



**Interdepartmental Programme of Postgraduate Studies in  
Management Information Systems**

**Master's Thesis**

**Game Based Learning's Impact in Learning Achievement:  
A Systematic Review**

**Andromachi G. Boikou**

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To my partner,  
for tolerating me all these years.

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## Abstract

Business Simulation Games are increasingly used in learning process, allowing participants to exercise real world skills and providing them all necessary feedback in order to learn from their mistakes in a “safe” environment. Current research has quite controversial results concerning the learning outcomes business simulation game’s users attain. Moreover, there is a lack of studies concerning the cognitive practices students employ when playing a game. This study discusses business simulation games and their impact in learning outcome, associated with Critical Thinking Dispositions (CTD), Motivation (MOT) and Team Skills (TS), as well as the impact of pc skills, gender and hours of game playing per week. This work expands current research by (1) recording game based learning’s impact for each cognitive level of Bloom’s SOLO taxonomy, (2) searching the possible impact of motivation combined with CTD may have in learning achievement and (3) testing whether educational games can improve CTD. Eighty (80) university students used McGraw Hill’s Education “Practice Marketing”, a Simulation Game used for practising a business marketing plan. A pre and post theory test based on Bloom’s Solo taxonomy was used in order to measure learning achievement. A paired-samples t-test was conducted to evaluate the impact of the game's practice on Student's scores, and a statistically significant increase in test scores was found. Data was collected through a self-administered Likert-style questionnaire that was distributed to all students before and upon completion of the simulation. A multiple linear regression was calculated for Test scores based on perceived Critical Thinking Dispositions (CTD) and Motivation (MOT) and were both not found significant predictors of Test scores. A paired-samples t-test was conducted to evaluate the impact of the game's practice on Student's CTD and no statistically significant increase was found. The relationship between perceived team skills and game scores was investigated using Pearson product – moment correlation coefficient and a strong, positive correlation was found. A two way between groups analysis of variance was conducted to explore the impact of gender, pc skills and hours of game play per week on learning achievement and no significant main effect or interaction effect was found in the overall analysis.

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## 1. Introduction

This study discusses business simulation games and their impact in learning outcome, associated with Critical Thinking Dispositions, Motivation and Team Skills. For the needs of this research, 80 university students from Economics (N=38) and Business Administration Department (N=42) used McGraw Hill's Education "Practice Marketing", a simulation game where students practice marketing strategy and try to successfully launch their new backpack product to the market, based on the framework of the "4 Ps" of marketing: Product, Price, Placement, and Promotion (McGraw Hill Education, 2017). Through the game's practice, students will have to analyze different strategic marketing plans and evaluate their decisions based on their knowledge gained from the course's lectures.

The following questions were set:

1. Does practicing an educational game have a positive impact in learning process and does it contribute in improving understanding ability of content?
2. Do higher levels of Motivation and Critical Thinking Dispositions contribute in better learning results?
3. Does practicing an educational game have a positive impact in Critical Thinking Dispositions?
4. Do higher levels of teamwork skills contribute in higher test and game scores?
5. What is the impact of pc skills and gender on test scores and score improvement? Does gender moderate the relationship between pc skills, hours of game playing and test scores?

Participants took part in two tests, before and after practicing the game, in order to measure their learning level based on Bloom's Solo taxonomy levels of understanding. Each test had 9 questions for uninstructural level, 10 questions for multistructural, 10 questions for relational level and 6 questions for extended abstract level. A five scale self-administered Likert-style questionnaire ranging from "completely disagree" to

“completely agree” was distributed to all students before and upon completion of the simulation, in order to measure their Motivation, Critical Thinking Dispositions and Teamwork Skills. A questionnaire based on the California Critical Thinking Disposition Inventory (CCTDI) was used for CTD’s measurement and another questionnaire based on the Academic Motivation Scale (AMS) was used to measure motivation. Teamwork Scale for Youth Questionnaire was used to measure teamwork skills. Participants were randomly divided into two groups, where the first group (N=40) would practice the game individually as homework and second group (N=40) would practice the game in teams in class, with each team consisting of 3 students while competing the other teams at the same time.

## **2. Review of Literature**

### **2.1 Bloom’s solo taxonomy**

Bloom's taxonomy consists of hierarchical levels which categorise educational learning aims and outcomes in levels of successively complexity. Three main domains determine each educational level (Wikipedia):

- The cognitive domain, referring to knowledge, comprehending, applying, analysing, synthesising and evaluating
- The affective domain which is based on emotions and refers to receiving, responding, valuing, organising and characterising
- The psychomotor domain, based in action and referring to perception, readiness to act, guided response, learning mechanism, complex response, adaptation and new path origination.

SOLO (Structure of Observed Learning Outcomes) is a structured learning model which develops a common language with measurable outcomes and helps both teachers and students to understand the learning process. It provides a simple and systematic way to describe how a learner’s performance grows in complexity from surface to deep understanding (Teaching and Educational Development Institute, 2018). Solo taxonomy

enables a quality evaluation of students' learning performance. There are five SOLO levels of understanding:

- Prestructural, where student has not yet understood the topic and needs help.
- Unistructural, where student has one relevant idea. Some verbs that describe this learning level are define, identify, name, draw, find, label, match, follow a simple procedure.
- Multistructural, where student has several relevant ideas. Some of the verbs describing this level are describe, list, outline, complete, continue and combine.

After this point we enter a deeper knowledge conquer and understanding:

- Relational level, where student can relate and integrate theories. Verbs describing this level are sequence, classify, compare and contrast, analyse, form an analogy, organise, distinguish, question, relate, apply.

Finally, student attains conceptual or constructed knowledge:

- Extended abstract level, where the student has taken the related ideas and extended them. Verbs describing this level are generalise, predict, evaluate, reflect, hypothesise, theorise, create, prove, justify, argue, compose, prioritise, design, construct and perform. (Biggs)

SOLO is a theory that helps the whole procedure of teaching and learning, rather than just a theory about knowledge. It offers useful diagnoses and feedback revealing which actions should be taken next during learning procedure, helping to plan objectives and success criteria, describe learning outcome and focus on progress (Hattie & Brown, 2004).

## **2.2 Educational Games**

Many have argued about the necessity of failure in the learning process. (Klein, et al., 2007). As the saying goes, no one can learn to ride a bicycle from a great lecture - knowledge is useful only in context, and virtual environments provide one, ideally similar to the one in which the content will eventually be used (Gee J. , 2003). Only

with an emotional stake in the content does our brain release the necessary chemicals for memory (Ledoux, 1998).

The term EduGames encompasses video games, used in the classroom. Games have players who work to a defined set of rules and can be competitive or co-operative. They are most often used as icebreakers, energisers, or to release tension. No one has developed a term that is broadly accepted yet. Other terms for these games may include: Serious Games; Massively Multiplayer Online Learning Games (MMOLG); Immersive Learning Environments (ILE); Edutainment –themed games published for home use (Wilson, 2009). The problem of many educational games is that they easily lose 'gaming character', due to the integration of educational contents and, therefore, their enjoyment and motivational capacity (Boeker, Andel, Vach, & Frankenschmidt, 2013).

Game based learning (GBL) is the process of using games with competitive and interactive exercises in the learning activity to motivate students. In order to create a truly educational game, the instructor needs to make sure that learning the material is essential to scoring and winning, allowing the learner to have fun while gaining knowledge (Starting point, 2018). Edutainment is a vast section that includes all process of entertaining people while teaching them something at the same time (Cambridge Dictionary, 2018). Class games and activities are short activities in order to engage students, mostly used to increase comfort and reveal student's current knowledge – some of them also use existing technology and infrastructure.

