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Research Paper

The Effect of Educational Games on the Level of Motivation in Science of Grade IV Students in Angel Villarica Central School

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Abstract: The concern of this study is to determine The Effect of Educational Games on the Level of Motivation of Grade 4 Students in Angel Villarica Central Elementary School. A quantitative research design employing an experimental method was used in the study. The essential data were gathered from a total number of seventy-three (73) respondents, 36 students from the control group and 37 students from the experimental group, with the aid of a questionnaire validated by a panel of experts. The statistical tools used in this study were Average Weighted Mean and t-test for Independent Sample Means. The study proved that there was no significant difference between the mean gain scores of the experimental and control groups. It means that the use of educational games has no significant effect on the level of motivation in science. However, educational games can be considered as an alternative method in delivering the Science lesson. It was being recommended in the study to conduct a similar study in the future to confirm that educational games have no effect on the level of motivation and involve a wider scope in the conduct of the study.

Keywords: Educational games; Experimental method; Quantitative research; Alternative method; Motivation.

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INTRODUCTION

Motivation has been the center of attention among teachers throughout the years because it is the backbone of the learning process. Learning is a complicated and dynamic process, and learning in a real sense gets completed through motivation. Students take an essential step on the road to learning through motivation. However, students may sometimes lose their willingness and interest in the lesson, which puts a significant barrier in front of effective learning. Students complained about boring and colorless lessons. They usually need action fun and increase their sense of success. Falconer (2013) advises not asking students just the same tasks every time and adds that "a stimulating environment creates enthusiasm and the opportunity for 'big picture thinking." Using educational games in the classroom can increase enthusiasm and reinforce.

With the implementation of the K to 12 curriculum in the Philippines, the Department of Education may shift to game-based learning to further the development of 21st-century skills among the learners' motivation. Previously conducted research on educational games can be developed the students' motivation; games can motivate the students inside the classroom, which is acquired the students' behavior through interaction with the students and the teacher (Protopsaltis, 2011). Motivation, by definition, is something that causes a person to do something. That motivation is rooted in an individual's

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needs, wants, and drives (Timm & Peterson, 2000) that; motivation is both intrinsic and extrinsic to the individual. It can make a certain kind of action related to the students (Pinder, 2014).

Mary Ann T. Palma, a science teacher in grade four of Angel Villarica Central School, explained that "in the science subject, it is needed that the students are involved in any activities because they will not learn if the teachers will always "chalk-talk." The students' behavior is very active and very participative when there is an activity. The motivation of the students is very high. She also cited that if the teacher does not apply any educational games inside the classroom, the class will be dull and the students will feel bored and lack energy" (personal communication, April 11, 2018). Based on the gaps cited, there is a need to study the effect of educational games on the level of motivations in science grade four students in Angel Villarica Central Elementary School.

Teaching and learning in any school have been under a significant influence of educational games were used by the students is a great help. One of the educational goals is to create a competent individual who can, at any time, access a source of information, use it, and apply it in new situations. Educational games aim to train students for life-long learning and decision-making. As a process of acquiring knowledge, skills, and routines, learning is more effective if multiple perceptive experiences gain new knowledge during teaching facilitated by multimedia teaching (Steinkuehler, 2010). It was emphasized by the researchers the importance of the teacher's role. A teacher has to be a good organizer and leader while providing help and support and directing students in their active work. Since the game design process also involved game-playing, students developed better cognitive skills and decision-making skills, identical to the results of researchers dealing with the positive impacts of games on learning.

There are many explanations for what defines an "educational game" nowadays. While some games are competitive, others may allow students to work together as a class to solve a general problem where no one "wins" or "loses." In "All Play and No Work," MacKenty (2006) states that "it's the act of problem-solving that makes games so engaging devoid of challenge or risk of failure; games aren't all that much fun." On the contrary, Schrand (2008) discusses the powerful capabilities of interactive multimedia games (or activities) where students work together as a class to categorize information in charts by moving facts, so they rest in the appropriately labeled columns. Revisiting these types of games and activities can help reiterate important information for students.

