



Research Paper

Digital Game-Based Learning as A Determinant of Students Performance from Low School Divisions to High School Division in Some Selected Schools in Kumasi Metropolis, Ghana.

Ampofo Joshua, Qian Xusheng, Zhang Xinyu

¹College of Education, Zhejiang Normal University, Jinhua/ China

²College of Education, Zhejiang Normal University, Jinhua/ China

³College of Education, Zhejiang Normal University, Jinhua/ China

Email – ¹Ampofojoshua@yahoo.com, ²jkyqxs@zjnu.cn, ³1316673972@qq.com

Corresponding Author: Qian Xusheng (jkyqxs@zjnu.cn)

ABSTRACT: Education is the key agent of sustainable growth change. It enhances the ability of people to turn their social dreams into reality. In their sustainable development every country strives for high quality education. The value of digital game based learning for shaping children's success in schools worldwide has been highlighted. This research therefore examined the impact on the academic performance of students from digital game-based learning in Low School Divisions to High School Division in Some Selected Schools in Kumasi Metropolis. A descriptive survey was used in the study. The target population in the Kumasi metropolis was 2,000 students. The study included a number of 200 students in Kumasi Metropolis who were chosen using a multi-stage sampling process, from low school to high school. The student survey was used to collect data. The data was then analyzed statistically and reported in terms of frequency, mean, and standard deviation. SPSS, a statistical package for social sciences, was used to aid in the creation of a table summarizing the findings. Students' academic progress is influenced by a combination of digital game-based learning, parents' schooling, and parents' professions. The findings, however, show that a student's academic achievement is not significantly influenced by his or her parents' financial level. Students' academic achievement was shown to be significantly impacted by game-based learning's digital elements.

Keywords: Digital game-based learning, Parents education level, Parents occupation, Parents income level, Academic performance.

Received 23 Feb., 2024; Revised 02 Mar., 2024; Accepted 04 Mar., 2024 © The author(s) 2024.
Published with open access at www.questjournals.org

I. INTRODUCTION

The first decade of the 21st century has been marked by greater focus on student success due to the No Child left Behind Act and a continued success for color school students, low socioeconomic family students, and English students (ELLs). (Liu & Chen, 2013) promoted learning in scenarios of reality and thus formed ideas by creating them. In recent years, some scholars have studied interactive technology's efficiency in promoting literacy, which is mostly done using sports. The use of games in education is traditionally easier to improve learning engagement, constructive involvement and focus among students than conventional learning practices (Vlachopoulos & Makri, 2017). In addition, games will boost the social competencies of students as well as their ability to learn and solve problems (Kirikkaya, Iseri, & Vurkaya, 2010). Increased interest has come to new developments, including immersive game-based learning. However, their execution is much lower than predicted due to scientific, educational, financial and sociological obstacles (Alyaz & Genç 2016). The application of digital game-based learning in social, business and academic fields is increasingly (Rapini, 2012). The globalisation, the diversification of games into modern genres of cultural hybridity, worldwide access to broadband and the numbers of non-traditional gamers all led to significant digital gaming and playing activities being extended into new environments and applications (Reinhardt & Sykes, 2014). The use of games is strongly rooted in various learning theories (interactionists theories, experiential theories). Dewey (1938), who promoted learning opportunities that support positive learning cited by (Pieratt, 2010). According to him, true learning occurs as students voluntarily participate in the subject in a realistic way. Also (Shabaneh & Farrah

2019) quoted Kolb (1984), who also considers the experience-based learning to be a complex factor in the involvement of learners. Consequently, he argues that "learning is the method of the transfer of intelligence."

(Plass et al., 2015) quoted from (Lenhart et al., 2008) the use of games for the sake of learning and advancement in academia is by no means a substitute. However, the growing adoption of computer gaming as mass entertainment has raised the issue of the path to cash or the promise of digital games to be used for education. The report of the youth's consumption of computer gaming, with surveys similar to the Pew Internet & American Life Project that show 99% of boys and 94% of women who play digital gambles. It is also convincing that young people spend between 7 to 10 hours a week in computer games (Lenhart et al., 2008), while newly calculated figures add up that figure even more (Homer, Hayward, Frye, & Plass, 2012).

In other research, educational games for boys and girls reveal no significant differences in learning outcomes (Homer et al., 2012) despite gender variations in the amount of times boys and girls play digital games and in the games boys and young girls chose to play (e.g., Annetta, Magnum, Holmes, Collazo, & Cheng, 2009; Papastergiou, 2009).

(Benoit, 2017) quoted from (Meskill, 2005) that many improvements in education have occurred across the world in this 21st century: increasing technologies, increasingly stringent contents, and the influx of students worldwide. The population of students continues to expand and is projected to double by 2050, with these students facing great challenges in a world that is no exception to Ghana (Meskill, 2005). Not only does he find the most nuanced language in the world, he must still remain awake, and his native peers study the same strict material as his native peers (Meskill, 2005).

The key driver of transition to sustainable growth has been digital game-based learning. It enhances the ability of people to turn their social dreams into reality. For its sustainable growth, both countries aim for better education. Like all other countries, the Ghana government views education as a human right and a vital way of ensuring that all students know their maximum capacity. Since modern education was adopted, the issue of student success in schools has been of interest. Many countries have learnt that students are the focus of education without successful performance; all educational advances are doomed to failure.

Education includes all of those encounters that gain information and enlighten the mind according to Okolo (2010) as referred to in Okafor (1981). As stated in the Kuzu and Ural results quoted in (Donmus, 2010, p. 1499) "When games and training are mixed, educational environments also are exciting and students who learn by using games gain optimistic emotions and are highly inspired by knowing ". Despite the use of digital game-based learning in Ghana, it has been noticed that pupils' academic performance has fluctuated over time, and learning is no exception. Various researches are conducted across the globe to find out what influences students' academic performance at various educational institutions. Using Crosnoe, Johnson & Elder, 2004 as a starting point, Farooq et al. (2011) note that most of these research focus on three interfering elements: familial causative factors, academic causal factors, and individual causal factors. An individual's ability to do well in school is influenced by a combination of several variables. It is important to note that these differences might exist across academic settings, student cohorts, and cultures (Mlambo, 2011; Diaz, 2003) (Diaz, 2003). This highlights that these variables can also be studied within the sector of learning specifically in Ghana to figure out the influence of such variables on the academic performance of students.

(Hartshorne et al., 2018) stressed that there is ample analysis in the world of game-based learning as also recent large-scale study has given a primal direct estimate of the crucial amount (CP), but brain-power is found well later than originally thought (until the ages of 17–18 years). Alternative researchers refer to the age result for learning and also addressed the CP as minor variations in the L2 behavior of young and adult learning (Abdullah & Akhter, 2015; Sang, 2017). Boyle et al. (2016) and Maureen Catherine Connolly, Boyle, MacArthur (Acquah & Katz, 2020) quoted Hailey and Boyle (2012) as being checked by students older than 14 years; and Hailey, Connolly, Boyle, Wilson, & Rasak, 2016, primary education, primary education, primary education for handling the gap left by Boyle et al.(2016) and by Maureen Cathe, respectively; (2012). (Liu & Chen, 2013) investigated and found that violent games did not provoke violent feelings and behavior among students and the effect of varied laptop games on flow skills and positive emotions of students. In addition, Taiwanese researchers studied the subject of learning achievements (Liu, Lin, Hsiao, Chen et al., 2009). (Liu&Chen, 2013) quoted in a course on game-based learning by Yien, Hung, Hwang, & Lin (2011), found that this strategy was easier for improved academic efficiency and student attitudes than former PPT teaching and had an impact on their food patterns. (Benavides-Varela et al., 2016) quoted from Siegler and Ramani (2008) speculates that the limited possibilities for playing number games during their childhood are in actual fact a shortage of the skills used by students from low-income households.

In Ghana, (Quaicoe & Pata, 2015) the research examines the digital and digital literacy of teachers as components of the digital split between Ghana's primary schools. It is also observed from the above studies that all research into digital game learning looked at the impact of families on student academic performance as those students use digital game-based learning instruments.

(Harrison, 2019) said that in schools in the low, medium and high schools students are failing. (ALQAHTANI, 2015) cited from (Nation, 2001) that one of those culprits is a lack of education and basic vocabulary, which in academic texts represents an immense amount of terms.

Digital game-based learning has become an exciting program in recent years that offers a truthful variety of rewards and an insight into self-employment. In recent years, Digital game-based learning has been an interesting program giving an honest range of opportunities and provides an insight for self-employment. Digital game-based learning was introduced into the academic system to strengthen the event of business ventures, government organizations, and to provide some quantitative and qualitative analysis for scientific evidence. No matter the vital role Digital game-based learning plays, it appears that over the years, there are fluctuations within the academic performance of students. Many of these teachers teaching the Digital game-based learning course complain of low academic performance of the students, and although majority aren't performing well, few students are pushing harder and getting good grades (Arku 2015). (Opoku-Asare & Siaw, 2016) cited from Asihene and Opoku-Asare (2011) further revealed that Digital game-based learning teachers recently have improved on their way of teaching, yet majority of students are still having difficulty understanding the subject matter of the programme and which can be caused by many factors. Many studies are conducted to look at the factors affecting student academic performance worldwide. (Sugano & Nabua, 2020) cited from (Ganyaupfu 2013 and Blazar 2016) stating that variety of those studies focused on the methods utilized in teaching the topic. Most of these studies focused on three main factors which are the family factors, academic factors, and personal factors, of which such studies are Nambuya 2013, Katsikas & Panagiotidis 2010, Mwaniki 2012, and Osuafor & Okonkwo. (Rapini, 2012) cited in (Gunn & Klebanov, 2007) stressing that research into the academic success of students repeatedly showed that the predictive output of children in the field of digital game-based learning is important. The methods to explain this interaction have however not been well studied. This is also since, as (Davis-Kean 2005) has seen in general, digital game-based learning models such as those created by Linver and Brooks (2002) explored the effects of children's performance on parenting, as well as on the layout of their house setting. Others centered on those habits, such as harsh discipline, nutrition and heat. Factors including parental schooling, parental compensation and parenting in digital game-based education have also been less worked out. In addition, the existing studies have been performed mostly outside of Ghana (Ugwuja 2010-Nigeria, Kamau 2013-Kenya etc.). Quaicoe & Pata (2015) discusses digital education and digital activity of teachers as components of a digital gap within Ghana's primary schools. In addition, no findings seem to have concentrated on the academic success of students dependent on digital game learning. This opens a niche for researching how digital game-based learning impacts students' academic success in Kumasi, Ghana.

