

Integrative Gamification Technique In Teaching Specialization Courses In Mathematics

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Abstract— One of the theories to improve Mathematics performance is by the integration of fun while learning, to name one Yadav (2015) conducted a play-way method resulted to students' learning mathematics clearly and easily. By this, the study sought to determine the significant differences on the perceived use of Gamification Technique (GT) when grouped according to sex, age, year level, and Mathematics course. Also, it sought to determine the relationship of the Mathematics performance in the four areas of GT namely; academic achievement, cooperation, behavior and familiarization of non-virtual Filipino Modified Games. The relationship of its integration in general when the four areas were combined is also tested. The researcher made use of the multiple randomized block action research design. The researchers surveyed the proportional stratified randomly selected 181 college students. Appropriate Statistical tools were then used and revealed an extreme positive perception towards GT. As to sex profile, only cooperation while as to age, only academic achievement area were revealed significant. These mean that male, 21 to more than 23 years old had a more positive view compared with female and 18 to 20 years old. A significantly different conclusion in all four areas of GT was reflected in first, second, third and fourth year students. Such four areas were all significantly different in College, Advanced and Abstract Algebra, Plane, Solid and Modern Geometry, and Plane Trigonometry courses. A positive correlation in all areas to Mathematics performance of the students was revealed. Generally, the use of GT is a way of innovating teacher's instruction in improving students' Mathematics performance. However, limitations on the use of GT were seen in abstract mathematics concepts and subject for its further improvement.

Index Terms— Gamification Technique, Academic Achievement, Cooperation, Behavior, Non-Virtual Filipino Modified Games, Mathematics Education

1 INTRODUCTION

The world contains numbers, which are largely, Mathematics. One of the problems about Mathematics is the impression that comes along with it. Many people think that Mathematics is difficult to learn. Learning Mathematics stand by now could be changed through the theory of game-based learning. Why, because besides the results by the Third International Mathematics and Science Study-Repeat (TIMSS-R) 2015 that Filipino students are still scrawny in Mathematics and Science and a report of the Department of Science and Technology (DOST) said that the 6,601 Filipino students who took the TIMSS last 2016 ranked 36th in both Science and Mathematics tests out of a field of 38 countries. (Philstar Global, 2017), innovations in teaching Mathematics must be developed. Now, one of the theories to improve the performance in Mathematics is by the integration of fun while learning. Based from the study conducted by Yadav (2015), the Mathematics teacher should provide some simple games and make the learner to play for acquiring maths. Mainly, the teacher has to teach an arithmetic skill to the students and the other aspects of mathematics courses which can be incorporated with games. The teacher can creatively provide conventional materials to design the classroom as an entire game.

This will make the student to learn mathematics with more desire. By learning in play-way method, the student learns mathematics clearly and more easily. Thus, learning may be fun and interesting. Moreover, a gap from the traditional culture from the students' behavior nowadays was found since they are belonged to the so called "millennials" who are more inclined with modern games, traditional Filipino games were now forgotten. The value that the traditional games gave in the previous generations may not be absorbed by the new generation now because of its absence in the community.

Thus, the researchers integrated as well the traditional Filipino games in learning Mathematics courses. Thus, the purpose of the study is to determine if there is a need to redefine the guidelines of the gamification technique if found significantly different in the demographic profile. Also, to determine in what area of GT helps to improve Mathematics learning and perhaps do some improvement over time implementation. Limitation of the study is not determining its full effectiveness since no experimental and controlled group was assigned.