Additionally, in a more general approach, we seek information that supports the question: What makes an educational game effective in the classroom? "Nearly seventy percent of students learn best actively and visually" (McLESTER, 2005). Because of this, we feel that there are many potential benefits of active learning through games in the classroom. Educational games are supposed to be an effective and efficient instructional strategy for teaching and learning (Boyle et al., 2011); however, these claims seem questionable (Akili, 2006; Von Wangenheim & Shull, 2009; All, Castellar & Van Looy, 2016). Games seem not rigorously as most evaluations as educational games are performed in an ad-hoc manner in terms of research design, measurement, data collection, and & analysis.

It is essential to cater to students' needs and make the educational process more creative. Therefore, it is crucial to integrate educational games into learning. Educational games directly support learning by allowing students to develop knowledge and cognitive skills emotionally, make decisions in critical situations by solving problems, learn by researching, and experience situational learning (Holzinger, Nischelwitzer & Meisenberger, 2005).

Students must discover and develop their abilities and skills by playing educational games, gaining experience, learning, and creating. Games build imagination and creativity. Educational games have their meaningful context learning becomes a situation contributing to forming a competent and confident individual. Games are the best motivation for learning and activities. For each subject, there are educational games that can be integrated into the teaching process. Students find some subjects harder and easier (Lee & Hoadley, 2007).

Van Eck (2006) mentions that in the last years, many studies have discovered that games promote learning and decrease the time of teaching for many subjects and with students of different ages. He reminds us of the studies that determined the positive impacts of educational games on learning in other subjects and with different ages. Kebritcki (2008) also looked into the effects of educational games on students' motivation for learning.

In his research Burguillo (2010) observed that a combination of game playing and friendly competition resulted in pupils' strong motivation and helped increase learning effectiveness. And girls suggested that using meta-cognitive strategy in learning based on educational games greatly influenced better

achievements in games, learning and improving skills for social problems solving and new situations (Kim, Park & Baek, 2009).

Educational games have been used as an innovative instructional strategy to achieve higher levels of effectiveness (Von Wangenheim & Shull, 2009; Calderon & Ruiz, 2015). It is specifically designed to teach people about a particular subject, expand concepts, and reinforce development or assist them in drilling or learning a skill or seeking attitude as they play. They have been applied in diverse knowledge areas, such as mathematics, science, health, nutrition, among others (Backlund & Hendrix 2013; Calderon & Ruiz, 2015) as well as for computing education IT (Information Technology) training driven by the need to provide more than hands-on learning opportunities (Backlund & Hendrix, 2013). As they considered the relationship between playing educational games and realizing educational goals and trying to determine how educational games influence the realization of educational purposes, as they carried out research on a sample playing educational games is an important learning strategy in realizing educational aims at all levels and with children of different ages (Cameron & Dwyer, 2005).

Kamasheva et al. (2015) games have a fantastic ability to hold people's attention for a long time, build a relationship, win recognition and develop creativity. Games can be considered a sample of motivation and learning of the students, so now we are trying to apply these techniques to the grade four students through games; it can also develop the collaboration of individuals and brain storming the ideas of the students in terms of their motivation

METHOD

The researchers utilized a quantitative research design employing an experimental method. Piaw (2006) cited that experimental research is considered as good research design and is done to test the hypothesis. The design was utilized since the researchers want to measure the effect of educational games on the level of motivation of science grade four students. The study was conducted at Angel Villarica Central Elementary School (AVCES). The distribution of respondents was according to class section, which were categorized into experimental and control groups. There are seventy-three (73) Grade IV students of AVCES who are involved in the study and officially enrolled in the Science subject. There are thirty-seven (37) students in the experimental group and thirty-six (36) students in the control group. Both groups were given a pre-test and a post-test.