A "simulation game" is a simplified and dynamic model of a real or hypothetical system where players, following a set of rules, compete or cooperate in order to win a specific goal. Simulation based games allow trainees to compete against one another and understand how to adapt their decisions to the interactive effects of the environment and multiple competitors. Simulation applies to a game format that is suitable for educational purpose – they are structured environments, abstracted from real life action, with stated levels and goals, allowing participants to exercise real world skills, providing them all necessary feedback in order to learn from their mistakes in a “safe” environment. Simulations place users in a realistic virtual environment and require them

to take on roles representing real life actions. (Aldrich, 2009). A realistic scenario is necessary so participants can make valid decisions and plans. Relative information can be provided in written form, by a role play or by using video or audio tools. In a well structured realistic environment, they can also work in the area of attitudes and values as they cause users to participate and think through for themselves, realising the consequences of their decisions and attitudes. In a poorly designed structure where participants are unsure of details right at the beginning, they will be less willing to become involved in the necessary role play of the simulation. Without proper preparation, students also see simulations as abstract schemas, unrelated to their lives which can lead to further disengagement. Fidelity is defined as the degree to which a simulation is perceived as physically similar to the part of the real world that it is meant to simulate (Hamstra, Brydges, Hatala, Zendejas, & Cook, 2014). Some researchers suggest that a sufficient high fidelity is needed in some simulation genres in order to have useful results (Kadir, Zuhra, & Xu, 2011). Others suggest that fidelity's level is irrelevant from effectiveness in teaching through simulations (Hamstra, Brydges, Hatala, Zendejas, & Cook, 2014).

One of the most powerful tools for increasing the learner's problem-solving abilities are interactive simulations, helping them understand complex models, formulas and abstract theory by helping them visualize this concept with technology-enhanced tools. Simulations provide a model of abstracted reality, organised in levels of goal accomplishment in order to provide a more instructional and enjoyable experience. To accomplish this, a series of simulation, game and pedagogical elements are used. Simulation elements create an abstract reality environment interface giving the students the opportunity to make real life actions, providing them with the insight of how these actions affect relevant systems and also a feedback of their results. Game elements are techniques that aim to increase the student's motivation and engagement, such as awards, using an on screen character (avatar) combined with good graphics and design. They can build good will and lower tension but are also quite controversial as sometimes they tend to dilute the learning procedure. They are also subjective and not appealing to the same level to different cultures, ages or gender. Pedagogical elements represent the codification and access to content specific knowledge. They help the learners by providing them information of the actions they should make, how to use the interface, revealing them the relationship between choices and actions they make and

their results – and therefore helping them avoid a superstitious type of behaviour. They also guide them from the frustration of not knowing how to solve a problem to its resolution, trying different approaches and applying these outcomes in real life. Their challenge is to maintain a balance by not giving too much or too little help. They are best organised in tasks and levels to create challenging practice environments. A successful progress to the next level requires a demonstration of skills and knowledge. Level's interaction part could include a strategic decision first such as where to go, which items to choose etc, followed by the core game-play, where users also get a feedback for their actions. Simulations tend to go deep, acquiring much more time in their practice rather than their linear presentation in a lecture. Moreover, almost every learning process through practice takes longer than a theory presentation (Aldrich, 2009).

The fields of simulation and serious gaming have been growing rapidly, applying its disciplines in a constantly widening variety of domains such as defence, health care, education, risk management, business administration, city planning and engineering. Metaari, a market research firm that identifies revenue opportunities for learning technology suppliers, claims that serious game revenues spike to \$8.1 billion to 2022 (Metaari, 2017).

Practiceware, an educational simulation that enables action repeating in a high fidelity, real time environment, until the desired skills and knowledge are achieved. It includes many characteristics of a complex game, it has a high development cost for organisations to build it themselves or even customise it, and is more profitable for them to buy it off the shelf (Aldrich, 2009).

A business simulation game's classification can be made based on the learning goals and content (whether they are management or functional games), the learning environment (played in class room or applying distance learning), the way decisions are made (by each player or as a team), the way individuals and groups interact with each other through competition or not and finally, technology level (hand-scored, PC-based, internet-based) (Eckardt, Selen, & Wynder, 2015).

Off the shelf simulations provide students with a well designed, immersive learning environment, giving them the possibility to analyze data from their actions and trials. However, their pre-built environment doesn't allow students to express and explore their own understanding of a given theory through their practice. All possible interactions with simulations are needed for students to combine further skills in scientific thinking, even through studying and analyzing existing simulations, redesigning them, and even programming and building simulations themselves (Klopfer, Scheintaub, Huang, Wendel, & Roque, 2009).

### **2.3 Educational game's impact in learning process**

Electronic Arts, one of the largest game companies, introduces over 200 ways a character can die in every game, in an attempt to encourage players and make failure a fun and memorable part of their effort to accomplish the game (Wilson, 2009). Educational games seem to serve exactly this purpose – enabling the student to learn through practice, in a safe environment where mistakes won't have a negative impact on their grades. Through the interactive game playing and the story represented in it, students can learn about goals, rules, adaptation and problem solving (Wikipedia, 2008).

There are certain aspects that make game based learning an advantageous process. According to Mayo, many more people can be reached through a game than one single lecture, also attracting students outside the classroom. Video games stimulate chemical changes in the brain that promote learning and achieve higher effectiveness than a lecture and they are also designed including effective pedagogical elements such as experimental and inquiry-based learning, goal setting, cooperation, feedback and tailored instruction (Mayo, 2007). There are also some challenges though, as Schell summarizes them: Time constraints, as games usually require more time than a simple lecture. Age constraints, as they are designed to attract younger ages already familiar with game playing. Usually, good games' prices are quite high as they include a long design process, which involves many developers. Finally, there also many design

challenges in maintaining a balance of a game design which is both fun playing and still educational (Schell, 2008).

Serious games are games designed for a primary purpose other than pure entertainment. Easy and fun to engage, they are mostly used to build awareness for social issues. They are used in various domains, such as education, training and simulation, health, public policy, strategic communication, human performance engineering and game evaluation (Zyda, 2005). Serious games are an increasingly important medium, facilitating deep and sustained learning (Gee J. , 2003), reaching wide audiences and particularly young people who are familiar with digital game playing, the so called “game generation” (Prensky M. , 2006). Some researchers claim that any digital game may provide learning opportunities, however, regardless of whether a game is considered serious or an entertainment one, serious games is a genre that explicitly focuses on education (Ritterfeld & Weber, 2012). Moreover, serious games’ outcome is always advantageous for the player: they facilitate learning experiences by eliminating at the same time all negative or harmful impacts from possible mistakes. Serious games are usually designed to deliver educational value mediated through entertaining game mechanics (Bellotti, Berta, De Gloria, & Zappi, 2008). The question is how learning can be achieved through specific game mechanics, learning profiles and embedded social interaction. As Boyle et al. suggest, commercial off the shelf (COTS) games, such as massively multiplayer online role-playing games (MMORPGs) involve training and creation of communities of practice between players to gradually acquire new problem-solving skills and knowledge, which are used by players to create strategies that can resolve real-world situations (Boyle, Connolly, & Hainey, 2011). Research showed that game-based learning was largely better than learning via textbook, improving understanding ability of content, real-world experience, self-assessment, motivation, engagement and effectiveness (Taillandier & Adam, 2018).

Business simulation games (BSG) are used for business training or education in business schools. They efficiently provide experiential learning that is focussed and controlled. Every simulation includes several numerous assumptions that determine feedback, and in this way lessons are learnt. There are several argues however in today’s business simulation games as many of them can’t seem to avoid over-

simplification of the business context (Eckardt, Selen, & Wynder, 2015). These can't be afforded in a learning environment which main purpose is to enable players to make proper strategic, tactical, and operational decisions in a dynamic business environment. BSG's were implemented in business education from early 60's, often considered as business war games. (Kriz W. C., 2017) .