1.1. Research problem

The study aimed to determine the learners' performance in Mathematics course while gamification technique is integrated. Specifically, the study sought to answer the following: (1) What is the profile of the respondents in terms of; (a) sex, (b) age (c) year level (d) Mathematics course? (2) What is the perception of the students in using gamification technique in the mathematics courses as perceived by the students enrolled in different Mathematics courses in terms of; (a) Academic achievement, (b) Cooperation (c) Behavior, (d) Familiarizing Contextualized Filipino games (e) General Gamification Perception? (3) Is there a significant difference on the perceived used of gamification technique in each area when the participants are grouped according to profile, (a) sex, (b) age (c) year level (d) Mathematics course? (4) What is the performance level of the participants in their Mathematics taken course? (5) Is there a significant relationship between each Mathematics course performance of the participants and their perceived use of gamification technique according to; (a) Academic achievement, (b) Cooperation (c) Behavior, (d) Familiarizing Contextualized Filipino games (e) General Gamification Perception? (6) What activities and enhancements can be proposed in using gamification technique based on the findings of the study?

1.2. Theoretical Framework

The study is anchored on Self-determination theory (SDT) by Edward Deci and Richard Ryan, Social Development Theory by Lev Vygotsky, and Goal-setting theory of motivation as discussed by Gollwitzer & Oettingen, (2012).

The self-determination theory (SDT, Deci & Ryan, 2012) — arguably the most-frequently used psychological theory in

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gamification research to date (Seaborn & Fels, 2015) — to develop and test hypotheses about the trinity of gamification design elements: points, levels and leaderboards (Werbach & Hunter, 2012). SDT would suggest that points, badges and leaderboards, visualizing progress made, serve as informational feedback instilling a sense of intrinsically motivating competence in the user. This SDT is highly significant to the present study since the gamification technique used chip-point incentives, heart-chip lives, and badges for leveling. The tangible objects kept by the leaders in each group which served as their informational feedback which motivates every member from the group to perform better.

Next is Vygotsky's Social Development Theory (1978) which states,

"Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals"

This theory plays a major role in developing cooperation skills of the student especially in the gamification technique since every action, behavior and academic performance of one member will affect the progress of the group. This cooperation skills learned in contributing to the group leveling up helped eventually the individuals' development. Last applicable theory is the goal-setting theory of motivation. Based from Gollwitzer & Oettingen, (2012) goal-setting, another well-established theory of motivation, to generate and test predictions about the effect of leaderboards on performance in a brainstorming task. Findings suggest that leaderboards indeed may function as an implicit form of goal-setting, inviting users to self-set performance goals at or near the top of the leaderboard: peoples' performance on leaderboards populated with high scores that are difficult or impossible to achieve was comparable to that of people being given explicit difficult or impossible goals. In addition, the authors found that individual goal commitment, an established individual moderator in goal-setting theory, moderates performance with leaderboards as it does with explicit goals.

2 METHODOLOGY

2.1 Research Design

A Randomized Complete Block Design (RCBD) was used. This design according to Calmoren & Calmorin (2007) is an experimental design which uses multiple group of respondents which are being studied while subsequent treatments were applied. There is no control group in this design so the only measure of improvement is the post-test gathered from every group. This design was suited since the researchers implemented the gamification technique to different group of students' constituting different year levels who are taking different Mathematics courses. At the same time, this study utilized action research since the role of the researcher is that of practitioner-researcher, where a lecturer examines his/her own practice, and is, thus, very responsive to data collected and flexible in reactions to findings from the observations (De Villiers, 2005). This close relationship to the research means

that any interpretations may be limited (Adams, 2010) and that the researcher has to be very aware of his/her own values around what constitutes learning and what he/she believes a student should be doing.

2.2 Participants and Sampling Technique

The population of the study was the college students from first year to fourth year level with Mathematics Education courses enrolled in Bachelor of Secondary Education program in the City College of Calamba. The researchers used stratified sampling technique and computed to have 158 students from a population of 255, however, the actual participants became 118 since questionnaires from some fourth year respondents were not retrieved because they graduated already, while some lower year levels transferred from another school.

