FWU Journal of Social Sciences, Fall 2021, Vol.15, No.3, 82-95
DOI: *http://doi.org/10.51709/19951272/Fall-2021/5*

Effect of Activity-Based Games on Students' Academic Achievement in Social Sciences

Nazma Bibi
Government Degree College Kot Khawaja Saeed, Lahore

The purpose of the research was to investigate the effect of activity-based games on the academic achievement of graduate-level pupils in social sciences. An experimental research design with a pre-and post-test control group was used in this study. As pre-test and post-test, MCQ achievement tests containing 70 items were used as research methods for data collecting. The initial stage in this initiative was to collect data on what inspires children to learn. Both groups took a pre-test, and the results were tallied. The project's second phase was to study the effects of various activities on academic achievement. Both groups were given an MCQ performance test. The T-test was used to analyze the data. The findings of this study demonstrated that, compared to the control group, most pupils' marks improved in the experimental group. The mean value showed that experimental group participants scored 18.77 on the post-test, while control group students scored 16.21. According to a post-lesson poll, most students regarded activity-based games to be more engaging than lecture-based instruction.

***Keywords*:** activity-based games, social sciences, experimental group, the control group

Among the most significant difficulties confronting educators worldwide is determining how to certify good, enthusiastic learners who are ready for a job. As a result, instructors must seek out the most effective techniques for engaging students in classroom active learning. Active learning is possible if teachers will emphasize comprehension of the supplied knowledge and problem-solving and critical thinking skills (Younis, 2018).

There are two methods of learning in the classroom, i.e., active or passive learning. In the classroom, passive learning is the result of the traditional lecture method. Teachers use creativity and critical activity to teach knowledge,

Correspondence concerning this article should be addressed to Dr. Nazma Bibi, Assistant Professor, Government Degree College Kot Khawaja Saeed, Lahore, Email:nazma.bibi@ymail.com

skills, habits, and values. Teachers use Activity-based games (ABG) as an alternative to traditional lecture methods in schools and colleges. Students' engagement and motivation, which affect their achievement, can be improved using activity-based games in lectures. Games have a considerable positive impact on learning, with improvements in cognition, psychological, affective, and social dimensions (Granic, Lobel, Rutger, & Engles, 2014). Learning sciences, particularly constructivist learning settings, in which learners attempt to use existing beliefs to generate new knowledge, are associated with games (Gerace, Dufresne, & Leonard, 1999).

Research on activity-based games (now onwards; ABG) has become popular since 2006(Tsai & Fan, 2013). Games are an effective instrument to teach students so that they can learn well in the classroom (Tobar-Muñoz, Baldiris, & Fabregat, 2017). Games are supportive of broadening pupils' creativity and developing the problem-solving ability of learners. All this is done in an environment where achievement and failure are acknowledged within the framework. (Whitton, 2012). GBL is where "specific problem scenarios are placed within a play context" (Tsai & Fan, 2013, p. 115), even though it has been primarily shown through the prism of the computer game. In an educational context, research proved that games are implemented in education through three methods. In the first approach, the students will be the developer, which means that the study of the content and problem-solving abilities to develop a video game. The second approach, commonly known as the gamification design process, is about identifying, extracting, and applying particular game features or limited, meaningful groupings of those elements (Landers, 2014). The most widely studied approach is third that the researchers or a commercial game developed the integration. The game supports, provides, and evaluates the learning process (Nadolny & Halabi, 2016). But, the concern of this research is the use of ABG (activity-based games) in education. In ABG, The teacher pretends to be a game developer. It is not just the design of the whole structure of the game, but the game provides, in the context of education in the society. This is different from gamification, where only a single or combination of games are specific to the element to which the broader context of the game (Landers, 2014).

Researchers have proved that learning through ABG has benefits over conventional teaching strategies. In a traditional classroom, pupils assume that their success is contingent on the failure of their classmates. Games help to create an excellent learning environment. The contact that occurs throughout group work and the debate and description of the topic all contribute to a deeper understanding of the content. Interactive activities and games are effective teaching tools. Participating in an activity raises a student's activity level to the point where they are more attentive and aware of the class's activities.