The primary objective of this research was to examine the effectiveness of digital game-based learning in certain schools in Kumasi, Ghana, ranging from elementary schools to high schools. The study's objective was to:

1. What is the influence of digital game based on the academic performance of students in learning?
2. What impact does parental education level have on a student's academic performance?
3. What impact does parental profession have on a child's academic performance?
4. What effect does parental money have on their children's academic performance?

II. REVIEW OF RELATED LITERATURE

Conceptual Review

Digital Game-Based Learning Concept

Digital game-based learning (DGBL) is a teaching approach that includes learning material or the values of computer games, aimed at educating students (Zin et al., 2009). Digital game-based learning applications rely from the constructivist curriculum philosophy. The use of games for planned learning outcomes is becoming much more familiar with digital game-based education (DGBL). Water E. Water E. (2019) Quoted from (Egenfeldt-Nielsen et al. 2011), the statement highlights the importance of using computer games for education rather than using independent apps. Digital Game-based learning (DGBL) typically means the use of digital games called games that are extreme, digital or instructional. Non-digital sports, however, are still used in large numbers for education. In research papers, DGBL is also not well described. This is also the dilemma with what to play with. The key conditions for the second degree and meta-level of behavior (Sanchez, 2011) are the two that derive from (Brougère 2000). A similar behavior could be used as a game or not as counting on the significance of the action in Sanchez E. (2019).

The second requirements include the player's independence. He is permitted to demand and shape his/her own decision. Sanchez E, (2019) notes that laws are framed by this sovereignty and that the end is still linked to confusion. A game's agonistic nature is a key feature of it. A game is man-made war where a player competes with the sport himself or his opponents (Salen & Zimmerman, 2004).

(R. N. Van Eck, 2015) DGBL can be an instructional practice with complexity. It contains a vast array of games and activities, topics and fields, educational backgrounds, school levels and even the proliferation of schooling, instruction or other instructional methods. Further, DGBL does not only ask for predicted learning results from the use of a chosen game. DGBL means a learning situation in which playing is important, but not just the use of a game. DGBL involves in particular debriefing which is essential for the transmission and metacognition.

DGBL is on the verge of understanding gamification. While gamification refers to motivational affordability implemented in non-gaming education environments, Sanchez E. (2019) DGBL refers to use of chosen games, which are considered serious games, instructional games or learning games. Numerous books, blogs, talks and more encourage the use of video games in student instruction, endorse personal insights and findings. (Cicchino, 2015) Cited from (Gee, 2007; Squire, 2011; Farber 2014; Devlin, 2013) These sources show an increasing interest in understanding the principles that video games glean to help make academic learning interesting, moving and effective for today's students within the classroom community. (O'Riley, 2016), quoted from Squire (2011), stressing that the need to know more about video games is substantiated, saying, 'We have failed in a digital, participatory age to awaken students' interest and curiosity and empower them to follow their intellectual curiosity, whenever it is necessary to turn a child away from the learning process (p. 15). (O'Riley 2016) stated Alexander, AETON & Egan (2010) that three main approaches to DGBL, including the separatist method, the integrative approach and the transition of learning approach, have appeared within the literature in the past decade. DGBL advocates typically use of one or many of the three categories as they argue for their use in the classroom. These three approaches are discussed below

Separatist Approach: This separatist approach "concentrates on the talents and thus on the abilities which players learn, through electronic games, skills such as interpretation, inference, prejudice and law" (Alexander et al., 2010). This approach proposes that play video games alone can be a positive learning experience, which also stems from such games in order to encourage the paradigm change in teaching and learning among educators (Gee, 2007). Video games are something more than entertainment, to be mentioned. (O'Riley, 2016) quoted from Jane McGonigal (2011) confirming that what computer games enhance our lives is 'truth is broken;' making today's students into collaborators of specialists, problem solvers and changers in the community. By entering the gameplace, the next generation concurrently develops and learns substitute literacy in a modern environment (Gee, 2007). In doing so, the way they view the world differs from the previous generation. Video games include whatever Gee (2007) calls, semiotic areas or contexts where various signals are able to battle various interpretations. Proponents contend that successful involvement in the semiotic fields of video games promotes the creation of a widespread knowledge of thought, which can be useful if translated to classroom (Gee 2007; McGonigal, 2011). In this way the separatist approach to video games and learning drives thinking about variability in game play skills and know-how (Alexander, Eaton & Egan, 2010).

Critics of the separatist approach for video games are against the idea that children can learn skills and know how through games (e.g. games like hide and seek or chess) and wonder why educators should put such a high premium on video games as a priority just to learn (Alexander et al, 2010).

The Integrative Approach: In his study (O'Riley, 2016), the integrative approach to DGBL emphasizes on using interactive games to display relevant curricular content (Alexander et al, 2010). (Felicia, 2009) indicates that there are spreads of instructor samples that promote such material goals by video games, either because the subject fits in a billboard game, by promotional games being used as a guide for the insertion of curriculum or by games developed especially for a particular curriculum or region. This group reacts to the use of computer games simply as motivators for repetitive activities or exercises. Proponents of the integrative approach argue that instructors will make a richer learning environment for college children through computer games that others call instructional games (Squire, 2011; Farber, 2015; Devlin, 2011). Squire (2011) said that to be considered beneficial to an academic game it has to do several different things. This includes the use of academic knowledge in order to achieve its aims, the many means of play (to help differentiate), the attraction of players and spaces for players to interact with others in the social arena, and a new way to see their world. Fundamentally, DGBL proponents claim that computer games and programs are often linked to achieve even better results. Instead, integrating skeptics contend that an obvious lack of observational data supports the production of learning goals inside the classroom through learning games. (O'Riley, 2016) quoted (Hanus & Fox, 2009; Seaborn, 2007) the risk is that computer games will either undermine or not have any benefits in terms of educational goals. The specific impact of digital games on learning results is still not enough knowledge that it is simply the simplest (Alexander et al, 2010; Dominguez, 2013).

The Transfer of Learning Approach: In the context of transferring the learning approach to DGBL, it is the objective to investigate what electronic games do, to abstract and structure the curriculum material so that it engages in a different direction. As a side note, this strategy appears to be related to gamification, which is the use of game elements in some non-game sense, to produce a more attractive result (Zichermann, 2012). Of note, gamification is also a relatively recent concept that is most widely used in the corporate community. Nevertheless, DGBL users in the school are usually equal persons who state that gamification has an equivalent capacity (Squire, 2011; Farber, 2015). Both research fields are closely linked and are also cited in the same literature. Returning to the Third approach, also referred to as the 'transfer of learning,' Alexander et al. (2010) define the core features of interactive gaming, which students love, as plot structure, heroic character individual qualities, vivid pictures, emotional interaction, extreme/exotic incidents, binary confrontation, and structure (p. 1840). They contend that educators should examine these features and research how successfully the student engages in redesigning the standard education content in order to pass the understanding (p. 1841). Farber (2015) recently argued that teachers ought to be much more mindful of and involved with the concept of their use in the classroom, in order for computer games to be used in this way. He also said that the teacher needs to also improve DGBL resources in the classroom, as a professional development (p. 24). Again, criticism argues that it is also not yet feasible due to the lack of real influence or value of DGBL in the K-12 classroom in observational studies (Dominguez, 2013). More research is required in this field that is believed to be accepted by the majority of supporters of DGBL (Gee, 2007; Squire, 2011).

Concept of academic performance

Education in society today is a major need and therefore academic excellence is very high on the national agenda, with the efforts of educators and politicians on tests, transparency and other relevant issues (Mark, 2003). Academic performance of students has gained concern as long as quality education is emphasized; most government agencies and activists together with teachers are ensuring that academic performances of their wards aren't overlooked.

According to Muola (2010), academic performance relates to the overall performance and, thus, therefore the degree of achieving the specified grades in class situation. Academic performances at Muola (2010) are that the key factor in developing student learning in the initial pattern of attitudes. In Ukwuije (1989) some of the need for measuring educational achievements are listed as follows: to assess students' progress or lack of growth in the acquisition of acceptable knowledge, attitudes, and social values; to establish a relativistic effectiveness of the curriculum, familiarize parents or guardians with the success of their children; predicting the general pattern in the advancement of schooling and learning; forging accurate choices on instructional preparation and providing educational managers with sufficient knowledge about the success and need of the teachers. The relation between independent and dependent variables is explained in a conceptual framework. During the present study, the conceptual structure briefly describes the connection between Digital Games-based Learning, which includes families' incomes, parenting and student academic performance in Metropolis in Kumasi.