2.3 Data Gathering Procedure and Ethical Considerations

The teacher-researcher applied the GT for three (3) consecutive semesters. Specialization courses were Calculus for third year students (3rd year) , Plane Geometry for first year (1st year) and Abstract Algebra for fourth year college students (4th year) taken during the second semester (2nd sem) of academic year (A.Y.) 2017-2018. College and Advanced Trigonometry for 1st year, both Solid Geometry and Plane Trigonometry for 2nd year, and Modern Geometry for 3rd year all taken during the 1st semester A.Y. 2018-2019. GT guidelines were distributed to every group during the first meeting of every semester, the guidelines include how the group can earn and lose heart lives. Every group had initial heart lives of 5, point incentives can be earned through the integration of modified Filipino games designed for specific topic in the mentioned course. Point incentives can also be earned through exemplar behavior and getting badges, like most punctual group in submitting problem sets, assignments and projects, most disciplined, inside and outside the class, most active in both classroom and school activities, etc. The collected point incentives can be exchanged as a heart live so that the group can move forward to level 2 up to level 5 before the class ends. The total collected heart lives were equivalent to plus points in the final examination. The role of the co-researcher was to research Filipino Games, convert the twisted version in Maths and create the manipulative and materials to be used. After the implementation, the researchers first seek the approval of the college president to gather the data needed in the study as well as to use the official documents of the institution such as the scores and final rating of the participants form first semester (sem) academic year (AY) 2017-2018 to present semester AY 2018-2019. The letter was first prepared by the researchers, let the acting director of DASTE noted it as well as the director for research and extension. The researchers also furnished a copy to the vice president for academic affairs for recommending approvals and the final step is through the president's approval and eventually the students' acceptance to participate in the study. The survey questionnaire were distributed into two manners, first was through google forms and for those students without internet connection, a hard copy was given to them.

2.4 Data Analysis

Data collected from the survey instruments were tallied, tabulated, and analyzed using the statistics generated by the Statistics Package for Social Sciences (SPSS). The statistical

tools used were percentage formula, weighted and arithmetic mean, t-test and analysis of variance, last was the Pearson product moment correlation coefficient.

3 RESULTS AND DISCUSSIONS

The profile of the students in terms of the sex distribution who responded the study can be seen that majority were participated by 67.4% (122) female out of 181 total respondents whereas 32.6%(59) male respondents completed the remaining ones. In majority of the recent studies as well as the population distribution all over the world, females actually dominated the males. Also, Kelleher (2011) concluded that most of the youths enrolled in a teacher-education program were females where she reported the statistical discussion of feminization of teachers in five mentioned countries, i.e. in Dominica, Lesotho, India, Samoa, and Sri Lanka. The age group of the participants was 18 to 20 years old with 70.7% (128), these participants were mostly graduate of the Grade 12 senior high school and the average age mostly ranges from the mentioned age group. This was followed by 21 to 23 years old with 20.4%(37), in this case, these are usually the second year students called "lifelong learners" wherein, they were the last graduates of Revised Basic Education Curriculum (RBEC) in the Philippines, that is 2015 and below graduates but failed to continue college and did not undergo Kinder to Grade 12 (K-12) curriculum. Lastly, the study was participated least by the 8.8%(16) which were usually the graduates of Batch 2018, the researcher let them evaluate the gamification technique since, they were the pioneer recipients of the technique. In consistent to the Hamilton Project (2017) that the plurality of students at both four-year and public two-year institutions are between the ages of 18 and 24. Nonetheless, more than 20 percent of undergraduate students at four-year institutions are over the age of 24. The distribution of profile when it comes to frequency of students as to their year level, 40.3% (73) were first year, 24.9% (45) were fourth year, 17.7% (32) were second year, while 17.1% (31) were third year. This distribution can be observed inconsistent because of the secondary curriculum transition from RBEC to K-12, which affected the college enrollment. The distribution of the participants in each course offered in the City College of Calamba per year level in Bachelor of Secondary Education in Mathematics Education. The 30.4%(55) came from the students who took College and Advanced Algebra, followed by 17.1%(31) and 16.6%(30) from the students who took Calculus 1 and Modern Geometry respectively. The participants were least participated by 9.9% (18) who took Plane Geometry, two 8.8%(16) from students enrolled in Solid Geometry and Plane Trigonometry and last by 8.3%(15) from the enrolled students in Abstract Algebra course.