Participating in an activity increases a student's activity level, causing them to become more alert and aware of the class's activities. Students who participate in an activity are thinking about and implementing the learning material. Students are asked to apply ideas independently in the lecture approach (Bhalli, Sattar, & Asif, 2016).

Games are not only suitable for science subjects but are also important for social sciences. This approach allows students to use and develop their creativity, engage in relevant contexts to improve their problem-solving skills, even while studying in a secure setting where errors and failures are involved in learning (Whitton, 2012). In Psychological context, Khan, Kazmi, and Maroof (2019) concluded that 3D- games are helpful in reducing depression. Several studies have examined the impact of games on student learning. However, one significant study by Hake (1998) looked at student accomplishment in basic physics classes using active engagement and lecturing techniques. In the sciences and business, games are employed as a teaching technique(Kumar & Lightner, 2007).

The current research considers Vygotsky's task and constructivist contexts. As they work through progressively complex issues, students maintain a satisfactory level of performance. There has been no significant research into the impact of ABG on pupil achievement in the humanities. The social sciences, particularly the theoretical subjects, are deprived of activity-based teaching. One of these subjects is "education," which is offered as an elective subject at graduation level. The present study examined the effect of activity-based games on students' achievement at the graduation level in social sciences.

Rationale

In general, traditional teaching methods are used to accomplish the majority of classroom instruction. In the classes, the students stay quiet in rows, the teacher speaks most of the time in the classroom, and the students passively listen to the trainer. They only speak when approached and do exactly what is asked of them. In a classroom setting, most students' learning abilities are limited to copying what is written on the board. They are unable to handle facts through thought, evaluation, and exploration efficiently. Learners lose interest in learning as a result of their limited intellectual capabilities. The concept of activity-based games is built on the idea that students should participate in activities. A teacher teaches through activities during activity-based education, allowing pupils to intervene in their learning. It's the process of effectively including the child in rational and interest-taking games. Activity-based learning is a meaningful classroom learning environment in which pupils contribute dynamically to co-

creating ideas. Controlling physical materials, playing games, or participating in physical object experiments are examples of this approach.

In Pakistan, traditional methods of teaching education or social sciences are still used in many educational institutions. Except for the whiteboard, instructors use activity or AV aids in this technique. Students dislike this method, but social sciences/ education teaching can be made more successful by incorporating activities. With this in mind, the researcher set out to "determine the effects of activity-based games on the academic achievement of graduate-level students in the education subject."

The outcomes of related research showed that the ABG strategy significantly impacts students' achievement and attitudes toward activity-based learning. Previously, many research studies were conducted in mathematics, computer sciences, and physics, but no significant research has been done in the area of social sciences. Yet, little research has looked into the impact of this learning strategy on students' achievement levels and perceptions of activities. As a result, there is a need for more research on this topic. This study is significant in that it fills a gap in the literature. According to the linked literature evaluated, no one has looked into students' attitudes on participating in science activities that are thought to improve students' grades in science classes. The findings of the study will help in the analysis of data collected in related surveys. Making the study results available to stakeholders to implement the proposal will help to improve learning quality and promote awareness about achieving long-term learning goals.

Literature Review

The development of the body, mind, and spirit is referred to as education. As a result, the mind without activities cannot fully develop the personality. Activity-based learning is the task that is presented in the classroom (Prince, 2004). Activity-based learning engages the students to carry out the tasks and think about what they are doing (Bonwell & Eison, 1991).Learners can benefit from activity-based learning because it acts as a problem solver. It enhances the unique aspect of the experience and provides a realistic learning environment. It provides learners with various encounters to promote the acquisition of knowledge, experience, abilities, and traits (Noreen & Rana, 2019).

The foundation for improving creative and critical thinking skills is activity-based games. This strategy, however, will not work if students are not sufficiently motivated to reach their full potential. Engaging students in active learning, which is also the core of ABG, is the most 9valuable and successful way to teach complex subjects (Anwer 2019).The extensive usage of games in

young people's social lives has piqued educators' interest in creating and researching game-based learning (GBL) systems (Ebner, & Holzinger, 2007). Teachers are looking for ways to incorporate games and game patterns within formal educational contexts. Yet, there is a scarcity of information about how to create games in formal education (An & Bonk, 2009). College pupils frequently engage in game-based learning. Academic achievement as a result of activity has been researched extensively. The purpose of this study was to see how successful Game-Based Learnings are at motivating college students to achieve academic success.