Simulations facilitate this sort of progressively learning procedure as they enable students to repeatedly practice and eventually move up Bloom's taxonomy to higher levels of mental abstraction (Alexander & Murphy, 1999). They reinforce students to apply knowledge they have learned in class to another, virtual environment. As important lectures may be, they don't always foster SOLO's taxonomy highest levels of complexity. In order to achieve higher understanding levels, active experimentation is crucial and simulations will be a great tool, integrating more complex skills of analysis, synthesis, and evaluation.

Educational simulations are more challenging than other genres of games used in education, concerning the skills and capabilities they have to provoke. They also require a coach and constant feedback. They apply to real life's challenges and environment so they directly relate to the participant's skills and their value is self evident. (Aldrich, 2009). They can be really helpful in teaching abstract theory which is always challenging for students, by exploring several what-if scenarios before an actual event happen, with complete control on all parameters. In participatory simulation human users interact with the simulated world by controlling some of the actors or agents in the system (Michael & Chen, 2006). Simulations have a double beneficial effect in students, as they place them in the position of a decision-maker while making them understand the complexity and the different issues of such decision-making. Simulation-based serious games are particularly interesting for raising awareness of various types of risks (Crovato, Pinto, Giardullo, & Mascarello, 2016). Many applications of gaming simulation fall into the category of education and training simulation games, used as experiential teaching and learning methods in order to develop skills and competencies, understanding of complex relationships and particularly to facilitate a safe learning environment to practice several dangerous tasks (Kriz W. C., 2017). Interactivity's culture embraces a learning goal of learning to know, to be and to do type. Students meet their learning needs while building self awareness, having a clear picture of their

unique strengths and weaknesses through a self evolving procedure of learning by doing.

One of Business simulation game's most important features is that it is expected that business students will have the opportunity to become more experienced and astute decision makers in uncertain situations (Anderson & Lawton, 2009). In many cases though better performance outcomes doesn't necessary indicate that participants improved their decision-making skills through the simulation. However, taking as a fact that through active learning and practice students improve and become more comfortable in certain environments, then simulation games do provide decision making practice or experience which should be useful in their further career. While traditional lectures are ideal to provide definitions, concepts and theory, decision making is also an empirical process (Wellington, Hutchinson, & Faria, 2017 ). According to Faria & Wellington, three main reasons that BSGs are first adopted are that they provide a decision-making experience, they allow theory's practice and help students familiarise with functional business areas (Faria & Wellington, 2004).

Current research has quite controversial results concerning the learning outcomes business simulation game's players attain. There is significant support for simulation based training - in a total of 11 experimental studies, Washbush & Gosen concluded that the use of simulations improved learning by an average of 10% on pre- and post-training knowledge assessments (Washbush & Gosen, 2001). A number of studies though have failed to find similar outcome (Cameron & Dwyer, 2005). Several others suggest that active experiential learning gained by simulations creates knowledge not easily measurable through traditional knowledge tests. There is a lack of studies concerning the cognitive practices and learning strategies that students employ when playing a game (Wideman, et al., 2007). Research may have shown that certain games can improve learning process for a variety of learners in different tasks, but this can't be sufficient to generalize to all game categories in every learning area and users, as there is no indication that games consist the most preferred educational tool for all situations (Hays, 2005). Familiarising students with a dynamic business environment demands innovative, flexible training approaches. Simulations seem ideal for creating realistic, experiential learning environments where users will be able to practice in "safe mode".

Employees need to possess skills which are not only specialized but also flexible in order to be sufficient adaptable to changing circumstances. Research suggests that to develop this adaptive expertise, trainees should be active participants in the learning process and learning should occur in a meaningful or relevant context (Moreno & Mayer, 2005).

Experience gained through practice is simulation and gaming's most important learning feature. Business simulation games represent an effective and sufficient approach to teaching and learning and contributes to students' engagement in Decision Support Systems (Ben-Zvi, 2010). Engagement and collaboration are achieved through practice and new skills are attained through the knowledge gained from learning from one's own trial and error (Scullion, Livingstone, & Stansfield, 2014), reinforcing both skill and knowledge (Harviainen, 2012). Simulations also contribute to experiential learning, an important component to developing emotional intelligence within organizations (Cherniss, Goleman, Emmerling, Cowan, & Adler, 1998). They can also prove effective in personal empathy building (Bachen, Hernández-Ramos, & Raphael, 2012) and teaching the way large social systems function (Sands & Shelton, 2010). Dankbaar et al. conducted an experiment comparing learning outcomes between two groups of students, one of them learning through playing a simulation game and the other through text based cases. They found that game practice increased students' motivation, not forcing them though to study longer, while both groups achieved the same learning outcomes and cognitive skills did not differ between groups (Dankbaar, et al., 2015). Simulations also contribute in cognitive mapping, as players develop and identify semantic patterns which help them through their strategy (Butler, 2017).

## **2.4 Motivation, engagement and their contribution to learning outcome**

Engagement is also an important feature in learning process. Social engagement is the sense of belonging in school's social life, while academic engagement refers to academic activities students engage to. Intellectual engagement is the conscious trial to increase knowledge and understanding, ability to resolve problems and form new theory models (Willms, Friesen, & Milton, 2009). Engaged learning students are involved in

active cognitive processes while getting psychological involved in the learning activities. (Kearsley & Shneiderman, 1998).

Engagement can be driven by student's own questioning and further interaction - plain observation of a simulation play is not sufficient. Therefore, there is great importance in adding inquiring activities to enhance the students' understanding, using game elements such as puzzles, riddles and fun visual aids (Adams, et al., 2008).

Motivation is very crucial and determines learning's outcomes: it refers to the level of engagement in goal orientation and achievement, persistence and self-efficacy. This suggests that one of motivation's most important features is the desire to conquer information and knowledge in an achievable manner. In game design elements, this has been captured in levels that a user passes after achieving certain goals, bridging the skill gap through this process. Feedback has an important role in this procedure, evaluating current performance relative to a goal and allowing users to optimize their performance (Powers, 1973). Economides suggests a framework for employing emotional feedback in Computer Adaptive Testing (CAT). In CAT questions adjust to learner's knowledge level in order to avoid both disappointment and boredom. Feedback helps in stimulating student's attention and knowledge development while providing them constant guidance and instruction, keeping them informed about their current condition, strengths and weaknesses (Economides, 2006). Trial and error in games and simulations don't provoke the usual anxiety and threat students feel in class. It's not unusual for a player to face a dead end while playing – errors within games are often viewed more as feedback than as external evaluation.

Motivation's characteristics include the orientation students choose through a training task, their efforts and their dedication and persistence in challenges and errors. One of the highest levels includes student's self control for their emotions during their training, not letting them to affect in a negative way their learning procedure (Bell, Kanar, & Kozlowski, 2008).