This is seen in the following chart (Fig. 1)

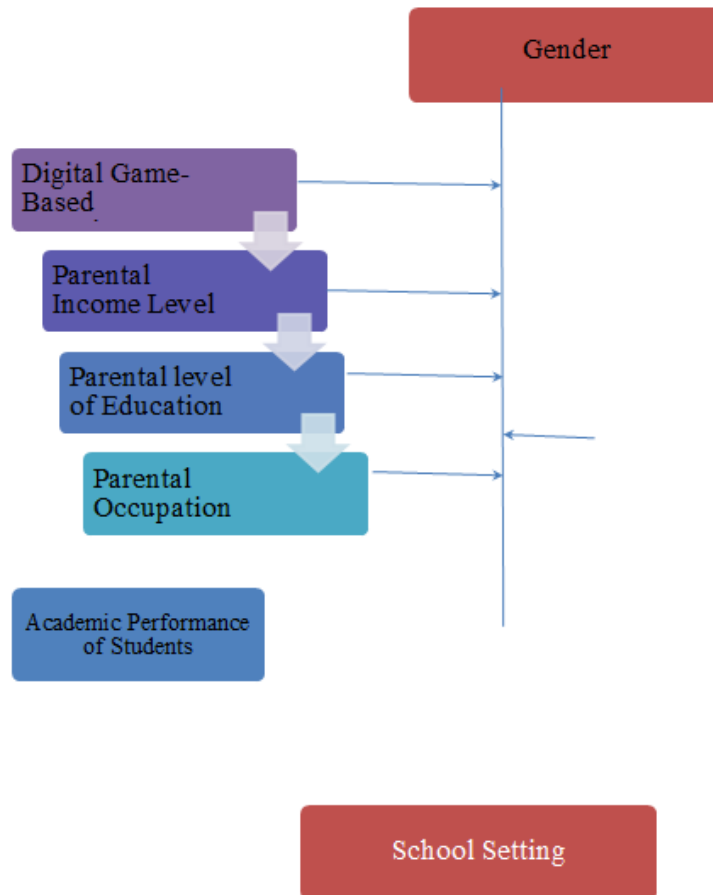


Fig 1: Conceptual Framework of the Study

The independent variable for this research is the digital game-based study which is divided into the next components: family income, parental educational level and occupation of parents, while the dependent variable is that of students' academic performance. The intervening variable is the gender and thus the moderating variable in the school environment is that that is supposed to affect the dependent variable. The school environment consists of features of a particular school such as school style, management, decision-making processes at school, and the degree of involvement of students in decision-making etc. Figure 1 illustrates that digital game-based factors have an immediate effect on students' academic performance, while gender and school conditions indirectly impact on students' academic performance. So, with a view to succeeding in the objective of this report, the study would examine whether or not digital game-based impacts on academic achievement have been supported by the independent variable (family income, the parental education level and the work of parents).

Theoretical Framework

Walberg Theory of Educational Productivity

One of the few empirically validated theories on school education is Walberg's (1981) theory of educational productivity (DiPerna, Volpe & Stephen, 2002). Walberg has defined 28 types of learning control using different approaches (Mohatt et al., 2006). Of the eleven major fields of variables, eight included psychological and emotional influences; class management, parent support and contact with students and teachers; social and conduct attributes; motivating and productive attributes; and coevals; the ethos of the school and the environment of the classroom. The pressures from distant backdrops, such as federal, district, school, organizational, curricular and instruction regulations had a less impact on the students' learning. Walberg claimed that the rapid involvement of social factors of learning is the first effective road to transformation. Kevin S. McGrew (2008) According to Walberg's concept, academic achievement may be boosted by a student's ability to self-regulate their learning, as well as their social and interpersonal skills. Students who were more self-assured and sure of their own abilities to learn benefited from the implementation of a Social-Emotional Learning (SEL) strategy, which allowed them to establish goals for their own development, increase their motivation, and improve classroom organization (self-regulated learning).

This theory played a key role in its implementation for this research, as it aimed at clarifying several factors which promote the academic performance of students in the schools. This was an incontrovertible reality, since a number of variables had the most possible impact on university students' success, Walberg taught students to such characteristics as psychological, motivational, maternal, affective, cognitive and metacognitive learning. This idea was important to the research because it examined the influence of the parents' occupations on their children's academic performance and therefore the impact of the parents' income on their children's academic performance, which were two of the study's requirements.

Maslow's Motivational Theory

This is another important idea that may be used to our investigation. Abraham Maslow formulated the hypothesis in 1970 (Omeh Gabriel Ugwuju, 2010) and numerous scientists, including Onyi (2007) have promoted it since then. According to Maslow, motivation is ever-changing, variable, and complex. He maintained that a human being must constantly be content. These demands are arranged in a hierarchical sequence, ranging from the most important to the least important. Both deficiency needs (physiology, protection, ownership and self-esteem) and development requirements (self-actualization) are separated in the hierarchy (McLeod, 2007). To put it another way, Maslow said that once a need is satisfied, it no longer serves as an incentive for action. The above hypothesis concerns the present research because the encouragement of learning and the requisite acceptance in classes is extremely critical. One of the key challenges faced by teachers and activists was that they must motivate students to do activities that satisfy preset expectations or that might exceed them. The motivation stimulates and maintains behaviour, directs and controls behaviour. A motivated learner has deliberate behaviors aimed at attaining the defined objectives.

Self Determination Theory

According to Ryan and Deci (2000) Self-determination theory (SDT) was created by social psychologists at the University of Rochester in 1985. People's motivation and psychological well-being were the focus of their research. Extrinsic or intrinsic motivation, for example, is typically the case. Fear or compulsion may inspire people (this is known as extrinsic motivation), but it's also possible that people are motivated because they appreciate a certain activity (intrinsic motivation). People who are self-motivated tend to be enthusiastic, enthusiastic, and confident.

Three human requirements that generate intrinsic motivation were identified by Ryan and Deci (2000) as part of their cognitive evaluation theory (CET). Learner competence is achieved when the player obtains new information and abilities via digital game-based learning. According to (Alvarez and Alvarez, 2009), relatedness occurs when the player sees themselves as part of a group of players and/or sports figures. According to (Alvarez et al., 2009), when a player has a sense of choice and control in their sport, they have achieved "autonomy." Using these three components in digital game-based learning empowers participants more effectively, since they are interdependent. Resuscitation promotes events like as competency and self-reliance. In order for a player to feel competent, they must be given the freedom to choose their own actions. Because of a lack of autonomy and competence, a player's intrinsic drive will decrease if the sport environment is excessively restrictive.

According to Ryan and Deci (2000) Having a sense of security and belonging in a social setting may also boost intrinsic drive. For intrinsic motivation, the feeling of having a "safe relationship basis" is essential (Ryan & Deci, 2000).

If you're interested in anything because of its aesthetics, newness, or difficulty, then these ideas will work for you, Ryan and Deci (2000) conclude. This conclusion pertains to the concept of "flow." Using a player's behavioral momentum, which is the desire to continue playing after spending time and effort, is an important part of fostering motivation in game design (Schonfeld, 2010). A person who has spent 10 hours playing a game will be inspired to continue since the acts necessary inside the game are not genuinely productive in the individual's real life, but they will still feel helpful. Working hard while playing a game may lead to a degree of joy that can't be achieved by rest, according to the idea of "blissful production" (Schonfeld, 2010). Those citizens may find significance in their job is supported by a high level of productive output. Even after a long day at work, gamers spend an average of 22 hours a week playing games (equal to working part-time). It's possible that their commitment to work hard in the classroom will be much more difficult to maintain in the real world. This shows that they are able to work at a high level of efficiency in the virtual environment. Flow is a byproduct of productive bliss.

Flow Theory

Mihaly Csikszentmihalyi, a psychologist, is widely credited with developing the concept of flow (1990). Nothing else mattered when individuals were engaged in hobbies such as hiking, playing chess, or dancing according to Csikszentmihalyi. Flow is a state of great focus, complete absorption, and awe-inspiring joy.

When it comes to digital games, the word "flow" has been used widely. (R. Van Eck, 2006) According to research, games for learning benefit from a state of flow (Pavlas, 2010), which was highlighted in (Webster, Trevino, & Ryan, 1993). Playing a well-balanced game puts the player in a state of flow. The player's skill level must meet the game's obstacles in order for the game to generate flow. There are times when a sport is too challenging and times when a sport is too simple for the participant to enjoy. Both of these events will cause the player to stop participating in the game. If you're playing a game where the aim is to learn new talents, this will be a big issue. Digital games for learning are designed to keep the user in a state of flow by systematically matching their level of expertise. Flow in educational games is supported by the PAT model, according to (Finneran & Zhang, 2003). (person-artefact-task). According to Finneran and Zhang (2003), a well-balanced educational game necessitates interaction between the player and the artifact (the game), and as a result, the PAT model was developed (the curriculum). It's possible for the student to become sidetracked if the assignment and the game are too complicated (Pearce & Howard, 2004). People, tasks and artifacts work together to generate a flow experience that encompasses temporal distortion and the loss of self. Consecutive learning outcomes include greater learning, a shift in perspective, and new horizons for investigation.

Gee's Game-Based Learning Design Principles

In 2008, (Gee, 2008) the ideas of Gee's game-based learning are well-known across the literature on intensive games. For further information, see Gee (2008). After analyzing a slew of popular video games, Gee came up with the 36 learning concepts listed below, which are often used into educational video games today. In the academic serious game literature (Djaouti et al., 2009), as well as in the creation of instructional digital games, these ideas are backed up by research into human learning and cognition (Michael & Chen, 2006). The principles of learning may be broken down into a variety of subcategories, such as learning as semiotics, learning and identity, meaning and learning, telling and doing, cultural models of learning, and social learning.