In this study, ABG-like fishbowl, think-pair-share, and quizzes are used to teach the experimental group. TPS (Think-Pair-Share) activity is a participatory, learner-centered technique in which students work independently (Think), then in pairs (Pair) or groups (Group), and lastly with the entire class (Share) on a problem set by the instructor (Banerjee, Patwardhan, & Mavinkurve, 2013). After the think pair share activity, students participated in quizzes related to the topic, which were taught through TPS activity. Fishbowl games were also conducted in the classroom related to the topics. TPS activity has some benefits which lead to creative thinking. Some benefits are: The quality of pupils' responses improves when they are given adequate "think time." Students are actively involved in the process of thinking. When thinking is discussed with a partner, it gets more concentrated. Another game is a fishbowl game. Fishbowl is a fun, student-centered technique for improving understanding while also practicing discussion capabilities. Students in the close sanctum, or "fishbowl," hold a text-based debate and practice response to diverse points of view, while students in the outer circle learn to take notes (Anistantia, Sudirman, &Huzairin, 2017). Moreover, to see the effect of fishbowl games in the speaking ability of pupils, Anistantia et al., (2017) found that "there was a statistically significant difference of the students' speaking ability before and after the implementation of fishbowl technique with the significant level $p < .005$ ($p = .000$)" (p. 1).

The literature review provides various findings on the effects of activity-based games on learners' school progress and attitudes toward the subject it is being used. Birgin, Baloglu, Catlioglu, and Gurbuz (2010) examined the impact of conventional and activity-based learning on students' success in mathematics subjects. According to the findings, activity-based learning improves the teaching of theoretical topics. This method of learning not only made learning fun but also made it personal. Another study found that learning through games significantly enhances learners' achievement in all the areas, and it is suited to be utilized in all types of programs (Karakoç, Eryılmaz, TuranÖzpolat, & Yıldırım, 2020). Furthermore, Alasi (2018) examined the effect of activity-based learning

practices on second-grade pupils' marks. Pupils were better able to comprehend the relations between data sets and thoughts as a result of the activities.

Through the use of activities, students describe the connections that result from the issues presented in the activities in an appropriate and timely manner. When compared to traditional instruction, activity-based teaching boosted students' achievement in a separate study of students (Kupcu 2012). Celik (2018) studied the impacts of activity-based teaching on sixth-grade kids' mathematical attitudes and achievement toward learning activities compared to traditional learning strategies. He discovered that both the control and experimental groups improved their school achievement. To encourage innovative teaching and learning practices, the role of leadership is critical. David and Abukari (2019) looked at the role of leadership in assisting teachers in delivering innovative teaching and learning approaches. Staff engagement is critical for good teaching (Al Samkari & David, 2019). According to Al Husseini & David (2017), instructional leadership is critical in fostering new instructional approaches. Technology integration is critical for vibrant teaching and learning practices (Daraghmeh & David, 2017).

The majority of game-based learning studies have found that using games as a learning environment boosts both student interest and learning (Hidi, 2000). In Pakistan, Noreen and Rana (2019) examined "activity-based learning vs. traditional teaching methods in Mathematics. "It was revealed that pupils who were taught using an activity-based approach performed higher in the post-test. It is suggested mathematics be learned through activities at the elementary stage. Teachers of mathematics may be given kit materials for activities.

Moreover, in public schools of Oman, Albadi, and David (2019) conducted a study and concluded that students' achievement improved as a result of activity-based learning. Students feel AB Gup surges comprehension, builds responsibility, creates a pleasant learning atmosphere, and boosts achievement. As a result, the study concludes that activity-based learning (ABL) has a considerable impact on student's academic success.