The instrument that was used in data gathering processes in this study was an adapted survey questionnaire from the study of Albalate, et al. (2018), entitled "Students' Motivation towards Science Learning (SMTSL) of STEM Students of University of Batangas, Lipa City." This questionnaire was used to measure the level of motivation of the students before and after the conduct of the study. The research instrument has submitted first to the adviser, panel adviser and panel examiners for correction and validation. The statistical tools used in this study were the Average Weighted Mean and t-test for Independent Samples. Below is the table showing the parameter of limits used to interpret the students' level of motivation:

Table 1. Parameter of Limits

Scale	Descriptive Equivalent	Interpretation
4.20-5.00	Very High	The respondents strongly agree with the statements which manifest an extremely high level of motivation.
3.40-4.19	High	The respondents agree with the statements which manifest a high level of motivation.
2.60-3.39	Moderate	The respondents have no opinion about the statements which manifest a moderate level motivation.
1.80-2.59	Low	The respondents disagree with the statements which manifest a low level of motivation.
1.00-1.79	Very Low	The respondents strongly disagree with the statements which manifest an extremely low level of motivation.

RESULT AND DISCUSSION

Pre-test Mean Scores of the Experimental and Control Groups

Shown in Tables 2 and 3 are the pre-test mean score of the experimental and control group. Having 37 respondents in the experimental group, the pre- test mean score is 3.08, while the control group with 36 respondents acquired the pre-test mean score of 3.17. The mean scores have the descriptive equivalence

of moderate to both experimental and control group which suggests that the respondents have no opinion about the statements.

It was supported by the findings of Gambari, et al. (2016) in their study which investigated the influence of educational games towards promoting intrinsic and extrinsic motivation as well as learners' achievements when learning chemistry. Results show that there was no statistically significant difference between the performance of the two experimental and control group in the pretest, implying that the groups were similar and have low motivation since the discussion is not yet delivered.

Table 2. Pretest Mean Scores of the Experimental Group

Indicators	Experimental Group N = 37	Descriptive Equivalent
Self-Efficacy	2.81	Moderate
Active Learning Strategies	3.01	Moderate
Science Learning Value	3.16	Moderate
Performance Goal	3.16	Moderate
Achievement Goal	3.26	Moderate
Learning Environment Stimulation	3.09	Moderate
Overall	3.08	Moderate

Table 3. Pretest Mean Scores of the Control Group

Indicators	Control Group N = 36	Descriptive Equivalent
Self-Efficacy	3.21	Moderate
Active Learning Strategies	3.15	Moderate
Science Learning Value	3.27	Moderate
Performance Goal	2.83	Moderate
Achievement Goal	3.15	Moderate
Learning Environment Stimulation	3.42	High
Overall	3.17	Moderate

Posttest Mean Scores of the Experimental and Control Groups

The post-test mean score of the experimental group which educational games is applied in the class in learning science and control group with traditional teaching was applied is shown below in Table 4 and 5, respectively. The post-test mean score of the experimental group is 3.60 with a descriptive equivalent of high. This reveals that in the experimental group there is a minimal difference from the result of the pretest compared to the post- test means score from 3.08 to 3.60. The posttest descriptive equivalence of the controlled group is 3.49 which mean high; though the result is high the statistical result shows that the experimental group improves higher than the control group.

The difference in the mean score of the pretest and posttest implies that the performances of the respondent increase when the educational games are utilized inside the classroom in learning science. This illustrates that educational games could be one of the effective techniques in improving the learners' motivation regarding teaching science. According to Martens, Gulikers & Bastiaens (2004) learners in a game learning environment and traditional approach have both increased motivations. Based on their study entitled "Game-based Learning in the Social Studies Classroom" the responses from the motivational survey did not statistically indicate that the students in the experimental group were more motivated compared to the control group. The means from the data indicated that the experimental group and control group is both at the same level. The study's results determined that the students in both groups increased their achievement and motivation from the posttest.

Table 4. Posttest Mean Scores of the Experimental Group

Indicators	Experimental Group N = 37	Descriptive Equivalent
Self-Efficacy	3.26	Moderate
Active Learning Strategies	3.56	High
Science Learning Value	3.76	High
Performance Goal	3.67	High
Achievement Goal	3.65	High
Learning Environment Stimulation	3.68	High
Overall	3.60	High

Table 5. Posttest Mean Scores of the Control Group

Indicators	Control Group N = 36	Descriptive Equivalent
Self-Efficacy	3.35	Moderate
Active Learning Strategies	3.42	High
Science Learning Value	3.63	High
Performance Goal	3.45	High
Achievement Goal	3.59	High
Learning Environment Stimulation	3.51	High
Overall	3.49	High