Game Design Patterns

Patterns are common in game design. Researchers (Björk et al., 2003) and (Jussi Holopainen, 2004) studied the mechanics of entertainment games and discovered trends. Their research also looked at other areas including architecture, software engineering, and interface design for inspiration for their own methodologies. Game design patterns were catalogued in a structural framework. An instance, a session, and a play session comprise the structural framework. Bounded patterns, temporal patterns, and objective patterns were all subdivided into three categories. Björk and Holopainen used a five-step iterative approach to design the patterns: identify, analyze, describe, test, and evaluate (rather than just one). In order to be included in the game design pattern guidebook, a game needs to pass this five-step procedure. In cases where a pattern was unclear or untested, it was either blended with another pattern or thrown away. Björk and Holopainen were able to combine mechanics, come up with names for abstract patterns, and get rid of any concepts that were unclear throughout this process. In their book *Patterns in Game Design*, they outline over 200 game design patterns (2005). CWTL's design was influenced by a variety of sport design patterns, which are not included in this document's scope.

Empirical Studies :A study on Digital Game-Based Learning (Aziz et al. 2018) stressed that Digital game-based education was a major tool to affect student's performance in schools around the world. Games are a true instrument for the learner's successful participation in training (Alessi & Trollip, 1984; Baide & Lambert, 2010; Kirikkaya & Vurky, & Huizenga, Akkerman, & Dam, 2009). Games are also regarded as a truthful tool for the students to take an active part in training practices. Students have suggested that digital game-based learning may be the easiest method for promoting student inspiration to learn (Provost 1990; Papastergiou 2009; Dickey 2010; Huang 2010; Tüzün, Yılmaz- Soylu, Karakuş, [Kızılkaya], 2009).

It has also been claimed that a game-based approach can help guide cognitive growth, helping to promote children's higher order thought (Carbonaro, Szafron, Cutumisu, & Schaeffer, 2010). video games are set to increase motivation due to characteristics, such as the excitement of the quest, difficulty, and novelty, according to Reynoso (2015) stated that games possess these attributes. Teachers ought to be willing to incorporate games into their instruction in order for students to realize game-based learning to be beneficial.

Several previous research show the value and the beneficial qualities of video games (Yien et al., 2011) by using game-based learning methods through a variety of learning tasks (Bourgonjon, Valcke, Soetaert, & Schellens, 2010; Warren, Dondlinger, & Barab, 2008). According to the book "Interactive and Simulations in Simulations in Elementary Schools" (Terrell and Rendulic, 1996), using video games for learning will make the participants want to do more for the sake of playing themselves and learning can lead to better performance on their own. According to the authors, video games which target the nutritional and learning needs of students in primary and secondary school, motivation and education can be improved, but students' abilities and awareness are also increased. Also from Garell (2015), in which children's learning activities are aided and in being advised to consume more food and drink by video games, several approaches in the game-based learning domain, including cognitive theory and situated learning, are thought to be successful.

Cognitive theories stress that people can develop general competencies in order to provide more advanced capabilities, while they learn different knowledge. To quote Gagné (1985), stresses that games go from simplicity to difficulty and that teaching is often progressive; learning processes ought to raise students' enthusiasm and should be entertaining as well. According to this theory, people learn more when they step into active environments with their goals already met. Our question should not only answer the facts, but it should also refer to other information in some way. If, to implement an upscale learning situation, consider making use of evaluation and practice on realistic problems and using active problem-solving techniques, learners can better grasp problem-solving abilities (Winn, 1993; Cuenca Ló & Martín Cáezares, 2010; Kim, Park, & Baek, 2009). The most beneficial of all of science maintains that even the easiest resources and interventions are not quite as effective as providing children with an exciting and invigorating learning environment (Norman, 1981). This idea is backed up by the fact that games are a children's medium, which is why they are more accessible to children and can be adopted more readily than other media (Kafai, 1995). Researchers often assume that video games help children deal with real-concerns and they say that they help them work out their problems (Seonju, 2002; Chuang & Chen, 2009; Lee & Chen, 2009; Blumberg, Rosenthal, & Randall, 2008; Shih, Su, & Chuang, 2010). The result is that digital game-based learning influences educational outcomes, which makes it highly valuable for judging student academic performance.

Family income levels on academic performance

In order to find out whether income from parents has an impact on academic performance, Ghazia (2013) investigated the correlation between family income and student academic performance. In his research, a significant association was discovered between family income and student academic performance was found to be a major. Asserted from Ghazia (2013), the family income may have a tremendous impact on students' academic performance. Achieving great academic performance as a student can be greatly complicated for many who don't have a low-income background. (Hassan et al., 2020) cited from Adzido (2016) added that family income level features a positive relationship on students' academic performance. To Adzido (2016) though higher family income may improve students' academic performance, except for the responsible and high students, low family income must not be an excuse for poor performance. Ghazia in his study concluded that the connection between income of parent and academic performance of Students could also be probabilistic. Thus, the particular relationship between these variables isn't really established because it is critical in nature.

(Li & Qiu, 2018) discovered in Becker's (1964) study that family income often impacted children's standing in school, peers' perceptions, stability in the community, and the safety of their families, and the impact on educational goals, which are all three key factors that were involved in determining a child's later success in life. In addition, many writers and researchers on family income and academic performance was seen to specialize in the kid academic needs, where low-income earners are unable to shop for school books and pay additional teachers to require extra classes with wards. Again, it had been also observed that the majority low-income earners spend most of their time working and to some extent; the kid comes in after school to assist in their work, giving these children no time to neither study nor do their home assignment. On the opposite hand, high income earners were able pay their children schools fees, buy required books which will aid in their learning, pay additional teachers to require their wards through extra classes reception and also give them more attention. Thus, these attitudes of high-income earners enable their wards to possess sound mind in studying, learn before their colleagues, and excel in their academic performance.

Parent's Educational level

Despite the fact that the different range of educational abilities among parents, all developed countries have the same conclusion: According to the reference pair of Desforjes & Aboucha (2003), there is evidence of a great impact of the level of parents' education on their children's academic success in all developed countries. In consistency with (Khan et al., 2010) with high level trained parents having more of an effect on their children's schooling, the research concludes that higher income seems to be associated with improved cognitive outcomes for children in all age groups. Trained parents have shown to be more interested in their children's school success and job development and academic interest. This undoubtedly results in a far better performance and achievements in studies. Additionally, (Li & Qiu, 2018) cited from Dekar (2012) concluding in his study that the academic level of parents influences their children's success in class. This also emphasized that parents' educational background and therefore the effects on students' academic performance indicated a positive significant relationship. This adds to the evidence that students whose parents have at least a college degree do, on average, perform well in assessments of literacy, arithmetic, and science knowledge. Thus, students from developed countries averaged seven percentage points more in their age-adjusted scores on creativity, whereas those from low- or middle-income countries averaged 45 points more on their standardized (Pamela & Dean, 2010). Parents' education has traditionally been described as a source of direct and obvious benefits to children's achievements. The success of Walberg and Iverson (2002) in updating their report on 18 original studies of 5,831 subjects on educational, psychological, and sociological literature rests on two fundamental revisions: So as a result, students' learning and accomplishment are dependent on their parents' level of education. Students seem to be helped the best by those of better educational backgrounds. This suggests that students are inspired by their benefactors, and have greater expectations about themselves because their capabilities and outcomes are based on their parent's level of education.

Nonetheless, most writers and researchers on the subject educational level of parents in relation with academic performance of their wards stressed more on the facts that, parents with higher educational level help their children in educational pursuit like, helping them to do their homework, encouraging and assisting them to review well, giving them more guidance on the way to study and buying materials which will aid in their learning. On the opposite hand, parents from low educational level were seen to neither encourage their wards to find out, however, they themselves couldn't assist them nor guide them in their studies, which in totality affect their academic outcome.

Without exception, it is critical to gather information on different dimensions of education-based achievement inside an examined family. Thus, the families can't be seen as distinct components of a whole (example, societal values, traditions, attitudes and residential environment). Consequently, this research focuses on family roles, traditions, and student capabilities as well as academic capability. One important issue not addressed in Lumsden's 1994 study was whether other life events and/personal environments, as well as parents, can have an effect on the configuration that students initially assume when they start thinking about their future educational trajectory. Creative way: "when a child is raised in a home where they feel worthy, capable, and self-responsible, they can develop more readily." Fleming and Gottfried (2004) clearly imply that parenting behaviors impact children's innate engagement and educational achievement. Accordingly, to help parents equip their children with techniques and activities for things like reinforcement of perseverance, application of effort, comprehension of control, and self-structure, and self-exploration, their children would have improved their overall grades (Gottfried, 1990). The contribution of families to students' inspiration and school success has been covered since the year 1953. Studies found that friends and relationships have a broad impact on integration across these realms. Outside influences, such as family and friends will, to some extent, get in the way of one's academic success (Chrastie & Dinham, 2001). Ryan (2000) stressed despite being rightfully endowed with intrinsic tendencies, it is no longer undisputed that individuals must provide and re-stabilize supportive environments in order to appreciate and improve upon their free-willed abilities.

In researching, it was found that external pressures including pressures, timelines, orders, and external targets were found to reduce our motivation. The other research discovered that autonomous children seem to have less of material desires compared to others who are highly dependent on their parents (Ryan & Deci, 2000).

According to the studies above, most researchers found a favorable association between Digital Game-Based learning and academic achievement, however few studies found a negative relationship between Digital Game-Based learning and academic performance. Students in a few selected schools in Kumasi's metropolitan area were chosen to participate in a study examining the link between digital game-based learning and their academic performance.