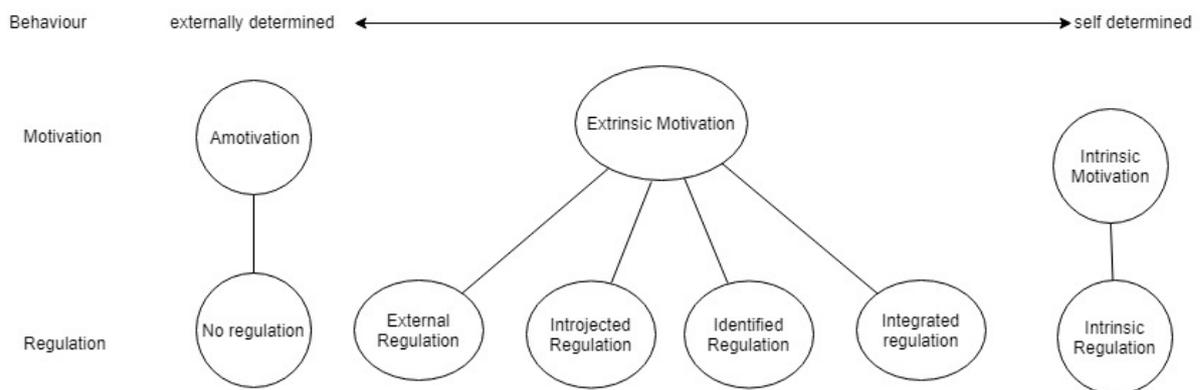
In intrinsic motivation someone's actions are caused by the satisfaction, enjoyment and interest they provide, resulting in high-quality learning and creativity, while in extrinsic motivation actions are not driven from personal interest but from external factors. Csikiszentmihalyi suggests the following main sources of enjoyment in learning procedure: achievable tasks with clear goals, the ability to concentrate deep and effortless, sense of control over actions, loss of self-consciousness and time awareness through playing. "Flow" was the term he introduced to describe this learning experience with the best potential outcome where users show full attention and best performance on their actions (Csikiszentmihalyi, 1990).

Self Determination Theory (SDT) of Motivation is a macro theory regarding motivation and personality characteristics, dealing with people's fundamental inclinations and psychological needs. It analyses the motivation factors of people's choices, where no external influence and interference is made. SDT records the extend of self motivation and determination in people's behaviour. Three instinctive needs are identified that upon their optimal function and growth is allowed: competence, relatedness and autonomy. These needs are identified as universal, instinctive and invariable across time, gender and culture (Wikipedia). A variety of questionnaires is available to assess different constructs contained within the theory (SDT, 2019).

An analysis of pre- and post-motivation tests based on SDT of motivation (Nikou & Economides, 2016) demonstrated a positive motivational orientation of students towards computers and mobile devices. Students with low learning scores also had a significant increase in learning achievement after participating in the mobile-based and computer-based assessment. Computers and mobile devices had positive effects on students' learning motivation, suggesting their potential use as an alternative to traditional learning process.

In order to measure motivation in this research the Academic Motivation Scale (AMS) was used (Vallerand, et al., 1992). Based on a tripartite taxonomy, motivation is measured by (a) intrinsic motivation, (b) extrinsic motivation and (c) amotivation.

- (a) Three types of **Intrinsic Motivation (IM)** can be identified as: **1.** IM to know, through exploration, curiosity, learning goals and intrinsic intellectuality, **2.** IM to learn, providing pleasure and satisfaction while learning, **3.** to accomplish things, as analysed in development psychology and mastery motivation (Harter, 1981). Also, to feel competent and create unique accomplishments (Deci & Ryan, 1990). It also includes achievement motivation (IM towards accomplishment) in pleasure and satisfaction of accomplishment and creation – noticed in students who extend their work beyond the requirements while attempting to surpass themselves.
- (b) three types of **extrinsic motivation (EM)** can be defined as: **1.** external regulation, where behaviour is regulated through external means such as rewards and constraints, **2.** Introjections, where individual begins to internalize the reasons for his behaviour but they still remain not truly self determined, **3.** identified regulation, to the extent that the behaviour becomes valued and judged important for the individual - especially when perceived as chosen by oneself, then the internalization of extrinsic motives becomes regulated through identification
- (c) **Amotivation** (Deci & Ryan, 1985). Students are considered as amotivated when they do not perceive contingencies between outcomes and their own actions, while they perceive their behaviours as caused by forces out of their own control.



**Figure 1: Academic Motivation Scale (AMS)**

AMS is probably the most used tool for student motivation's measurement, supported by self-determination theory (Stover, Guadalupe, Boubeta, & Liporace, 2012). Research

has shown that educational games practice promotes the involvement, motivation and interest in learning (Burguillo, 2010) (Erhel & Jamet, 2013). Allowing users to manage their own learning according to their own level, interests and goals, games make traditional learning more attractive while its high level of interactivity increases motivation and transforms traditional teaching (Gee J. P., 2007).

Current literature regarding motivation's impact in learning process is vast but there is no research regarding its effectiveness in comparison to critical thinking skills and dispositions. Christophel found that teacher's immediacy appears to modify motivation which also leads to increased learning achievement (Christophel, 1990). According to Fortier et al, perceived academic self determination and competence have a positive impact on motivation, which also improves learning performance (Fortier, Vallerand, & Guay, 1995). Pajares & Graham found that the only motivation variable to predict performance was students' task-specific self-efficacy (Pajares & Graham, 1999). Allen et al found that college commitment and social connectedness as long as academic self-discipline led to greater academic performance, which also decreased dropout behaviour (Allen, Robbins, Casillas, & Sue Oh, 2008).

## **2.5 Critical Thinking Skills and Dispositions**

Critical thinking refers to the process of judging and coming to a conclusion, after evaluating a problem through the analysis of different points of view and possible solutions. Critical thinking is reasonable thinking that is focused on deciding what to believe or not. It has two basic dimensions: critical thinking skills (CTS) and critical thinking disposition (CTD). CTS focus on cognitive approaches while CTD emphasizes on characteristics of attitude and the internal motives for problem solving. CTS can be developed through everyday practice in analysing and distinguishing facts according to their importance in real life scenarios (missionself, 2018).

Someone has to possess both thinking skills and the dispositions to use these skills when needed in order to be considered a good critical thinker (Ennis & Norris, 1990)

(Tishman & Andrade, 1996). CTD are defined by Ennis as the inclinations to achieve something given certain conditions (Ennis R. H., 1989), while Tishman & Andrade define them as tendencies toward particular patterns of mental behaviour and Facione et al. define them as the internal motivation to think in a critical way for solving problems, evaluating ideas and making decisions (Facione, Facione, & Giancarlo, 1998).

It was generally hypothesized for years that CTS are positively correlated with the persistent internal motivation to think in a critical way as well as that they are matched with specific CTD. As shown in empirical studies however there is no indication the hypothesized correlations are for all practical purposes (Facione, Facione, & Giancarlo, 2000).

According to Kuhn, three metacognitive abilities are crucial for coordination of theory and evidence: (a) modelling and encoding facts and theory in parallel with distinct relationships between them (b) the ability to understand that a theory doesn't necessarily represent actual world and (c) depending only in evidence in order to accept a theory and therefore the ability to suspend prior beliefs and evaluate evidence without prejudice. Metacognitive approach over this procedure helps students become aware of this inquiring procedure of knowledge and change of a belief and perception (Kuhn, 2005). Critical reflection consist an even higher level of reflection, where people are aware of their action's and thought's cause, are able to question them and also recognise the impact certain belief systems have on them (Arvola, Samuelsson, Nordvall, & Ragnemalm, 2018).

According to Lipman, higher-order thinking involves both critical and creative thinking skills, which are interdependent, in the same way that criteria and values or logic and emotion are. Critical thinking resembles Bloom's analysis; creative thinking Bloom's synthesis; and judgment Bloom's evaluation. Lipman is suggesting a curricular which emphasises on comparing, distinguishing and connecting leads to classification, analogical reasoning and immediate inference and finally to higher-order thinking under syllogistic reasoning. (Lipman, 2003). He also presents a three part model of higher-order thinking, referring to the ancient Greek regulative ideals of the True, the Beautiful

and the Good and associating them with critical, creative and caring thinking. On this basis, feelings and emotions play a significant role while caring thinking enacts values and is related with judgment (Lipman, 1995).

Lipman's dispositions list of cognitive skills include the ability to wonder, to be critical, to respect others, to be inventive, to seek alternatives, to be inquisitive, to care for the tools of enquiry, to cooperate intellectually, to be committed to self-corrective method, to feel a need for principles, ideals, reasons and explanations, to be imaginative, to be appreciative and to be consistent (Moseley, et al., 2005). Delphi Project's participants identified seven components of critical thinking dispositions: inquisitive, open-minded, systematic, analytical, truth seeking, critical thinking self-confident and maturity of judgement (Facione P. A., 1990).