Significance of the Difference in the Pretest Mean Scores of the Experimental and the Control Groups

Table 6 shows the difference between the mean scores of the experimental and control group to identify if there is any significant difference. The table displays an overall computed t-value of .47 with a p-value of .64 which is greater than the 0.05 degree of significance; thus, the hypothesis is accepted. This implies that there is no significant difference from the experimental group who were exposed to educational games and the students in the control group who were exposed to the traditional approach. The table presents the overall computed mean score of 3.08 for the experimental group while the mean gain score of the control group is 3.17. The computed t-value was .47 with a p-value of .64. The overall result was greater than 0.05 degree of significance; thus, the null hypothesis is accepted.

This entails that the Grade IV students from the experimental group and control group in Angel Villarica Central Elementary School shows a moderate level of learning motivation during the pre-test. Akpinar, Volkan & Simsek (2007) in their study entitled "The Effect of Game- based Learning on the Student Achievement, Motivation and Persistence in Mathematics Teaching" results that there is no significant difference when the average result pretest score of the students in the experimental group, who are exposed to educational games, is compared to average pretest score of the students in control group, who are taught without educational games. According to this result, it is seen that the behaviors of the student in both experimental and control group are very similar and two groups are equal to each other before the experimental group process.

Table 6. Significance of the Difference in the Pretest Mean Scores of the Experimental and the Control Groups

Indicators	Pretest Mean Scores		t-value	p-value
	Experimental	Control		
Self-Efficacy	2.81	3.21	1.78	0.08
Active Learning Strategies	3.01	3.15	0.62	0.54
Science Learning Value	3.16	3.27	0.43	0.67
Performance Goal	3.16	2.83	1.49	0.14
Achievement Goal	3.26	3.15	0.46	0.65
Learning Environment Stimulation	3.09	3.42	1.46	0.15
Overall	3.08	3.17	0.47	0.64

**Significant at .05 level of significance*

Significance of the Difference in the Pretest and the Posttest Mean Scores of the Control Group

The Table 7 shows the significance of the difference in the pre-test and posttest mean score of the control group that gains a mean score of 3.17 of the pre-test and the posttest result gain a mean score of 3.49 with a p-value of .03. This shows that the hypothesis is rejected and implies that there is a significant difference in the pre-test and post- test means scores in the control group. We can simply conclude that even the students were not exposed to educational games still their motivation is high. The traditional method improved the level of motivation of the students from moderate to high.

Ke & Grabowski (2007) compared the pretest and post test result of two groups of students when examined the motivation of the students. The first group was using games inside the classroom (experimental). The second group participated in traditional discussion and paper/pencil review sessions and did not play the games at all (control). Results showed that there "was no significance for game performance and the control performed significantly higher than the experimental group.

Table 7. Significance of the Difference in the Pretest and the Posttest Mean Scores of the Control Group

Indicators	Mean Scores of the Control Group		t-value	p-value
	Pretest	Posttest		
Self-Efficacy	3.21	3.35	0.72	0.48
Active Learning Strategies	3.15	3.42	1.53	0.13
Science Learning Value	3.27	3.63	1.65	0.10
Performance Goal	2.83	3.45	3.68	0.00*
Achievement Goal	3.15	3.59	2.22	0.03*
Learning Environment Stimulation	3.42	3.51	0.48	0.63
Overall	3.17	3.49	2.28	0.03*

**Significant at .05 level of significance*

Significance of the Difference in the Pretest and the Posttest Mean Scores of the Experimental Group

The Table 8, shows the significant of the difference in the pre-test and posttest in experimental groups. The pre-test gains the mean score of 3.08 and the post-test gain the mean score of 3.08 with a p-value of .02. This implies that the hypothesis is rejected. This means that there is a significant difference in pre-test and posttest mean score in the experimental group. This outcome is upheld by Blunt (2007), who underpins the possibility that effective educational games contain guidelines, objectives or goals, challenge, and particularly commitment, which results from an expansion in motivation, prompting an expansion in learning and generally scholastic accomplishment.