Table 1 (See Appendix A: Table 1 The Distribution of Means in using Gamification technique in terms of Academic Achievement) described the mean distribution of the perceived used of gamification technique in terms of students' academic achievement in general at 3.4 mean value. The highest perceived mean was derived from each Mathematics course which was computed highly from the students took Solid Geometry course with 3.69 computed value followed by Plane Geometry course with 3.57. It can be implied that geometry courses can easily integrate activities and games since it is a branch of Mathematics which were applied by nature in which students enjoyed Mathematics while learning which helps them to boost their perception in academic achievement

which is evident at mean value of 3.94. Moreover, in these two geometry courses, they find the retention of concepts easily same as the application of theories learned in real-life applications which was opposite result to the Non-Euclidean geometry – The Modern Geometry which gave an overall mean value of 2.84. The highlights of table 1 were found in the similarities of closed perceptions from College and Advanced Algebra, Plane Trigonometry, Calculus 1, and Abstract Algebra course when it comes to the help the gamification can give to students' academic achievement. It is evident to the mean values which were all interpreted as extremely agree. It implied that they have an extent of positive perception about the use of the technique in their Mathematics courses. However, the only course which gave the least mean value came from Modern geometry course which is consistent to all academic achievement's indicators. One reason is that, the nature of the course is abstract by nature which gamification technique had the hard time to integrate activities and games in the lesson most of the time. But generally, the gamification technique was perceived with high regards in academic achievement perception of the students in their endeavor with their Mathematics courses at 3.4. and interpreted as extremely agree. Just what Psychologists have long time acknowledged the importance of play in cognitive development and learning. Piaget (1962), for example, described play as being integral to, and evolving with, children's stages of cognitive development. According to Piaget, play becomes more abstract, symbolic, and social as children mature through different developmental stages. One way that play is seen as contributing to children's cognitive development is by activating their schemas in ways that allow children to transcend their immediate reality.

Table 2 (See Appendix A: Table 2 The Distribution of Means in using Gamification technique in terms of Cooperation) showed the mean distribution of the perceived used of the gamification technique in terms of cooperation. The highest computed mean was 3.52 in this part which tells that the students establish rapport (harmonious) relationship with their classmates, this indicator was all extremely agreed by students enrolled in six offered Mathematics courses except to those students enrolled in Modern Geometry course which for them was only "agree". It was followed by a weighted mean of 3.51 which allows them to learn Mathematics through group studies. All students again enrolled in the six courses strongly believed this part; however students in Modern Geometry course maybe tend to agree only since they opted to study in individual basis in most of the lessons. Third indicator with computed mean value of 3.42 tells that the students can share their thoughts comfortably in the group about the lessons which was evident to all responses of extremely agree to all six courses while agree in Modern Geometry course. Second to the least indicator with 3.34 mean was assigned to the indicator stating that gamification technique helps them to contribute little efforts in the progress of the group. Students enrolled in five courses strongly believed on that while students in Calculus were humble enough to claim an agree perception while disagree by the students in Modern Geometry class. Lastly, a mean of 3.29 was computed from the indicator that gamification technique helps the students to lead the group performance, the fact that all members are participating in every activity and games inside the class, they acknowledged everyone's effort and believed that nobody monopolizes the power. A general weighted mean in terms of

cooperation was computed at 3.42 which was equivalent to a verbal interpretation of extremely agree. As mentioned in the study conducted by Plass, Homer and Kinzer (2015) that gamification designs should take into account activities that specifically intended to promote social interaction and friendship, social networking around a specific activity, and social support structures that result in learning around the interaction related to a specific activity. This interaction and fluidity between interest-driven and friendship-driven social participatory structures imply learning.