Blooms taxonomy is a conceptualisation of higher - order thinking skills with its top three levels: analysis, synthesis and evaluation. According to Ennis though its concepts are too vague to be considered as a useful guide, while it doesn't include any criteria for judging the outcome. He introduces a list of critical thinking dispositions: being open-minded, paying attention to the total situation, seeking reasons and trying to be well informed. He also defines a fourfold analysis of the critical thinking abilities involved in decision making: information basis, inference, clarity and problem solving (Ennis R. H., 1985). Ennis' conception of critical thinking dispositions is composed by three basic dispositions (Ennis R. , 1996):

1. To understand something correctly to the extent possible, or at least care to do the best they can. In order to achieve this they will need the ability to seek alternatives, make hypotheses, explanations and conclusions as well as be open to them. It is also important to support an opinion only to the extent that it is justified by the information that is available. For this reason they need to be well-informed and seriously consider different aspects than their own.
2. To have a clear and honest representation of an opinion and define clearly the intended meaning of what is said or written with as much precision as possible. To achieve this it's important to determine in specific the conclusion or

question, to be able to seek and present all relevant information, to consider each situation in total always be reflectively aware of their own basic beliefs.

3. To care about the dignity and worth of every person, listen to others' view and reasons, taking into account others feelings and beliefs and also be concerned of other's welfare.

The California Critical Thinking Disposition Inventory (CCTDI) questionnaire is a widely used method to measure dispositional aspects of critical thinking (CCTDI, 2019). Specifically designed to measure the disposition of critical thinking in problem engagement and decision making, it consists of 75 items in a Likert Scale form ranging from “completely disagree” to “completely agree”, providing a profile of seven critical thinking dispositions: truth-seeking (12 items), open-mindedness (12 items), analyticity (11 items), organizing (11 items), self-confidence (9 items), maturity (10 items) and curiosity (10 items). While method's main advantage is that such instruments are easy to administer and score (Tishman & Andrade, 1996), it could also drive the respondents to fake by choosing socially desirable responses they may not have (Ennis & Norris, 1990).

## **2.6 Educational game's impact in Critical Thinking Dispositions**

Only scientifically literate people will be able to meet the challenges of an information economy. Scientific thinking is a crucial skill that students, citizens, and politicians need to acquire, as the ability to understand how to investigate, evaluate, and comprehend is more than crucial in every life aspect. It includes abilities such as reasoning and problem-solving skills involved in generating, testing, and revising hypotheses or theories. Playing a well structured video game reflects the scientific method of problem approaching: data analysis, hypothesis construction, experiment and testing, results evaluation and hypothesis' revision (Gee J. P., 2008). By encouraging players to stop, reconsider and explore different possibilities in order to adjust and form new strategies and goals before continuing their actions, instead of hastily moving toward their goal, games can promote problem solving skills (Gee J. P., 2007). According to Bradley et al., games' positive influence in motivation, cognition, and metacognition (awareness and understanding of one's own thought processes) can

improve science education (Morris, Croker, Zimmerman, Gill, & Romig, 2013). There is no magic recipe however; trial, error and adjustment in a dynamic content are always necessary, with the help of cultural tools such as language and information seeking strategies that improve human cognition.

One of the most classic examples in social dilemmas' field may be the Braess paradox, upon which simulation "Commuter Bridge" was based, which includes the complex interconnected actions and outcomes of large group negotiation. Simulations like this help users to become aware of social dilemmas, problems and traps, increasing their skills and understanding regarding competition's negative consequences and showing in practice how failing to institute a common agreed solution has a negative outcome on all participants (Merlone & Romano, 2017).

Cognitive skills in scientific thinking include the ability for problem identification, generating hypotheses, experiment design, data collection and evidence evaluation (Zimmerman, 2007). It is a common educational practice to give children learning experiences that represent issues they will face as adults (Mareschal, et al., 2008). McGonigal argues that "God games" – which place users in the position of controlling the game on a large scale, enhance realising the way events unfold over long periods of time and increase awareness on long-term outcomes of actions. These are also structural skills in scientific thinking – critical reasoning and linking observations over time to detect patterns and conceptualise abstract system models, understanding the impact a change in one subsystem has on others (McGonigal, 2011).

Bokyeong et al found that social problem solving ability strongly affects the academic achievement and the game performance. They claim that students' performance both in learning and gaming can increase by practicing a commercial game in conjunction with meta-cognitive strategies (Bokyeong, Hyungsung, & Youngkyun, 2009). Gerber & Logan's survey results however found that gamers and non-gamers do not differ significantly on critical thinking dispositions. Furthermore, a low impact in higher open-minded thinking has been recorded compared with high involvement in the gaming community. What is important though is that strategy game players scored

higher on actively open-minded thinking than did other types of gamers (Gerber & Logan, 2011). Song's research measured CTD and CTD training via online collaborative peer review to find that CTD characteristics include open-mindedness, systematicity and inquisitiveness, and low interaction and motivation (Song, 2008).

There is little evidence in literature showing the development of critical thinking dispositions through educational games, regarding the various and sometimes contradictory reports so far. Current research mostly specifies in the relationship between specific components of critical thinking dispositions and learning styles and modes (Colucciello, 1999) (Rudd, Baker, & Hoover, 2000). Little research has been done in order to specify the factors which contribute to CTD's development and their impact to students' academic achievement. Stupnisky et al found that perceived academic control has a stronger impact on student's performance than CTD (Stupnisky, Renaud, Daniel, Haynes, & Perry, 2008).

According to Bell & Loon, students with greater critical thinking dispositions demonstrate better learning results after practicing business simulation games (Bell & Loon, 2015). Seifi et al. found that playing computer games has no significant effect on critical thinking, but there were a significant effect on students' learning achievement, while the type of computer game has no significant effect on CTD and learning outcome (Seifi, Derikvandi, Moosavipour, & Khodabandelou, 2015). Adachi and Teena found that playing strategic video games increases higher self-reported problem solving skills. Their research showed an indirect association between strategic video game playing and higher academic grades (Adachi & Teena, 2013). Wood and Stewart found that practicing a computer game in order to improve practical reasoning skills of students led to improvements in critical thinking (Wood & Stewart, 1987).

## **2.7 Educational Games, Teamwork Skills and their effect to the learning outcome**

Teamwork is a significant skill that students have to acquire to meet in order to function sufficient in labour market, as recognised by the European Higher Education Area

(EHEA, 2018). Maintaining the ability to work in groups is of major importance as the majority of job tasks are becoming too complicated to be achieved by just one person.

Well designed simulations and games provide a decent demonstration of social dilemmas' main dynamics and difficulties of managing group interactions. Gaming is considered as a social activity, especially when it comes to multiplayer, online games. Their social perspective enhances the process of learning as a social achievement rather than just a process of information gathering and skills development. Players form teams with certain group missions, meet online, chat, gather in virtual environments and engage in different playing styles with various levels of collaboration and competition and extend to out-of-game related activities and associated materials such as fan forums (Squire, 2002).

There is a remarkable number of researches analysing the reasons teams can effectively function, however a clear definition of teamwork has not yet been made. The general consensus is that a complex variety of variables is required not only for organizational support and individual skills but also teamwork. Salas et al. specified these requirements as the "Big Five" in teamwork, based in relevant literature about this topic. They identified teamwork's core aspects as team leadership, mutual performance monitoring, backup behaviour, adaptability, and team orientation. They also pointed that these components required specific supporting coordinating mechanisms, such as closed-loop communication, and mutual trust, while their importance vary during the life of the team and the team task (Salas, Sims, & Burke, 2005).