In Pakistan, educators must recognize the value of ABG since it allows for a better grasp of topics. Many underdeveloped countries, like Pakistan, require significant educational assistance due to a lack of basic teaching strategies. Teacher training will increase the amount of information available to students (Anwer, 2019).If teachers are provided training, they will be more equipped to incorporate progress on an individual and societal level. As a result, it will help teachers and students improve their motivational qualities as well as their critical thinking abilities and creativity. Activity-based learning combined

with peer education produces an optimal scenario for teaching science disciplines, particularly physics. Students participate in practical work and have the opportunity to connect abstract ideas and theories to actual observations in an activity-based learning session(Hussain, Anwar, & Majoka, 2011).According to Singal et al., (2018), ABG strives to provide rigorous active learning, focused learning, and changes will happen. Students benefit from activity-based instruction because it supports and connects them to their peers, increasing strength and enthusiasm.

Moreover, in New Zeeland, Harfield, Davies, Hede, Panko, and Kenley (2007) led research regarding activity-based teaching. They found that teachers' opinion on pupil commitment in the classroom and terms of end assessment was positive. Furthermore, the connection between activities-based teaching and student learning was demonstrated by a significant enhancement in marks compared to the preceding class.

Games had a favorable influence on academic achievement in general. They found significant differences in their investigation comparing survey and experimental studies on educational games in Turkey to reach some similar conclusions (Cop & Kablan, 2018). Nadolnyand Halabi (2016)stated that in university education, the use of game-based learning methodologies has looked promising to increase students' achievement. The impact of a big lecture course developed with game-based learning on sharing and achievement was investigated in their study. Findings revealed that learners in a big course using game-based learning showed high involvement and tenacity in achieving prerequisites. Furthermore, results had no strong relation with age, gender, learning style,which contradicted previous studies on game-based learning.

Objectives of the Study:

To determine the effectiveness of activity-based games on students' achievement in education at graduation level.

Delimitation

The major delimitation of the research is that pupils of one college were selected to participate in the experiment.

Hypotheses:

H_o: There is no significant difference in student's achievement after familiarizing ABG (activity-based games) in the education subject at graduation level.

H_1: There is a significant difference in student's achievement after introducing to the education subjectat graduation level.

Activity-based games: Quizzes, pair-share, fishbowl game

Method

The study's research approach was experimental, so we used a pre-and post-testing methodology. Pretest-posttest designs are the most common way to assess how much change has occurred as a result of interventions. The present study wasplanned to determine the effect of a variable. The following is a description of the design:

Treatment/Experimental group	O Observation before experiment	X Treatment	O Observation after experiment
Control group	O Observation before experiment	No treatment/ usual routine class	O Observation after experiment

Figure 1: Pretest-posttest control group design, Source: (Gay, 1996)

Because of the study hypotheses, this design was chosen. There is only one group in this study: the treatment group (30 students). There are numerous flaws in the pre-and post-test design. Internal validity is threatened by a variety of factors, including "maturation, history, instrumentation, and pre-testing" (Campbell & Stanley, 1963). When the intact group is employed rather than random selection, such problems usually arise. As for as the threat of maturity is concerned; three weeks is not long enough to generate maturity (Gul, 2012).

Variables

The teaching style (activity-based games versus traditional lecture approach) was the independent variable in this research, and the achievement scores of pupils in education subject was the dependent variable.

Population and Sample

All-female graduate pupils enrolled in an education subject at a public college in Lahore Cantt made up the study's population. The study's sample included 62 students who were studying education at graduation level. The sample consisted of 30 pupils in the experimental group and 32 pupils in the control group. In experimental studies, at least 30 people in one group are enough to led experiment (Frankle & Wallen, 2012). Furthermore, the research was carried out at a public college in Lahore Cantt. The researcher choose that public college because that college was located in Lahore Canttnear by her job place. So, it was convenient for researcher to conduct experiment in that specific public college.

Instrument

There is no standard test for the education subject at the graduation level; thus, the researcher created a test to assess the sample's academic achievement following the experiment. There were 70 multiple-choice questions in the test. Two chapters were included in the test's material. The reason for selecting only two chapters was that these two chapters are challenging for students to learn. We experimented during the session, so the researcher couldn't include those chapters that the students had not studied at that time. With the help of qualified instructors and examiners in the education field, the tool's content was validated. The tool was pre-tested on college students who were not involved in the research. The instrument's Kuder-Richardson coefficient of internal consistency was 0.84. Lastly, 50 items for the post-test were chosen based on expert opinion and item analysis.