Table 3 (See Appendix A: Table 3 The Distribution of Means in using Gamification technique in terms of Behavior) gave the distribution of means on the use of gamification technique in terms of behavior. What is recognizable in this key area of gamification is that the very first in rank with highest mean is 3.63 and interpreted as extremely agree that the gamification helps the students to compete fairly by not stealing the incentive chips and heart lives chips of other groups. However it is noticeable too that among all the seven courses offered by the college, only students enrolled in Modern Geometry class disagreed this part. It can be implied that some of the groups honestly assessed themselves that they sometimes did this stealing for the sake of group progress. This is evident in the second highest in rank indicator at 3.58, where all six courses extremely viewed that life is a friendly competition that it is not about winning the game but it is about learning the main purpose which in contrary to the answers of students in Modern Geometry class since it was interpreted as disagree which tend them not to attend (come) on class enthusiastically. While students in all six courses (College and Advanced Algebra, Plane Geometry, Solid Geometry, Plane Trigonometry, Calculus 1, and Abstract Algebra) strongly acknowledged that aside from being careful to their actions inside and outside the school is not because of the incentives they are about to earn but because they strongly agreed that it is the right thing to do, they also highly believed that they need to behave according to what is expected to them as a teacher-education students. While some students in Modern geometry class only agreed this thing. Like what was studied by the paper of Glover (2013), he outlined some of the key concepts and criticisms of gamification as to when deciding whether to gamify a learning activity/process, it is necessary to consider some question first. He considered the question "Are there behaviors to encourage/discourage?" Gamification is frequently used to provide incentives to modify specific behaviors, such as by encouraging group work or discouraging interruptions and distraction. This particular use can be effective, but it may not result in long-term changes without continued incentives. Although, the weighted mean of 3.55 was interpreted as extremely agree perception in general, this one subject with students' negative perception must be considered in designing appropriate activities that will help not just the majority but all students in developing behaviors through gamification.

Table 4 (See Appendix A: Table 4 The Distribution of Means in using Gamification technique in terms of Familiarizing Modified Filipino Games) represented how gamification technique helps the students in Familiarizing Modified Filipino Games. The distribution of means was quite interesting since the general weighted mean of 3.6 manifested extreme agreement. However, out of seven courses, only six perceived it strongly as to compare in Modern Geometry course as disagree. It can be implied that the contextualization of activities in this course

is not successful; one possible reason is that the course is too abstract, technical and proving which the facilitator and the researcher find the difficulty on how to integrate it well. It is fortunate to know that students in the Abstract Algebra which were now teachers also tend to use and practice gamification technique in their career now as seen in the computed means of 3.80 and 3.87 based on indicators four (4) and five (5) respectively, but unhappy to know that the fourth year students who were enrolled in Modern Geometry class find uninterested in the technique used to them since their responses fall in 2.27 disagreement in both mentioned indicator. Moreover, the students enrolled in the first year and second year Mathematics courses enjoyed and strongly embraced the technique implemented to them, and had the future plans to implement the technique as well in their future endeavor as a teacher. Additionally, the study wanted to strengthen Filipino games in the past since most of the millennial today was not too familiar with the Filipino culture when it comes to traditional games. A mean weight of 3.65 was commendable already to imply that gamification technique in the context of this study helped the researcher to meet its goal since they extremely now aware to some of the used Filipino games like "Pinoy Henyo", "Paper Dance", "Boat is Sinking", "Charades", "Relay", "Picture Perfect" and many more which led the students to highly appreciate Filipino games rather than virtual and online gaming since it involves face to face interaction which garnered a computed mean value of 3.59 which was also interpreted as extremely agree. The discussion in Table 4 was generally positive yet considering its weak points when it comes to the perceptions of students in Modern Geometry class. This weak result, although small in the whole picture needs to reinforce in the next implementation especially in this course Modern Geometry. It may lead to a worse scenario if regret and set aside.