III. RESEARCH METHODOLOGY

Research Design

This investigation employed descriptive research techniques to learn about the impact of digital game-based learning in junior high school divisions in Kumasi, Ghana. According to a researcher Boru (2018), one benefit of the descriptive research method is the ability to apply knowledge gleaned from all segments of the community, particularly perceptions, opinions, and motives. Cronholm & Hjalmar (2011), On the basis of their findings, McMill & Schumach (2006) have argued that surveys are useful for gaining new insights into relationships. Creswell (2012) stressed that quantitative analysis seeks to gather information on beliefs, expectations, and activity patterns, with those details referred to as descriptive samples of the community becoming main source of data. The system of data collection was chosen because it's reliable and cost-effective as well. Although the aim of the survey was to represent a very large community, statistical significance can be achieved even with large surveys. Data collection has a lot of opportunities since it gives you the chance to explore knowledge from many sides (Hale, 2011). It helps break down intellectual boundaries to permit researchers to witness situations. According to (Wang, 2009), Descriptive research, according to Fraenkel & Wallen (2009), generates an honest number of replies from a large number of people at a time, gives a meaningful picture of occurrences, and aims to explain people's perception and behavior on the notion of the information collected at the time. Furthermore, they noted that descriptive research style is generally used with higher confidence when researchers are looking to answer a specific issue. This study also used descriptive survey design since the variables weren't manipulated, and there's a chance to explore and examine the respondents for more information. The planning is effective in obtaining information concerning people's thoughts, feelings and opinions at the present. The descriptive survey design with all the various merit can't be used to correlate variables or determine cause and effect. A participant, on seeing someone is looking over their shoulder, altered their conduct. Additionally, there are lots of surveys which make use only the responses given by the participant and have no predetermined answers. While collecting with a variety of answer options helps the researcher gather more information, it takes away from participants' versatility if their answers fail to comply with the allotted response criteria. A significant amount of important material could be omitted from this study (Dickson & Mitchelson, 2007). In using descriptive survey design, no variables are manipulated; therefore, statistical analysis isn't possible, due to this some scientists regard descriptive survey as unreliable and unscientific.

Population

A population, according to Polit and Hungler (1999), includes all of the individuals who fulfill a given set of characteristics. That's why it's important to describe the group of people the researcher is interested in learning more about and making conclusions about. It serves as a proxy for the bigger group of people that the researcher is interested in. The target population of this study was students altogether in the 21 schools within the Kumasi Metropolis which the researcher estimates to be 2,000 students. Low School Divisions To high school Division students were used because they have been in class for quite one school year and even have had more contact and used with computers unlike the first students who haven't been within the school for quite school year and don't even have any experience with the utilization of computers and even digital games. All of those schools were accessible to the researchers.

Sample and sampling technique

The researchers examined the outcomes of a random survey of 2000 people, and discovered that 200 of them displayed behaviors that met the criteria for the trait in question. In this section of the study, just 10% of the whole population was sampled. When students are called to react to the research, a study constituency may be reached. Additionally, convenience sampling could include the collection of non-probability data from members that are readily available for the research. Participants are easy to approach and are unaffected by personal bias and this makes it the most reliable source of evidence with the most unbiased sampling. ; Simple to find, so it's great for experimental use (Lawrence, Carla, Jennifer, & Kimberly, 2013). Mackey and Gass (2005) pointed that Convenience sampling has the apparent drawback of being prejudiced. Also, students (males and females) were selected from each school to form a complete of two hundred (200) students which were used for the study.

Research instrument for data collection

The questionnaire used a set of questions to gather the data for this research. The questionnaire used was designed by Ugwuja (2010) for his study but was adapted by the researcher for the study. Questionnaire was used because data are often collected relatively quicker even when the researcher isn't present and enormous amounts of data are often collected from an outsized number of individuals during a short period of time and is comparatively cost effective. Though participants are unlikely to feel the need to answer the majority

of the questions, there is a possibility that they may miss questions or fail to return. The results of the analysis could be incorrectly interpreted by some of the respondents. Dealing with this respondent's lack of receptivity, the researcher outlined the most critical things to the participants and urged them to be truthful in their answers. In order to increase participation in the survey, those who signed the informed consent form were also promised reimbursement for their participation. The instrument was titled, "Digital Game-Based Learning influence questionnaire". The questionnaire was constructed on the idea of the research questions. Thirty-one items on the experience of digital game-based learning, parental education, parental profession and economic impact were used to create this instrument. The instrument was constructed. The questionnaire was broken into three sections. First, demographic data was collected; second, information on students' familial backgrounds; and third, four groupings were grouped into (A-D). Cluster A consisted of questionnaire items asking about digital game-based learning experiences; Cluster B contained questionnaire items asking about the influence of parental education level; Cluster C contained questionnaire items asking about the influence of parental occupation; and Cluster D contained questionnaire items asking about the influence of parental income level.

The questionnaire was structured in category of five –point scale coded as follows:

Strongly agree (SA)

Agree (A)

Neutral (N)

Disagree (D)

Strongly disagree (SD)

Data collection procedure

The researcher constructed an online questionnaire for the collection of the data from the Kumasi Metropolis. The online questionnaires were then sent to varied school's platform for the educational stakeholders (teachers and students) to fill and submit for the researcher. The questionnaire was sent to individuals on their various WhatsApp and emails to collect their data. Participants were made aware that their participation in the research was completely optional, and they were free to opt out at any point throughout the data gathering process. When asked about the study's purpose, participants were informed that their answers would be kept strictly secret. The online questionnaires were then sent to various schools' platform for the students to fill and submit on spot for the researcher.

Validity of the instrument

(Kim, 2015) emphasis from (Nachmias & Nachmias, 2007) that, Meaningful measurement has validity because it matches the researcher's preconceptions of whether it is being measured. Validity is concerned with the type of instrument used and with whether it is sufficient for gathering the information required for drawing conclusions. To make sure the validity of the instrument, it had been given to an expert to look at it thoroughly so as to get rid of all the things which will affect the validity of the study. The instrument underwent adequate scrutiny within the hands of experts to make sure that validity of the instrument was achieved. The researcher made adjustment to the instrument to reflect the suggestions of the experts.

Pre-testing of the Instrument

Students in Cape Coast, Ghana, were used as a control group for the instrument's pre-test. The Cape Coast Metropolis has ten (10) schools from which to choose the contestants. The questionnaire has a pre-test to determine the strengths of each item. It's worth noting that the 10 schools in the research have many of the same socio-cultural traits as the schools in the Kumasi Metropolis. Because of this, students in various regions share a lot of features with one another. The pilot-testing goal was to improve the accuracy and reliability of the instrument. Those who participated in the pilot test were given the questionnaire and invited to give their thoughts on any questions that they found confusing. Instructions were also provided to freely address any confusions, inconsistencies, or failures in understanding they found with respect to the draft questionnaire. Final modifications were made to a few elements.

Reliability of the instrument

(Wanjala et al., 2017) also cited from (Mugenda and Mugenda, 2008) stating that Reliability of the instruments was administered so as to seek out whether the measures of the research instrument yield an equivalent result on other occasions. So as to make sure the reliability of the study instrument, a pilot study was conducted in Cape Coast using forty participants from outside the study population to work out how effective the instrument is going to be. Also, the results from the pilot study or the trial study was used to determine the interior consistency of the instrument using Cronbach alpha procedure in other to assess the reliability of the instrument.

The following table summarizes the reliability coefficients for each of the research variables.

There is a list of the items' reliability coefficients.

Reliability of the Items			Reliability Coefficient	No. of Item
Experience About Digital Game Base Learning			0.71	7
Influence of parental education			0.80	7
Influence of parents' occupation			0.75	4
Influence of parents' income			0.77	5

Ideally, the reliability coefficient ought to be more than or equal to 0.70 according to Fraenkel and Wallen (2000a). This means that the study's findings are justified by the results.

Data analysis technique

The data from the survey was compiled, cleaned, sorted, and processed in SPSS. Mean and variance analysis were applied to the data which was captured. Using the mean to address study questions was advantageous while the variance was utilized in assessing the variability of the data.

IV. Results and Discussion

Biographic Information of Respondents

The study sampled 200 respondents who were all From Low School Divisions to High School Division in Some Selected Schools in Kumasi Metropolis, Ghana. The questionnaires were distributed to all the respondents and each of them responded accordingly.

Table 1: Name of School of Students

School	Frequency	Percent
Adventist SHS	2	1.0
Agony SDA SHS	1	.5
Andrea Adjei SHS	1	.5
Angel Educational Complex	2	1.0
Kumasi Anglican SHS	6	3.0
Asanteman SHS	5	2.5
Ayanfuri SHS	1	.5
Bibiani SHS	1	.5
Church of Christ SHS	1	.5
College of Health	1	.5
Dunkwa SHS	1	.5
Ghana Armed Forces SHS	2	1.0
Ideal College	7	3.5
KNUST SHS	9	4.5
Komenda SHS	1	.5
Kumasi Academy	24	12
Kumasi Anglican SHS	1	.5
Kumasi Girls SHS	9	4.5
Kumasi High School	5	2.5
Kumasi Technical	2	1.0
Kwapong SHS	1	.5
Micheal Boakye SHS	1	.5

Mmofraturu Girls SHS	4	2.0
Nicole High School	1	.5
Okomfo Anokye Senior High	1	.5
Opoku Ware SHS	28	14.0
Osei Kyeretwie SHS	4	2.5
Osei Tutu SHS	2	1.0
Pankrono SHS	1	.5
Pentecost SHS	6	3.0
Prempeh College	24	12.0
Presbyterian Boys SHS	1	.5
Presbyterian SHS	1	.5
Rising Sun SHS	1	.5
Serwaa Nyarko SHS	5	2.5
Shama SHS	1	.5
St Joseph International School	1	.5
St Louis SHS	12	6
Swedru School of Business	2	1.0
T.I Ahmadiyya SHS	7	3.5
University practice	7	3.5
UEW	3	1.5
Yaa Asantewaa Girls	4	2.0
Total	200	100.0

Source: Field data, 2020

From table 1, all the respondents who were targeted participated in responding to the instrument administered which gave a total percentage of 100.