Procedure

First, a pre-test was conducted in the class of grade 12, which consists of 70 MCQs. The students had studied these two chapters through the traditional teaching method. The pre-test helped evaluate students' prior knowledge of these two chapters. Then, the content was taught to the students of graduation level through multiple activities and quizzes. Seven days were required for conducting these activities. The duration of one period was 45 minutes. Seven activities were designed for a better understanding of students. The purpose of each activity was to evaluate the individual and group performance of students. After ninety days post-test was held in the class to assess the effect of activities on the student's achievement. The experimental group was taught the material through a variety of activities and puzzles. Seven exercises were created to give them cooperative learning opportunities. Following each activity, a quiz was given to evaluate group and individual performance.

Results

An independent sample t-test was used on the pre-test to determine the mean difference between the achievement scores of the control and treatment groups. There is no significant difference between the two groups (p=.813), according to Table 1. It signifies that both groups were performing at the same level before the intervention.

Table 1

Interdependent sample t-test for a pre-test of pupils' achievement,

Variable	N	mean	df	t-value	Sig.
Experimental group	30	13.17	63	.175	.813
Control group	32	13.08			

Table 1 displayed the mean achievement score difference between the experimental and control groups during the pre-test. The experimental (M= 13.17, SD = 4.381) and control groups' achievement scores (M= 13.08, SD = 4.752; t(62) =.175, p=.813) were not significantly different (two tailed).

On the achievement scores of both groups' post-tests, the same statistics were used. Table 2 revealed that the value of p=.010 is significant at the level of 0.05. This means that the control and experimental groups' post-test scores were significantly different. This shows that pupils who were taught using group work methodologies scored higher than those who were taught using the traditional approach.

Table 2

Independent Sample T-Test for Post-Test of Students' Achievement

Variable	N	mean	df	t-value	Sig.
Experimental group	30	18.77	60	2.770	.010
Control group	32	16.21			

$^{*}p<0.05$

In the post-test, the mean difference in achievement scores between the experimental and control groups is shown in the table. The table indicated that there was a significant difference in achievement scores between the experimental (M= 18.77, SD = 3.372) and control groups (M= 16.21, SD = 3.187; t (62) = 2.770, p=.010.

A paired sample t-test was used to compare the effect of the intervention on the experimental group's achievement results. At the level of 0.05, the value of p=.000 is significant, as seen in Table 3. This result demonstrates that the experimental group's achievement scores before and after the intervention were significantly different.

Table 3

Paired sample t-test for pre-test and post-test

		Mean difference	SD	t	Sig. 2-tailed
Pair1	Pretest-posttest	-4.300	1.84	-11.782	.001

$^{**}p<0.01$

A paired sample t-test was performed to compare the effect of the intervention on the achievement scores of the treatment group. The pretest ((M=

13.17, SD = 4.381) and post-test (M= 18.77, SD = 3.372) achievement scores were significantly different, t (62) = -11.782, p=.001, as shown in the table.

After data analysis the H_1 is accepted that there is a significant difference in student's achievement after introducing to the education subject at graduation level.

Discussion

The findings of this descriptive correlational research are covered in this section. This research is designed to see the effect of ABG on student's achievement. In contrast to the control group, the experimental group scored higher on the post-test, as depicted in table 2. However, the results revealed that the experimental group improved following the intervention, with a significant difference between the treatment group's achievement scores in the pre-test and post-test, as shown in table 3.These findings confirmed prior studies (Albadi& David, 2019; Anwer, 2019; Celik, 2018; Harfield et al., 2007; Hussain et al., 2011; Nadolny & Halabi, 2016; Kupcu, 2012; Noreen & Rana, 2019; Singal et al., 2018). These studies have found that ABG or activity-based learning has a significant effect on learners' academic achievement. Based on these findings, it can be stated that activity-based games have a good impact on student's academic progress at the higher secondary level. It is also clear that it is more effective than the traditional way in terms of developing active participation, cooperation, and sharing abilities.