Table 5 (See Appendix A: Table 5 The Distribution of Means in using Gamification Technique in terms of the Four Key Areas in General) summarized the general mean weight of each key area considered in the implementation of this gamification technique in the City College of Calamba. The highest mean was 3.6 in the fourth key area of Familiarization of Modified Filipino Games in Mathematics courses, seconded by behavior at 3.55, third in cooperation, and last in academic achievement at 3.42 and 3.40 respectively which then interpreted as all extremely agree. This strong agreement was consistent to all students enrolled in Solid Geometry at 3.83, followed equally by Plane Geometry and Plane Trigonometry with equal means at 3.72, continuously supported by three courses in College & Advanced Algebra, Calculus 1, and Abstract Algebra at three equal weights of 3.60. Nevertheless, a bare agreement was come from the perception of students enrolled in Modern Geometry course with 2.54 computed weighted mean. The result implied that with the four key areas of integrating gamification technique in Mathematics courses, the objective of learning Mathematics will be interesting in their minds and enjoyable in dealing the subject.

Table 6 (See Appendix A: Table 6 The Comparison of Means in using Gamification Technique when the participants were grouped according to Sex) showed a comparison of means in using the gamification technique when the participants were grouped according to sex. Aside from the viewpoint of gamification technique in general, and from the four areas, i.e., Academic Achievement, Cooperation, Behavior and Familiarizing Modified Filipino Games, only Cooperation Area

was perceived differently by male and female. It can be implied that cooperation among male and female was differently received by each group. Males highly valued cooperation in each member as to compare in females.

Table 7 (See Appendix A: Table 7 The Comparison of Means in using Gamification Technique when the participants were grouped according to Age Group) showed a comparison of means in using gamification technique when the participants were grouped according to age bracket. Among all the four key areas, this time the only significant different was the area of academic achievement, older students tend to view the significance of gamification in the contribution to their academic achievement in the course.

Table 8 (See Appendix A: Table 8 The Comparison of Means in using Gamification Technique when the participants were grouped according to Year Level) elucidated the comparison of mean perceptions in using gamification technique when the participants were grouped according to year level. Since all p-value is flat 0.00 which is highly significant in all four areas including the general perception, it implied that the gamification technique was received differently by each year level. It can be implied that activities implemented in each year in the college were appropriate to their level. The facilitator and the researcher tried to differentiate the activities which were suited to them which were successful since it is evident to the statistical measure of significance.

Table 9 (See Appendix A: Table 9 The Comparison of Means in using Gamification Technique when the participants were grouped according to Mathematics Course) expounded the comparison of mean perceptions in using gamification technique when the participants were grouped according to Mathematics courses. All p-value is flat 0.00 which is highly significant in all four areas including the general perception; the courses offered in the Teacher education program under Mathematics Education have different natures, one can be applied by nature like Plane and Solid Geometry which deals with figures in flat surface and in space, Plane Trigonometry and Calculus 1 which were application in Science, Technology, Education and Mathematics field. While other one is technical theories, concepts and definitions by nature, these are seen in Algebra, Modern Geometry and Abstract Algebra. Implied that the nature of the course is important in integrating gamification technique, since it was perceived differently, the students received appropriate learning activities in the course as reflected in their mean perception which fell all in extremely agree, but received just enough in Modern Geometry course in an agreeable level only.