3.9.1 Demographic information

This segment gives the population information on respondents' demographic characteristics. On this page, the following is described elements are the concepts covered in this section: gender and the school a student was enrolled in.

3.9.2 Gender distribution of respondents

Respondents were more than half male in number. The overall number of respondents who attended males' schools was greater than the number of girls, as two of the schools were boys' schools. In Table 2, the percentage of responses dependent on gender is mentioned.

Table 2: Gender distribution of respondents

Item	Frequency	Percent
Male	128	64.0
Female	72	36.0
Total	200	100.0

From table 2, it turned out that the responses provided were gender sensitive. Male students represented approximately 64% as compared to female students who were approximately 36% of the students' category. In total, all the 200 questionnaires administered were accordingly responded to by our targeted respondents.

3.9.3 Age of respondents

There was also an examination of the respondent's age. Table 3 summarizes the survey results.

Table 3- Age distribution of student Respondents

Age	Frequency	Percent
13	2	1.0
16	3	1.5
17	7	3.5
18	16	8.0
19	39	19.5
20	49	24.5
21	48	24.0
22	3	1.5
23	19	9.5
24	2	1.0
25	4	2.0
26	2	1.0
28	1	.5
30	4	2.0
32	1	.5
Total	200	100.0

Field data, 2020

Table 3 shows that 49 (24.5%) of the students were 20 years, 48 (24%) of the students were 21 years, 39 (19.5%) of the students were 19 years, 19 (9.5%) of the students were 23 years, 16 (8%) of the students were 18 years, 7 (3.5%) of the students were 17 years, 4 (2%) of the students were 25 and 30 years, 3 (1.5%) of the students were 16 and 22 years, 2 (1%) of the students were 13, 24 and 26 years and 1 (0.5%) of the students were 28 and 32 years.

V. Presentation and Discussion of Main Results

This part of the study presents the findings and discussions of the

Question 1. What is the impact of digital games on students' academic performance in learning?

Table 4: Influence of digital game-based on the academic performance of students

S/N	Items on parental education level	Mean	Std. Deviation	Decision
10	Indicate how much you agree or disagree with the following statement: "I looked forward to the days that we used computers as part of class activities."	4.40	0.49	SA
11	How would you rate your experience with Digital Game-Based Learning activities?	4.55	0.50	SA
12	Compared to other lessons, how much do you think that you learned by using interactive simulations (Digital Game-Based Learning)?	4.52	0.49	SA
13	Indicate how much you agree or disagree with the following statement: "Video games and computer simulations help me to learn."	4.51	0.51	SA

14	Compared to other forms of school work (e.g., worksheets, homework, assignments), do you like playing the game design to learn the school works?	4.53	0.50	SA
15	Do you feel that playing the lessons video game helped you understand concepts and increase your skills?	4.55	0.49	SA
16	Was it easy for you to learn how to play the lesson game?	4.54	0.50	SA

A = Agree, SA = Strongly Disagree,

There are items 10-16 that have mean scores that fall within the range of 3.5-4.49. Table 4 shows that students' academic performance has a significant impact on learning via the usage of digital game-based learning. Digital game-based learning was shown to have a considerable impact on academic performance in all items with a mean score between 3.5 and 4.49, indicating that students strongly agreed with this statement. The researcher thought most of the products affected by digital game-based learning were appropriate. This shows that the respondents thought that students' academic achievement was impacted by digital game-based learning. Digital game-based learning, it may be established, has a substantial impact on academic performance.

The findings are consistent with those seen in Serrano et al. (2019) citing from Liu et al. (2011), which found an increase in student learning and understanding of science after introducing the concepts to the students through digital game-based learning with 20-oriented tests. Mathematics Assessment Resources Service or MARS was first introduced in 2007 by the Bill and Melinda Gates Foundation, which consist of tasks that utilize game play to stimulate students' creativity. This study also agrees with Ter Vrugt et al. (2015), who measured the effect of calculating fluency on cognitively (addition, subtraction, and division) with the children in the Tempo test (Tempo Reken) and discovered that academic students performed better. It is further supported by (Liu, 2014) in the claim that science evaluation test scores will show a rise in awareness, from pretest to posttest as shown by the greater increase in scores on the assessments before the use of modern media-based learning tools such as interactive games.

Question 2: What is the influence of parental level of education on students' academic performance?

To find out if Digital game-based learning influences will have a positive effect on the academic performance of students in Kumasi Metropolis. A wide range of parents' educational levels is examined to meet this criterion based on this, the students were asked to identify their parents' educational status, which options were given; Below Primary, Junior High, Senior High, First Degree, Master's Degree, Ph.D., and Others. The responses of students according to their mother and father educational level are presented in table 4 and table 5 respectively.

Table 5: Distribution of fathers' educational Level

Fathers Educational level	Frequency	Percent
Below Primary School	1	.5
Junior High	18	9.0
Senior High	45	22.5
First Degree	67	33.5
Master's Degree	28	14.0
PhD	41	20.5
Total	200	100.0

Source: Field data 2020

As shown by table 5, 67 respondents (33.5%) who participated in the study indicated that their fathers had completed First Degree; 45 of the respondents (22.5%) who participated in the study indicated that their fathers had attained a Senior High School Certificate; 41 of the respondents (20.5%) indicated that their fathers had also attained a PhD; 28 of the respondents (14%) indicated that their fathers had attained a Master's degree; 18 of the respondents (9%) indicated that their fathers had completed Junior High and only 1 of the respondents (0.5%) indicated that their fathers had below primary education. These results suggest that most fathers in the sample have been to school at least at the secondary level, which may influence their children's academic achievement.

Table 6: *Distribution of students on mothers' educational level*

Mothers Educational Level	Frequency	Percent
Below Primary School	4	2.0
Junior High	36	18.0
Senior High	40	20.0
First Degree	84	42.0
Master's Degree	14	7.0
PhD	22	11.0
Total	200	100.0

Source: Field data, 2020

As seen in Table 6, most of the mothers of the participants were exposed to more than elementary school, which may be influencing their children's academic success. It was also questioned how much parents' education standard affected their academic achievement. Table 6 indicates the summary of the extent of influence of digital game-based on the academic performance of students as indicated by the respondents.

Table 7: *Parental educational level and its influences on students' academic performance.*

S/N	Items on parental education level	Mean	Std. Deviation	Decision
17	Educated parents always want their children to be educated.	4.0850	.34404	SA
18	Parents who are educated provide most of the recommended textbooks and other learning aids for their children.	4.0650	.34840	SA
19	Parents who are educated encourage their children to study subjects which are pivotal for good university courses.	4.0350	.38013	SA
20	In homes of educated parents, there is a conducive environment for studies.	4.0400	.35923	SA
21	Educated parents arrange for supportive teachers for the subject/subjects which their words/children find difficult in the school.	4.0700	.43131	SA
22	Parents who are educated guide their children in school assignments and homework.	4.0200	.36090	SA
23	Educated parents always demand progress reports of their children to know the children's academic and social progress.	4.0500	.35797	SA

A = Agree, SA = Strongly Disagree,

Table 7 reveals that items 17-23 have mean scores that are within the limit (4.00) accepted by the researchers. From table 9, respondents showed a strong agreement with the fact that educated parents always want their children to be educated and this came with a mean and standard deviation of (4.05,0.43) respectively. All the items under influence of parental education on academic performance had a mean within 3-4 which indicated that respondents showed an agreement to the fact that their parents' education level has a significant influence on their academic performance. For this study, the researchers agreed to recognize all things up to parental educational standard. Teachers evaluated student academic achievement in relation to their degree of parental schooling. In conclusion, it can be deduced that the quality of schooling parents have has an effect on a student's academic achievement. This result is consistent with a theory that maintains that parental levels of schooling have an influence on student academic performance. Finally, this research concurs with Ryan and Deci (2000) who assert that greater parental involvement in schooling results in greater academic success for student. In addition, the studies that have been done agree with Murray and Fairchild (2009) show that the academic and

behavioral effects of the children are strongly tied to their parents' educational attainment levels. A recent study has shown that higher level educated parents have some degree of impact on their children's educational and career progress, although not as much as low level educated parents.

Question 3: What influence does parental occupation have on students' academic performance?

This study also examined the influence of parental occupation on academic performance of students in the Kumasi Metropolis. In order to deal with this objective, parental occupation of students was assessed. Parental employment is a combination of the occupations of both the father and the mother. Petty traders, traders, lawyers, doctors, pharmacists, farmers, engineers, teachers, civil servants, contractors, lecturers, and other professions made up the majority of the workforce. Students were asked about their parents' occupations, and the results are summarized in table 8.