Online games and simulations provide a large gaming community where users often redefine themselves within its context. Willging & Johnson found that students would more easily drop out from a distance learning programme if they faced difficulties in socializing with other students (Willging & Johnson, 2004). Users identify more to an enduring game character and also can feel a strong sense of membership to their character's groups, while strong friendships may occur through online games. The way someone plays could also reveal details readily visible in person, such as a concealed anxiousness, strategic thinking or fast problem solving abilities (Kimppa & Muukkonen, 2014).

Business simulation games can also contribute to a more collaborative work process in organisations. Poor communication and teamwork can make employees feel vulnerable, stressed, isolated, and dissatisfied with their job. Simulation practice can enhance teamwork concepts, situational awareness and interpersonal communication (Kutzin, 2010).

Team structure and cohesiveness has been found to have a significant influence on team performance. Certain team structure and quality factors make a team more cohesive and help avoiding mistakes in the game, resulting to a better task quality (Mayer, 2018). It is also found though that using teaching methods that help project management and group dynamics don't have a significant impact on the overall learning outcomes (Noguera, Guerrero-Roldan, & Maso, 2017). Curricula have proved to be more effective when they address more teamwork principles (Chakraborti, Boonyasai, Wright, & Kern, 2008).

Out of the existing surveys measuring teamwork, while they may estimate different dimensions, the most commonly assessed dimensions are communication, coordination, and respect (Valentine, Nembhard, & Edmondson, 2015). A number of available self-report measurement tools currently exist in order to measure teamwork competence. Youth Outcomes Battery teamwork scale (American Camp Association) is a brief 8 item questionnaire but as it is specifically designed for the camp setting, lacks discriminant validity (Lower, Newman, & Anderson-Butcher, 2015). Youth Experiences Survey (YES) teamwork scales examines the group cooperation skills, feedback, leadership, and responsibility and is designed for high school students (Hansen & Larson, 2005). Team Skills Scale (TSS) is a 17-item scale (Hepburn, Tsukuda, & Fasser, 2012), implied to assess self-perceived team skills. The proposed structure however isn't absolute and further psychometric testing is recommended (Owens, 2006).

Knowledge, Skills, and Abilities (KSA) Teamwork Test is a tool psychologists measure which evaluates people's knowledge, skills and abilities. Developed by Stevens and Campion, KSA is a 35-item test measuring 14 individual KSA requirements for

teamwork (Stevens & Campion, 1994). It is composed by two main categories: The Interpersonal KSAs, referring to skills as Conflict Resolution and Communication, and the Self-Management KSAs, including skills as Goal Setting and Task Coordination. KSA is appropriate for estimating team-specific behaviour as it highly focuses on knowledge of appropriate behaviours rather than personality tendencies, making it a sufficient tool for organizations to measure their personnel's level of teamwork as well as reveal ways of improvement (Wikipedia). It was considered a valid test in general and has been frequently used in organizations; O'Neill et al. however identified serious problems with both the reliability and validity of this test (O'Neill, Goffin, & Gellatly, 2012).

Cumming et al. introduced Groupwork skills Questionnaire (GSQ), a two-factor model composed of task groupwork skills referring to behaviours that contribute to the group's management, and interpersonal groupwork skills, referring to the group's interpersonal dynamics contributing to emotional support and intelligence. They found GSQ to demonstrate good validity and reliability for both a research and pedagogical application (Cumming, Woodcock, Cooley, Holland, & Burns, 2015).

Teamwork Scale for Youth is used in this research, a brief 8 item questionnaire assessed on a 5-point Likert-type scale ranging from 1 (don't agree at all) to 5 (totally agree), developed to assess a youths' perceived skills of teamwork and collaboration in order to achieve a common goal. Items reveal self perceived attitudes toward teamwork and teamwork behaviours (Lower, Newman, & Anderson-Butcher, 2015).

## **2.8 Pc Skills and game playing**

Younger generation grew up fully familiarised with digital technology, computers and video games. They are used to instant gratification, hyperlinked information and fast feedback. They are also called "digital natives", in contrast with "digital immigrants", the older generation who only started using computers as adults, whose main source of knowledge are books and main way of communicating the phone. When it comes to education, digital immigrants have to teach students with total different methods and

approach of learning. Educational games can be a great tool to bridge this gap (Prensky M. , 2001). Skills and knowledge related to technology are really useful in Information Problem Solving. The "Big Six Skills Approach to Information Problem Solving" refers to a set of skills for information literacy and problem solving process (Eisenberg & Doug, 1996).

Papastergiou found no significant difference regarding gender on learning achievement through game based learning, though boys were more experienced in computer gaming. Educational computer games are proven an effective and motivational learning tool, regardless of students' gender (Papastergiou, 2009).

Well-designed digital and simulation games apply game characteristics such as missions, rules and principles in order to create a challenging, immersive learning environment (Huang, Huang, & Tschopp, 2010). There is no consensus on the critical design features that support learning or motivation in games (Garris, Ahlers, & Driskell, 2002). However, different design features have proven to be effective for skills improvement, such as cases with a range of task difficulty, repetitive practice and interactivity (Cook, et al., 2013).

### **3. Methodology**

The whole procedure lasted four weeks. It involved filling 3 questionnaires and taking two tests that would take approximately 50 minutes and playing "Practise Marketing" game for at least 2 hours.

#### **Week 1:**

1. After the student's declaration of interest to participate in the research, a consent form was given to them, according to GDPR procedures for research involving human subjects.
2. The first self-administered Likert-style questionnaire was distributed to students, consisting of 12 questions on perceived Critical Thinking Dispositions (CTD) and 9 questions on perceived Motivation (MOT).

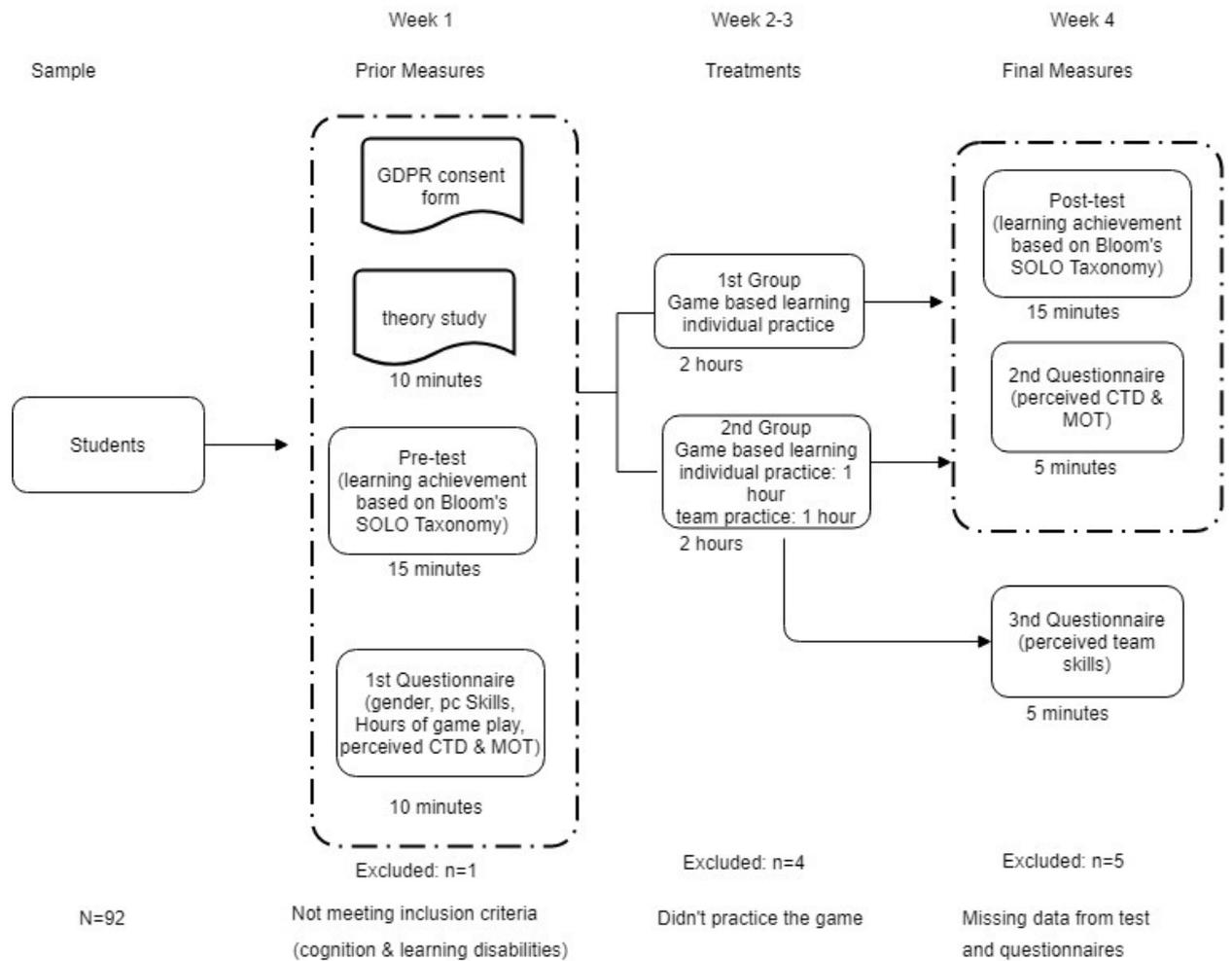
3. Students were given to study a document with basic key concepts regarding strategic marketing theory.
4. Students took the first test based on Bloom's Solo Taxonomy.