Table 10 (See Appendix A: Table 10 The Frequency Distribution of Mathematics courses Performance Level of the Students in BSE major in Mathematics) explicated the performance level of the students in their Mathematics enrolled Mathematics courses in the City College of Calamba for the past three recent semesters starting from first semester 2017-2018 up to the first semester 2018-2019. It can be seen that the students performed very good in there Calculus 1 class at 85.29%. Three mathematics courses were at good remarks at Solid Geometry, Abstract Algebra and Plane Geometry with 78.79%, 77.2% and 74.61% respectively. It was followed by a satisfactory level in Plane Trigonometry and College % Advanced Algebra at 73.56 and 65.31% respectively. While only a passing remark in Modern Geometry class. These performances were a result of gamification technique with the use of incentives and heart lives in seat

works, activities and final examinations.

Pilkington (2018) studied a playful approach to promote motivation to third year third-year students via a gamified approach to improve coursework participation and student experience which is parallel to the recent study which is the main goal is to improved academic performance but this time in all level of students. The good performance is evident since a general mean of 72.08% is in the bracket of satisfactory rating.

Table 11 (See Appendix A; Table 11 The Correlation of Mathematics courses Performance Level of the Students in BSE major in Mathematics and their perceived use of Gamification Technique in General) had the means for each Mathematics course with corresponding verbal interpretations for academic performance level as well as the perceived used of Gamification Technique as whole agreement. It also had the distribution of correlation R-values with its corresponding level of correlation in which all were negligible. P-values were then derived to determine the relationship of the two mentioned variables under considerations and it was found out that the performance of mathematics major students in their Mathematics course was significant positively correlated to the extreme agreement in using of Gamification Technique in General and vice versa. It can be implied that the higher their level of agreement in experiencing Gamification Technique in General, the higher there grades in there Mathematics course. On the other hand, the lower the perceived values the mere they can get a lower grade. Mathematics should offer us logical thinking. When the learner learns various approaches of problem-solving in learning mathematics, they come to know which approach is the best. Standard curriculum should be rich in such activities that are helpful in learning numbers and make transition to algebra easier too. To keep the interest of students in the subject, it was found that engages the students in an activity which helps in their learning and provides them strong foundation, (Yadav, 2015). This result is consistent to the study since enriched activities were implemented to improve learning in Mathematics..

4 CONCLUSIONS

Based on the findings of the study, the researcher drawn several conclusions:

1. The participants were mostly female, age group was 18 to 20 year old first year college students enrolled in College and Advanced Algebra course during the first semester of AY 2018-2019. This mean that that City College of Calamba students profile taking BSE-MathEd program in terms of sex was dominated by female while having the age group mostly by 18 to 20 years of age.
2. All areas of gamification technique such as academic achievement, cooperation, behavior, and Familiarizing Modified Filipino Games were all highly received positively by the respondents including the integration of Gamification Technique in general. This implies that students are not resistant to innovative way in learning Mathematics courses.
3. The perceived use of Gamification technique was significantly different in some areas when the students were grouped according to profile. Implied that different approaches where received successfully by different categories.
4. The performance level of the mathematics major students in the City College of Calamba is satisfactory when it comes to their major subjects. It is quite proven that the licensure examination rating of the college for the past years are still

evident to the future performance of the students major in mathematics since they performed well.

5. The use of gamification technique matters in the performances of the students in Mathematics. Hence the use of GT is highly recommended in Mathematics teaching

5 RECOMMENDATIONS

In the light of the findings, conclusions and implications drawn from the study, the researcher recommends the following:

1. Administrators of the local colleges may conduct seminars and trainings for in Mathematics anchored in Gamification Technique.
2. The educators may plan critically the appropriateness of the activities to be implemented using Filipino Modified Games in Mathematics topics.
3. The Mathematics educators need to revisit and update the activities every semester for possible enhancements not only the technique but the performances of the students in Mathematics course.
4. Educators and students may try to use the proposed activities to enhance further the teaching-learning process in Mathematics Education.
5. Teachers may use the Gamification Technique in other course which is not limited to Mathematics since it was found related to the better performance of the students.
6. Implementers of the technique may consider the weak indicators to watch out specially the development of values, behavior and discipline inside the classroom for the goal not to be deviated.

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