Table 8- Parents' occupation

Occupation	Frequency	Percent
Petty Trader	2	1.0
Trader	68	34.0
Lawyer	3	1.5
Medical Doctor	13	6.5
Pharmacist	20	10.0
Farmer	9	4.5
Engineer	2	1.0
Teacher	37	18.5
Civil Servant	26	13.0
Contractor	5	2.5
Lecturer	11	5.5
Others	4	2.0
Total	200	100.0

Source: Field data, 2020

From table 8, 68 of the respondents (34%) provided that their mothers were involved in trading; 37 of the respondents (18.5%) provided that their mothers were involved in teaching, 26 of the respondents (13%) provided that their mothers were involved as civil servant, 20 of the respondents (10%) provided that their mothers were involved as pharmacist, 13 of the respondents (6.5%) provided that their mothers were involved as medical doctors, 11 of the respondents (5.5%) provided that their mothers were involved in lecturing, 5 of the respondents (2.5%) provided that their mothers were involved as contractors, 3 of the respondents (1.5%) provided that their mothers were involved as lawyers, 2 of the respondents (1%) provided that their mothers were involved as engineers, 2 of the participated respondents (1%) stated that their mothers were into petty trading; 4 of the respondents (2%) indicated that their mothers' occupations can be found in the other category. Only 9 of the participated respondents (4.5%) stated that their mothers were farmers. From the summary it was realized that majority of the participated respondents' mothers are into lucrative occupations which may have an influence on the academic performance of students.

Students were asked a number of questions on how their parents' jobs affected their academic achievement, and the results are shown in the table.

Table 9: Parental occupation and its influences on students' academic performance.

N	Items on parental occupation	X	S D	Decision
24	Some occupations do not give parents time to attend to their children's academic needs.	2.87	1.13	A
25	Parents on low-earning occupations find it difficult to provide learning aids for their children.	2.35	0.79	D

26	Parents who are poor farmers can only enroll their children into minor apprenticeship programmes.	2.17	0.60	D
----	---	------	------	---

Source: Field data, 2020

NOTE:

SA = STRONGLY AGREE

A = AGREE

D = DISAGREE

The tests conducted on the table revealed that one of the items tested had scores elevated by parental occupation having a mean of over 2.50. The results suggest that some careers do not allow parents to offer their children their proper attention to their academic requirements. Furthermore, findings suggest that parents on low-income jobs are not finding it challenging to provide educational support for their children, while parents who are poor farmers can enroll their children into other programs more than minor apprenticeship programs. Parents' occupations have an important impact on student academic performance in the answers indicated by this research.

The research results align with that parents want their children to enter careers because it means their kids can grow up to be better adults (an argument of Ekwuiji et al., 2001) cited from (Chikweru Amadi et al., 2018). Doctors, judges, and other talented members of the upper class will also be similar kin. Uwoma (2006) in her research, "the most vocational students are children of farmers or craftsmen," she notes. Similar to all previous research, however, the results in this study agree with Eke (1999) which claimed that the type of employment of parents has no effect on their children's academic success. People may draw different conclusions about the research of these scholars because of a different method of data processing. Instead of applying commodity moment correlation, other researchers such as Uwoma (2006) and Ezeji (2001) used the t-test for their study, while Eke (1999) employed the approach of moment correlation.

Question 4: What is the influence of parents' income on students' academic performance?

The study's final goal was to determine the amount of parental income. Each respondent was assigned a parent-income category based on their average monthly earnings as a couple, which were divided into six ranges: below GH500; within GH500-1000; within GH1100-1500; within GH1600-2000; within GH2100-3,000; and finally between GH3,001 and more. Additionally, items on parental income impact were utilized to examine how parents' money affects their children's academic success. Tables 10 and 11 summarize the replies of those polled on their parents' earning levels.

Table 10-Distribution of Average Income

Income	Frequency	Percentage
below GH¢500	7	3.5
GH¢500-GHS1000	12	6.0
GH¢1100-GHS1500	19	9.5
GH¢1600-GHS2000	36	18.0
GH¢2100-GHS3000	41	20.5
GH¢3000 and above	85	42.5
Total	200	100

Table 10 presented above highlights that 85 of the student respondents (42.5%) provided that their parents earned an average monthly income of GHS3000 and above; 41 of the respondents (20.5%) also indicated that their parents earned an average monthly income of GHS2100-GHS3000; 36 of the respondents (18%) indicated that their parents earned an average monthly income of GHS1600-GHS2000; 19 of the respondents (9.5%) indicated that their parents earned an average monthly income of GHS1100-GHS1500, 12 of the respondents (6%) indicated that their parents earned an average monthly income of GHS500-GHS1000 and 7 of the respondents (3.5%) indicated that their parents earned an average monthly income of below GHS500.

Table 11: *The influence of parents' income on students' academic performance.*

S/N	Items on parental occupation	X	SD	Decision
27	Children from high-income status parents achieve better academically than those from low-income status parents.	2.19	0.66	D
28	Parents on high-income can afford to provide the basic necessities required for their children's education.	3.05	1.06	A
29	Children from upper-working class homes perform better academically than those from lower-working class homes.	2.19	0.61	D
30	Children whose parents are on high-income status have higher career aspiration than children whose parents are on low-income status.	2.28	0.71	D
31	Only parents who are on high-income status can train their children beyond secondary school level.	2.12	0.65	D

Source: Field data, 2020

A= Agree D= Disagree

The figure that appears on the table reveals that only one of the questions (question #28) asked respondents' comply with the statement that people on high-income are able to afford to have essential requirements for their children's schooling, demonstrating that they believe parents of high incomes should meet the educational needs of their children. The students didn't think parental income had an impact on their academic performance of students, but accept that only high-income parents' provide enough to meet specific requirements. As parents' family income levels and student academic performance are not linked, it can be inferred that financial status has little effect on their academic performance by means, no matter learning using digital game based learning.

The results of this research challenge the assumption that the overall family income is positively correlated with students' academic achievement. Ghia (2013) believes overall family income is a significant for students. The new study is at odds with the results of the previous work by Adzido (2016) which found that families' income level has a positive impact on the academic outcomes of their children. While having a higher family income might help the students do better in school, it's unreasonable for under privileged students must not use an excuse for poor performance of responsible and serious students.

The above statistics demonstrate a substantial effect of digital game-based learning on students' academic performance, but parents' income status has no impact on that. It supports the views of Ugwu (2010) that students from high-income families have a distinct advantage in academic achievement over those from low-income families because their parents can afford needed educational materials and equipment. Brembah (2013) this study found that factors as the sex of the household head, annual income, number of people in the household, etc. had a significant influence on the academic performance of the student. But Ebong's (2005) results showed no correlation between parental occupation and student achievement.

VI. Conclusion and Recommendation

The primary goal of this research was to determine whether or not digital game-based learning in Kumasi Metropolis, Ghana, and schools affects students' grades from primary to high school. After determining how digital game-based learning influences students' academic performance and how parents' educational level impacts their children's academic performance in Kumasi, Ghana, researchers set out to examine how parents' occupations and family income levels affect their children's academic performance in Kumasi, Ghana. This study made use of the descriptive survey design.

A total of two hundred (200) students' were included in this study's sample, which was drawn from several schools in the Kumasi metropolitan area. The primary data collecting tool was a questionnaire on the usage of digital game-based learning as a predictor of student achievement. The numerical values given to the replies in the questionnaires were used for the purpose of the research. In order to acquire quantitative data from the surveys, replies to the items and the closed-ended questions were given numerical values. The Statistical Package for Social Sciences (SPSS) was used to conduct a quantitative analysis of the data (SPSS). The data was processed and displayed in tables as a result of this.

Digital game-based learning had a significant impact on student performance; parental education, occupation, and income all had a significant impact on students' academic performance; however, parental income had a negligible impact on students' performance. The following are the findings from the analysis.

VII. Summary of the Findings

The results of the investigation are summarized in this section. This section focused on the study's goals, which included examining the effects of digital game-based learning on student academic performance, as well as the effects of parental educational level, family income, and profession on student academic performance. Based on the study's goals, this was given.

As a result of the data gathered, the study's conclusions were presented and summarized in the same order as the research questions.

A) Influences of digital game-based learning on students the academic performance.

The findings of the study show that;

1. Students really looked forward to the days that we used computers as part of class activities.
2. Students have highly experience with Digital Game-Based Learning activities.
3. Compared to other lessons, students think that they can learn more by using interactive simulations (Digital Game-Based Learning).
4. Students know and think that "Video games and computer simulations help them to learn."
5. Students prefer playing the game design to other types of school work (e.g., worksheets, homework, assignments).
6. Students said that playing the video game helps them better comprehend ideas and improve their abilities.
7. Students were able to quickly grasp the instructional game's mechanics.

B) Influence of parental level of education on students' academic performance:

According to the survey,

- 1) Educated parents are constantly concerned about their children's education.
- 2) Most of the suggested textbooks and other learning aids are provided by parents who are well-educated.
- 3) When parents are well-educated, they urge their children to study material that will be crucial to their college education.
- 4) When parents are well-educated, their children have a better chance of succeeding in school.
- 5) Parents who are well-versed in the educational system will seek out instructors who can provide encouragement and assistance to their children in the subjects that they know would be challenging.
- 6) Parents that are well-educated help their children with schoolwork and homework tasks.
- 7) Parents who are well-educated seek regular updates on their children's academic and social advancement.

C) Influence of parental occupation on students' academic performance.

According to the research

1. There are certain vocations that don't provide parents the time they need for their children's education,
2. If you're a low-income parent, buying educational materials for your kids isn't a big deal.
3. The only other option for parents of impoverished farmers is to enroll their children in better schools rather than modest apprenticeship programs.

D) Influence of parental level of income on students' academic performance.

In the research,

- 1) Students with higher socioeconomic position did not outperform those with lower socioeconomic status in terms of academic achievement.
- 2) High-income parents can afford to provide their children's education with the basic essentials.
- 3) Students from upper-class families do not outperform those from lower-class families in terms of academic performance.
- 4) Students with high-income parents are less likely to have loftier professional goals than their low-income counterparts.
- 5) Not only parents with a high socioeconomic standing can afford to educate their children through secondary school.