### **Week 2-3: Game Practice**

5. Students were randomly separated in two groups, where the first group would practice the simulation game individually as homework while the second group would practice it in class, playing in teams.
6. Students from both teams are playing the business simulation game "Practice Marketing", with their process and game scores being monitored.
7. Students from 1<sup>st</sup> group are playing for two hours from home and second group are practicing from home for one hour.
8. Students from second group are gathered to practice the game in teams for one hour. They are separated in teams of three and each team compete in order to achieve the best game score.

### **Week 4:**

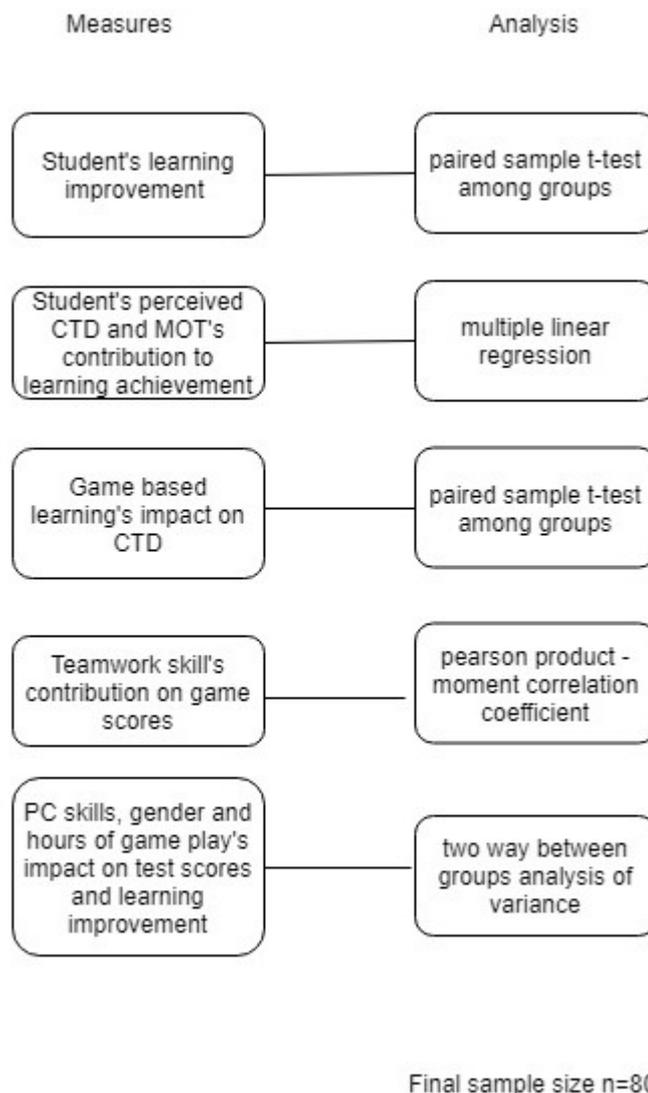
9. Students from both groups took the second test based on Bloom's Solo Taxonomy.
10. Students from both groups were given the second self-administered Likert-style questionnaire, consisting of 14 questions on perceived CTD and 6 questions on perceived MOT.
11. Students from second group were given the third self-administered Likert-style questionnaire, consisting of 9 questions based on Teamwork Scale for Youth, in order to measure their perceived team skills.



**Figure 2 Experiment's Flow Chart<sup>1</sup>**

For the needs of this research, 80 university students from Economics (N=38) and Business Administration Department (N=42) used McGraw Hill's Education Business Simulation Game "Practice Marketing". Data was collected through a self-administered Likert-style questionnaire that was distributed to all students before and upon completion of the simulation.

<sup>1</sup> Created with *draw* on <https://www.draw.io/>



**Figure 3: Experiment's Methods and Analysis**

## 4. Data Analysis - Results

### 4.1 Educational game's impact in learning process

A pre and post theory test based on Bloom's Solo taxonomy was used in order to measure learning achievements. Paired samples t-test was conducted in order to compare scores before and after practicing the game, for each level of Bloom's Solo Taxonomy learning level, in order to evaluate if there is a significant change on

student's test scores. Categorical independent variable is time, with two different time levels – before and after the game practice, while the continuous, depended variable is test scores of the same people, as measured before and after the game. Difference between the two scores obtained for each subject should be normally distributed, an assumption that is not violated in our case as our sample size is more than 30. A statistically significant increase was found in uninstructural and extended abstract level, no significant change was noticed in multistructural level while a statistically significant decrease was found in relational level. As a total score for all learning levels, a statistically significant increase was found after the game practice.

**Table 1: Mean’s comparison for each Bloom’s level**

<b>Bloom's Level</b>	<b>Mean test1</b>	<b>Mean test2</b>
Unistructural (one relevant idea) Verbs: define, identify, name, draw, find, label, match, follow a simple procedure	0.477	0.654
Multistructural (several relevant ideas). Verbs: describe, list, outline, complete, continue, combine	0.55	0.591
Relational (relate and integrate theories). Verbs: sequence, classify, compare and contrast, analyse, form an analogy, organise, distinguish, question, relate, apply.	0.608	0.551
Extended abstract (taken the related ideas and extended them). Verbs: generalise, predict, evaluate, reflect, hypothesise, theorise, create, prove, justify, argue, compose, prioritise, design, construct and perform.	0.379	0.573

#### **4.1.1 Level 1 (uninstructural) Paired samples t-test**

Is there a significant change in participant's test scores in first level of Bloom's SOLO taxonomy (uninstructural level) following participation in a simulation game where they practice course's theory?