Conclusion

It is a fact that well-developed and implemented educational games may make learning entertaining and easy while also contributing to students' emotional, intellectual, sensorimotor, and emotional intelligence. As a result, children are engaged both mentally and practically during the game, so they're not simply spectators but also participants. So, it is decided that in theoretical subjects, pupils do not take much interest in lectures. Pupils take active part in those classes in which teacher teaches through activities and games. Furthermore, critical thinking may be created in students through different games. This study looked at game-based learning environments in the context of experimental and control group pre-test-post-test outcomes. A total of 62 students took part in this experimental study, with 30 students in the experimental group and 32 in the control group. The present research concluded that ABG has a vital impact on pupils' achievement in social sciences.

Recommendations

It is essential to organize classes utilizing activity-based education to promote thinking skills. Educational institutions may also undertake teacher training programs on teaching through games to improve teachers' teaching abilities. At the right time, relevant activities can be used. Teachers may organize activities based on the topic at the start of the academic session. Social sciences teachers may be offered refresher courses and workshops regularly to keep their skills up to date. It would be beneficial for new teachers to update their abilities. Future research in all fields and at various levels may be done to validate the findings of this study.

References

Alasi, W. (2018). The effectiveness of teaching using active learning strategies on second-grade students' acquisition of national and life knowledge. *IUG Journal of Educational and Psychology Science, 27*(1), 135-151.

Albadi, A.,& David, S. A. (2019). The Impact of Activity Based Learning on Students' Motivation and Academic Achievement: A study among 12th Grade Science and Environment Students in A Public School in Oman. *Specialty Journal of Knowledge Management, 4*(4), 44-53.

Al Samkari, H., & David, S.A., (2019). The role and impacts of authentic leadership on staff engagement and performance: A study among school leaders and teachers in private schools in the UAE. *Specialty Journal of Psychology and Management, 5*(4), 65-78.

An, Y., & Bonk, C. J. (2009). Finding-that-SPECIAL-PLACE-Designing-digital-game-based-learning environments. *Tech Trends, 53*(3), 43-48.

Anistantia, U., Sudirman, &Huzairin (2017). The implementation of the fishbowl technique to improve students' speaking ability at second grade of SMP N 2 JATI Agung South Lampung. *UNILA Journal of English Teaching, 6*(6), 1-8.

Anwer, F. (2019). Activity-Based Teaching, Student Motivation, and Academic Achievement. *Journal of Education and Educational Development, 6* (1), 154-170.

Banerjee, G., Patwardhan, M., &Mavinkurve, M. K. (2013). Teaching with visualizations in a classroom setting: Mapping Instructional Strategies to Instructional Objectives, *IEEE Fifth International Conference on Technology for Education*.

Bonwell, C., &Eison, J. (1991). *Active learning: creating excitement in the classroom. Washington D.C.: School of Education and Human Development.* The George Washington University.

Bhalli, M., Sattar, A., & Asif, M. (2016). Teaching strategies; perception of medical students used in basic science year. *The Professional Medical Journal, 23*(5), 614-619.

Birgin, O., Baloglu, M., Catlioglu, H. &Gurbuz, R. (2010). An investigation of mathematics anxiety among sixth through eighth-grade students in Turkey. *Learning and Individual Differences, 20*(6), 654- 658.

Campbell, D. B., & Stanley, C. J. (1963). *Experimental and quasi-experimental design for research.* Houghton Mifflin Company.

Celik, H. (2018). The effects of activity-based learning on sixth-grade students' achievement and attitudes towards mathematics activities. *Eurasia Journal of Mathematics, Science and Technology Education, 14(*5), 1963-1977.

Cop, M. R., &Kablan, Z. (2018). The analysis of studies on educational games in Turkey. Kocaeli University, *Journal of Education, 1*(1), 52–71.

Daraghmeh, H. A. R., & David, S. A. (2017). Benchmarking of Educational Leaders' Technology Utilization: A study of the attitudes of education leaders in using technology in the UAE. *Education Research Journal, 7*(3), 48-58.

David, S.A., &Abukari, A. (2019). Perspectives of teachers on the selection and the development of the school leaders in the United Arab Emirates. *International Journal of Educational Management. 34*(1), 56-69.