VIII. Conclusion

The results in this paper back up every assertion made in it. In order to see whether pupils in Kumasi, Ghana, benefit from digital game-based learning, researchers conducted a study. According to the research, the use of computer game-based learning approaches had a substantial impact on their student's academic

performance. When students studied science concepts using Digital game-based learning, the researchers at Liu et al. (2011) discovered that their general academic performance had improved on a 20-item scientific test. Additionally, the Bill & Melinda Gates Foundation used performance-based activities in MARS (Mathematics Assessment Resources Service). De Vos's TTR (Tempo Test Rekenen) was designed in 1992 to test students' arithmetic computation fluency (addition, subtraction, multiplication and division) and demonstrated a favorable correlation with students' academic success, according to the findings of Ter Vrugte et al. (2015). A rise in scientific knowledge assessment scores from pre- to post-test and a reduction in doubtful replies, as revealed by the findings of Alien Rescue, suggest that new media learning environments, such as digital game based learning, may positively benefit student learning (Liu et al. 2002). According to research and reviews of the literature, digital game-based learning affects students' academic achievement. Again, influence of parental educational level on students' academic performance in some selected schools in Kumasi Metropolis. The study revealed that parents with higher levels of education are more likely to be involved in their ward's schools. This involvement results in consistent academic achievement in class. The opinion expressed by Onochie and Okpalla (1985) agrees with this research, which demonstrates that socio-economic status of parents influences academic achievement and importance of children. Izundu (2005) suggests a strong correlation between the level of parents' schooling and their children's academic performance. Based on this research, we believe that students' academic performance is highly related to their parents' educational level.

Again, with regards to investigating the influence of parents' occupations on students' academic performance in some selected schools in Kumasi Metropolis, it had been revealed that prestigious occupation had an influence on students' academic performance and such parents' want their children enter an equivalent occupation as theirs. This mirrors the statement of Ekpenem (2001) who says that parents want to see their children succeed. Many people who are known for their creativity include doctors, engineers, engineers, and artists, among others. According to Uwoma (2006), many students in this sample came from rural or blue-collar families. The findings do not support this argument, according to Eke (1999), parental occupation has no bearing on the academic performance of students. The results indicate that parental involvement has significant influence on student academic performance.

As a final conclusion, we found that students from high-income status parents and upper-working class houses do not do better academically than those from lower-income status parents. According to Ojo and Yilma (2010), the socioeconomic position of a family may influence the conduct of pupils and decide their goal. This was in contradiction to our findings. When it comes to college preparation, families with a higher socio-economic level are often better equipped to provide high-quality child care and books for their children. As a result of the aforementioned findings and the literature analysis, it can be said that a student's academic performance is not much affected by the family economic level.

IX. Recommendations

Based on this background, the researchers make the subsequent recommendations:

1. One among the main findings of this study is that digital gamed based learning has an influence on students' academic performance. During this case, it's recommended that, parents should provide all required materials that's needed by students to be used for during their digital game-based learning classes to support their academic performance.
2. Another major finding of this study is that parental educational level features a great influence on students' academic achievement. For instance, in most cases, parental level of education is proportional to the academic achievement of their children. During this case, it's recommended that, the academic achievement of parents shouldn't be the sole factor motivating students' academic performance.
3. Another finding of the study is that income of parents doesn't influence students' academic performance. This could not be an excuse for parent's to not provide their wards with the required study materials to support their academic performance. It's recommended that parents should provide their wards with the required learning materials and support.
4. It was also found that, parental occupation influences the academic performance of students. Parents with socially recognized occupations relatively have an interest in their wards' education and seek to watch their academic progress. However, parents with less socially recognized occupations motivate their wards to realize better academic performance in order that they don't find yourself like them. It's therefore recommended that, students regardless of the occupation of their parents should aim at achieving the best in their academic endeavor.

REFERENCES

- [1]. Arbuckle, J. L., & Worthke, W. (1999). AMOS 4.0 Users Guide [Computer Software Manual]. Chicago, IL: Smallwaters.
- [2]. Awino, J. O., & Agolla, J. E. (2008). A quest for sustainable quality assurance measurement for universities: Case study of the University of Botswana. *Educational Research and Reviews*, 3(6), 213.
- [3]. Barbosa- Leiker, C., Kostick, M., Lei, M., McPherson, S., Roper, V., Hoekstra, T., & Wright, B. (2013). Measurement invariance of the perceived stress scale and latent mean differences across gender and time. *Stress and Health*, 29(3), 253-260.
- [4]. Bassey, B. A. (2012). *A Wider View of Classroom Management*. Uyo: Ekong Publishing House, Nigeria
- [5]. Best, J. W. (1996). *Research in Education*. New Delhi: Prentice Hall.
- [6]. Burnham, K. P., & Anderson, D. R. (2002). *Model Selection and Inference: A Practical Information-Theoretical Approach* (2nd Edition). New York: Springer.
- [7]. Bush, G. (2006). Learning about learning: from theories to trends. *Teacher Librarian*, 34(2), 1419.
- [8]. Cai, J., Perry, B., Wong, N. Y., & Wang, T. (2009). What is Effective Teaching?: Study of Experienced Mathematics Teachers from Australia, the Mainland China, Hong Kong-China, and the United States. In *Effective mathematics teaching from teachers' perspectives* (pp. 1-36). Brill Sense.
- [9]. Carter, H. (2010). Teacher who attacked pupil with dumbbell given community order [Online] Available at:<<https://www.theguardian.com/education/2010/may/24/teacher-dumbbell-peter-harvey-community-order>> [Accessed on Feb 8th, 2019]
- [10]. Carter, K. (1990). Teacher's knowledge and learning to teach. In W. R. Houston (Ed.), *Handbook of research on teacher education* (pp. 291–310). New York: Macmillan.
- [11]. Charlie, M. U. (2006). *Discipline and Management in the Classroom: Theory and practice*. Kaduna: Joyce Graphic Printer and Publishers Company, Nigeria.
- [12]. Chinaveh, M. (2013). The Effectiveness of Multiple Stress Management Intervention on the Level of Stress, and Coping Responses Among Iranian Students. *Procedia*, 84, 593-600
- [13]. Cohen, E. (1994). *Designing groupwork: Strategies for the heterogeneous classroom*. New York: Teachers College Press.
- [14]. Cohen, S., Kamarck, T., & Mermelstein, R. (1983). Aglobalmeasureof perceived stress. *J HealthSocBehav*, 24(4):385–396.
- [15]. Cohen, S., Kessler, R. C., & Gordon, L. U. (1995). Strategies for measuring stress in studies of psychiatric and physical disorders. In S. Cohen, R. C. Kessler, & L. U. Gordon (Eds.), *Measuring stress: A guide for health and social scientists* (pp. 80 -101). New York: Oxford University Press.
- [16]. Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.
- [17]. Den Brok, P. J., Brekelmans, J. M. G., & Wubbels, T. (2004). Interpersonal teacher behaviour and student outcomes. *School Effectiveness and School Improvement*, 15, 407-442.
- [18]. den Brok, P. J., Fisher, D., & Scott, R. (2005). The importance of teacher interpersonal behaviour for student attitudes in Brunei primary science classes. *International Journal of Science Education*, 27, 765-779.
- [19]. Díaz, C., González, G., Jara-Ramírez, L. I., & Muñoz-Parra, J. A. (2018). Validation of a Classroom Management Questionnaire for pre and Inservice Teachers of English. *Revista Colombiana de Educación*, (75), 263-286.
- [20]. Dolbier, Ch., Smit, sh., Steinhardt, M. (2007). Relationships of protective factors to stress and symptoms of illness. *AM J Health Behave*,31(4):423-433
- [21]. Dougall, A. L., & Baum, A. (2001). Stress, health and illness. In A. Baum, T. A. Reversion, & J. E. Singer (Eds.), *Handbook of health psychology* (pp. 321-337). Mahwah, NJ: Lawrence Erlbaum
- [22]. Effiong, U. A. (2007). *Dealing with Disruptive Behaviours in the Classroom*. Calabar: Hilcop Printing Press, Nigeria.
- [23]. Ekere, O. S. (2006). *Concept of Disruptive Behaviour Among Students in Public Secondary Schools*. Uyo: Ekpeyong Publishers, Nigeria.
- [24]. Martin, N., Schafer, N., McClowry, S., Emmer, E., Brekelmans, M., Mainhard, T., & Wubbel, T. (2016). Expanding the definition of classroom management: Recurring themes and conceptualizations. *Journal of Classroom Interaction*, 51, 31–41.
- [25]. Marzano, R. (2003). *What works in schools*. Alexandria, VA: Association for Supervision & Curriculum Development. Okutan, M. (2005). Sınıf yönetiminde örnek olaylar [Case studies of classroom management]. *MilliEğitim*, 33 (168). Retrieved from http://dhgm.meb.gov.tr/yayimlar/dergiler/Milli_Egitim_Dergisi/168/index3- okutan.htm
- [26]. Marzano, R. J., Marzano, J. S., & Pickering, D. J. (2003). *Classroom management that works: Research-based strategies for every teacher*. Alexandria, VA: Association for Supervision and Curriculum Development.
- [27]. Marzona, R. E. (2008). *Teachers' Effectiveness in the Classroom*. Ilorin: Gashen Print, Nigeria.
- [28]. Mckee, J. G. (2001). *Toward an agenda for induction: Perceptions of beginning teachers and student teachers*. Paper presented at the Annual Conference of the Eastern Educational Research Association, Boston, MA
- [29]. Misra, R. & Castillo, L. (2004). Academic Stress among College Students: Comparison of American and International Students. *International Journal of Stress Management*, 11, 132-148
- [30]. Misra, Ranjita; Castillo, Linda G., (2004) Academic Stress Among College Students: Comparison of American and International Students. *International Journal of Stress Management*, 11(2), 132-148.