Dewey (2011) supported the utilization of play in teaching to make going to class progressively agreeable and the learning less demanding. He additionally added that students need to connect and encounter their surroundings with the goal for them to adapt effectively. Dewey (2011) invading the educational modules with play to accomplish positive scholarly and moral development of the understudy, and he pushed that the more the movement approximates everyday experience the more genuine the learning that will be gained in the experience. The play takes into consideration games, which is a recovery of energy as the name suggests. In any case, the play isn't just for games; however, work that is loaded up with play results in an agreeable movement that advances intrinsic motivation.

Table 8. Significance of the Difference in the Pretest and the Posttest Mean Scores of the Experimental Group

Indicators	Mean Scores of Experimental Group		t-test	p-value
	Pretest	Posttest		
Self-Efficacy	2.81	3.26	1.99	0.05*
Active Learning Strategies	3.01	3.56	2.38	0.02*
Science Learning Value	3.16	3.76	2.23	0.03*
Performance Goal	3.16	3.67	2.16	0.04*
Achievement Goal	3.26	3.65	1.58	0.12
Learning Environment Stimulation	3.09	3.68	2.35	0.02*
Overall	3.08	3.08	2.48	0.02*

**Significant at .05 level of significance*

Significance of the Difference between the Mean Gain Scores of the Experimental and the Control Groups

Table 9, shows the result of the mean gain score of the experimental and controlled group, with the (43) respondents in the experimental group and (36) respondents in controlled group. The main gain score of the experimental group is .51, and the controlled group is .32 with a p-value of .38. Which means the null hypothesis is accepted. Therefore, there is no significant difference between the mean gain score of the experimental and controlled groups. Both experimental and controlled groups have the remarks of a not significant result. This result shows that using educational games is not enough to increase the level of motivation of Grade IV students.

As suggested by Hays (2005), who conducted a comprehensive literature review of the advantages and limitations of Game-based learning, the benefits brought by educational games may need only in specific situations, and games are not always the preferred mode strategy in all cases. Hays (2005) found

that educational games are more effective when they are integrated with the instructional discussion that include debriefing and feedback, and that instructional support during play may increase the effectiveness of Game-Based Learning. Games should be used as a supplement, not just a standalone strategy and combine with applicable pedagogies (Hays, 2005; Shaffer & Gee, 2006).

Table 9. Significance of the Difference between the Mean Gain Scores of the Experimental and Control Group

Indicators	Mean Gain Scores		t-value	p-value
	Experimental	Control		
Self-Efficacy	0.45	0.14	1.06	0.29
Active Learning Strategies	0.55	0.26	1.21	0.23
Science Learning Value	0.60	0.36	0.76	0.45
Performance Goal	0.50	0.44	0.22	0.83
Achievement Goal	0.39	0.44	0.17	0.86
Learning Environment Stimulation	0.59	0.09	1.74	0.09
Overall	0.51	0.32	0.87	0.38

**Significant at .05 level of significance*

CONCLUSION

Based on the pretest results, the Grade 4 students' both in experimental and control group, in terms of self-efficacy; active learning strategies; science learning value; performance goal; achievement goal; achievement goal; and learning environment stimulation have a descriptive equivalent of moderate which indicates that the respondents have no opinion about the statements manifesting a moderate level of motivation. Based on the posttest results, the Grade 4 students' both in experimental and control group, in terms of self-efficacy; active learning strategies; science learning value; performance goal; achievement goal; achievement goal; and learning environment stimulation have a descriptive equivalent of high which indicates that the agree with the statements manifesting a high level of motivation. There is no significant difference in the pretest mean scores of the experimental and control groups. Both groups have the same level of motivation in science. There is a significant difference in the pretest and posttest mean scores of the control group. The control group has increased their level of motivation in science learning using the traditional method of teaching. There is a significant difference in the pretest and posttest mean scores of the experimental group. The experimental group has increased their level of motivation in science learning utilizing educational games in teaching Science. There is no significant difference between the mean gain scores of the experimental group and control group. It signifies that the use of education games has no significant effect in the level of motivation of Science in Grade IV students. However, educational games can be considered as an alternative method in delivering the Science lesson.

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