Ebner, M., &Holzinger, A. (2007). Successful implementation of user-centered game-based learning in higher education: An example from civil engineering. Computers & Education, 49(3), 873–890. doi:10.1016/j.compedu.2005.11.026

Frankle, J. R., &Wallen, N. E. (2012). *How to design and evaluate research in education* (8th ed.). McGraw Hill.

Gay, L. R. (1996). *Educational research; competencies for analysis and application* (5thed). Prentice-Hall.

Gerace, W. J., Dufresne, R. J., & Leonard, W. J. (1999). *Using technology to implement active learning in large classes.* Amherst, MA: University of Massachusetts Physics Education Research Group.

Granic, I., Lobel, A., Rutger, C., &Engles, M. E. (2014). The benefits of playing video games. *American Psychologist, 69*(1), 66-78.

Gul, F. (2012). *The Effects of Cooperative Learning STAD Model on Students' Achievement.* Published in proceedings, IER, University of the Punjab, Lahore.

Harfield, T., Davies, K., Hede, J., Panko, M. & Kenley, R. (2007). Activity-based teaching for UNITEC New Zealand Construction students. Emirates Journal for Engineering Research, *12*(1), 57-63.

Hidi, S. (2000). An interest researcher's perspective: The effects of extrinsic and intrinsic factors on motivation. In C. Sansone, & J. M. Harackiewicz (Eds.). *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp. 373–404). San Diego, CA: Academic Press.

Hussain, S., Anwar, S., &Majoka, M. I. (2011). Effect of peer group activity-based learning on students' academic achievement in physics at the secondary level. *International Journal of Academic Research, 3*(1), 940-944.

Karakoç, B., Eryılmaz, K., TuranÖzpolat, E. &Yıldırım, I. (2020). The Effect of Game-Based Learning on Student Achievement: *A Meta-Analysis Study. Technology, Knowledge and Learning*, 1-16.

Khan, S., Kazmi, F., &Maroof, R. Y. (2019). Therapeutic outcomes of 3D- GIT game among depressive cancer patients. *FWU Journal of Social Sciences, 13*(3), 57-64.

Kupcu, A. R. (2012). The effects of activity-based teaching approach on the proportion related problem-solving success of middle school students. *Journal of Kırşehir Education Faculty, 13*(3), 175-206.

Kumar, R. &Lightner, R. (2007). Games as an Interactive Classroom Technique: Perceptions of Corporate Trainers, College Instructors, and Students. *International Journal of Teaching and Learning in Higher Education, 19*(1), 53-63.

Landers, R. N. (2014). Developing a theory of gamified learning: Linking serious games and gamification of learning. *Simulation & Gaming, 45*(1), 752-768.

Nadolny, L., &Halabi, A. (2016). *Student Participation and Achievement in a Large Lecture Course with Game-Based Learning. Simulation & Gaming, 47(1), 51–72.*

Noreen, R. & Rana, A. M. K. (2019). Activity-Based Teaching versus Traditional Method of Teaching in Mathematics at Elementary Level. *Bulletin of Education and Research, 41*(2), 145-159.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education, 93*(3), 223-231.

Singal, N., Pedder, D., Malathy, D., Shanmugam, M., Manickavasagam, S. &Govindarasan, M. (2018). Insights from within activity-based learning (ABL) classrooms in Tamil Nadu, India: Teachers perspectives and practices. *International Journal of Educational Development, 60*(1), 165-171.

Tsai, C.-W., & Fan, Y. T. (2013). Research trends in game-based learning research in online learning environments: A review of studies published in SSCI-indexed journals from 2003 to 2012. *British Journal of Educational Technology, 44*(5), 115 119. doi:10.1111/bjet.12031

Tobar-Muñoz, H., Baldiris, S., &Fabregat, R. (2017). *Augmented Reality Game-Based Learning: Enriching Students' Experience During Reading Comprehension Activities. Journal of Educational Computing Research, 55(7), 901–936.*

Whitton, N. (2012). The place of game-based learning in an age of austerity. Electronic Journal of e-Learning, 10, 249-256.

Younis, T. (2018). *A study of the effectiveness of inquiry-based learning and project-based learning of science and language subjects at high school level in the U.A.E.*(Unpublished Master Dissertation). The British University in Dubai.