 Recana, Hezron Joseph²⁷. 857. 75 Roquete, Andre Joshua³². 778. 58 Shiroma, Alex Gregg³⁵.

77. 75 Tongson, Lily Mae³³. 278.

75 Tulid, Rena³⁰. 428. 75 Vicente, Hannah Grace³⁴.

35. 63 Total⁹³⁴. 56260. 29 Average Total of Time³¹. 158. 68 The table reveals the raw data gathered in the Pre test and Post test. It is found that students performed faster in the Post test as is compared to the pre test.

This suggests that the intervention material, the Mathopoly Bagatelle, is an efficient tool in increasing proficiency of learning mathematical concepts.

Graph 1. Graph of the means of the Pre test and Post test raw data The graph reveals the average time span for the pre test and post test of the 30 respondents. It is seen that there is a significant difference between the time for the pre test and the post test. There is an observed decrease in time from the pre test to the post test which suggests that the intervention material is efficient in increasing the speed of the student to answer specific questions.

Moreover, this implies that the Mathopoly Bagatelle can increase proficiency in solving both Algebraic and Geometric questions regarding lines and slopes. To determine whether there is a significant difference between the means of the pre test and the post test, T-test correlated sample is employed.

Table 2. T-test Correlation of Samples in the Pre test and Post test Variable
1Variable 2 Mean³¹.

1528.676333333 Variance27.3519406913.56429299 Observations3030
Pooled Variance20.45811684 Hypothesized Mean Difference0 Df58 t Stat19.
24533099 P(T