Categorical independent Variable: Time (Time1 where PRE\_TEST.A took place and Time2 with the POST\_TEST.A, after the game's practice). Continuous, dependent variable: Test scores

**Table 2: Paired Samples Statistics - Level 1**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE_TEST.A	0.4773	80	0.18636	0.02084
	POST_TEST.A	0.6544	80	0.17485	0.01955

**Table 3: Paired Samples Correlations - Level 1**

		N	Correlation	Sig.
Pair 1	PRE_TEST.A & POST_TEST.A	80	0.197	0.081

**Table 4: Paired Samples Test - Level 1**

		Paired Differences		Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Mean	Std. Deviation		Lower	Upper			
Pair 1	PRE_TEST.A - POST_TEST.A	-0.17713	0.22912	0.02562	-0.22811	-0.12614	-6.915	79	0.000

There is a statistically significant increase in test scores from Time1, PRE\_TEST.A (M=0.4773, SD= 0.18636) and TIME2, POST\_TEST.A (M = 0.6544 , SD = 0.17485),  $t(79) = -6.915$ ,  $p < 0.001$  (two-tailed). The mean increase in Test scores was -0.17713 with a 95% confidence interval ranging from -0.22811 to -0.12614. The eta squared statistics (0.376) indicated a large effect size (Cohen, 2013).

#### 4.1.2 Level 2 (multistructural) Paired samples t-test

Is there a significant change in participant's test scores in second level (multistructural) of Bloom's SOLO taxonomy following participation in a simulation game where they practice course's theory?

Categorical independent Variable: Time (Time1 where PRE\_TEST.B took place and Time2 with the POST\_TEST.B, after the game's practice. Continuous, dependent variable: Test scores.

**Table 5: Paired Samples Statistics - Level 2**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE_TEST.B	0.5500	80	0.16226	0.01814
	POST_TEST.B	0.5913	80	0.16319	0.01825

**Table 6: Paired Samples Correlations - Level 2**

		N	Correlation	Sig.
Pair 1	PRE_TEST.B & POST_TEST.B	80	0.294	0.008

**Table 7: Paired Samples Test - Level 2**

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE_TEST.B - POST_TEST.B	-0.04125	0.19337	0.02162	-0.08428	0.00178	-1.908	79	0.060

There was not a statistically significant increase in test scores from Time1, PRE\_TEST.B (M=0.55, SD= 0.16226) and TIME2, POST\_TEST.B (M = 0.5913 , SD = 0.16319),  $t(79) = -1.908$ ,  $p < 0.06$  (two-tailed). The mean increase in Test scores was -0.04125 with a 95% confidence interval ranging from -0.08428 to 0.00178. The eta squared statistics (0.044) indicated a moderate effect size.

#### 4.1.3 Level 3 (relational) Paired samples t-test

Is there a significant change in participant's test scores in third (relational) level of Bloom's SOLO taxonomy following participation in a simulation game where they practice course's theory?

Categorical independent Variable: Time (Time1 where PRE\_TEST.C took place and Time2 with the POST\_TEST.C, after the game's practice. Continuous, dependent variable: Test scores.

**Table 8: Paired Samples Statistics - Level 3**

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 PRE_TEST.C	0.6088	80	0.18363	0.02053
POST_TEST.C	0.5513	80	0.16304	0.01823

**Table 9: Paired Samples Correlations - Level 3**

	N	Correlation	Sig.
Pair 1 PRE_TEST.C & POST_TEST.C	80	0.285	0.010

**Table 10: Paired Samples Test - Level 3**

Pair	Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig.(2-tailed)
					Lower	Upper			
Pair 1	PRE_TEST.C - POST_TEST.C	0.05750	0.20793	0.02325	0.01123	0.10377	2.473	79	0.016

There was a statistically significant decrease in test scores from Time1, PRE\_TEST.C (M=0.6088, SD= 0.18363) and TIME2, POST\_TEST.C (M = 0.5513 , SD = 0.16304),  $t(79) = 2.473$ ,  $p = 0.016$  (two-tailed). The mean decrease in Test scores was 0.0575 with a 95% confidence interval ranging from 0.01123 to -0.10377. The eta squared statistics (0.072) indicated a moderate effect size.

#### 4.1.4 Level 4 (extended abstract) Paired samples t-test

Is there a significant change in participant's test scores in fourth (extended abstract) level of Bloom's SOLO taxonomy following participation in a simulation game where they practice course's theory?

Categorical independent Variable: Time (Time1 where PRE\_TEST.D took place and Time2 with the POST\_TEST.D, after the game's practice. Continuous, dependent variable: Test scores.

**Table 11: Paired Samples Statistics - Level 4**

Pair	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE_TEST.D	80	0.3791	0.02215
	POST_TEST.D	80	0.5731	0.02071

**Table 12: Paired Samples Correlations - Level 4**

	N	Correlation	Sig.
Pair 1 PRE_TEST.D & POST_TEST.D	80	0.222	0.048

**Table 13: Paired Samples Test - Level 4**

Pair	Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1 PRE_TEST.D - POST_TEST.D		-0.19400	0.23926	0.02675	-0.24725	-0.14075	-7.252	79	0.000

There was a statistically significant increase in test scores from Time1, PRE\_TEST.D (M=0.3791, SD= 0.19811) and TIME2, POST\_TEST.D (M = 0.5731 , SD = 0.18523),  $t(79) = -7.252$ ,  $p < 0.001$  (two-tailed). The mean increase in Test scores was -0.194 with a 95% confidence interval ranging from -0.24725 to -0.14075. The eta squared statistics (0.394) indicated a large effect size.

#### 4.1.5 Total Test Scores

Is there a significant change in participant's test scores following participation in a simulation game where they practice course's theory?

Categorical independent Variable: Time (Time1 where PRE\_TEST took place and Time2 with the POST\_TEST, after the game's practice. Continuous, dependent variable: Test scores.

**Table 14: Paired Samples Statistics - Total Test**

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 PRE_TEST.TOTAL	0.5185	80	0.10884	0.01217
POST_TEST.TOTAL	0.5693	80	0.11385	0.01273

**Table 15: Paired Samples Correlations - Total Test**

	N	Correlation	Sig.
Pair 1 PRE_TEST.TOTAL & POST_TEST.TOTAL	80	0.321	0.004

**Table 16: Paired Samples Test - Total Test**

	Paired Differences	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1 PRE_TEST.TOTAL - POST_TEST.TOTAL	-0.05075	0.12986	0.01452	-0.07965	-0.02185	-3.496	79	0.001	

There was a statistically significant increase in test scores from Time1, PRE\_TEST.TOTAL (M=0.5185, SD= 0.10884) and TIME2, POST\_TEST.TOTAL (M = 0.56925 , SD = 0.11385),  $t(79) = -3.496$ ,  $p = 0.001$  (two-tailed). The mean increase in Test scores was -0.05 with a 95% confidence interval ranging from -0.079 to -0.0218. The eta squared statistics (0.1339) indicated a large effect size.

## 4.2 Motivation (MOT), Critical Thinking Dispositions (CTD) and their impact in learning outcome

A multiple linear regression was calculated on Test scores based on perceived Critical Thinking Dispositions (CTD) and Motivation (MOT), in order to find out how well do the two measures of control (CTD, MOT) predict test scores, how much variance in test scores can be explained by scores on these two scales and which of CTD or MOT is the best predictor of total test scores. Total test scores is the continuous dependent variable while CTD and MOT are the continuous independent variables. While standard multiple regression can make a number of fuzzy assumptions about the data, it is the most common tool to use while having a set of variables and wanting to identify the variance they are able to explain in a group (Pallant, 2016). The issue with this method is generalisability which can't be obtained with a small sample. Stevens recommends 15 participants per predictor in order for the results to be reliable (Stevens J. , 1996) while Tabachnic and Fidell give the  $N > 50 + 8m$  formula (Tabachnic & Fidell, 2013), with  $m =$  number of independent variables. In our case, having two independent variables our sample must be either 30+ or 66+, which is covered by our current sample size ( $N=80$ ).

From correlation table we can see that both independent variables don't correlate substantially with Test Scores, with Pearson Correlation for CTD=0.225 and for MOT=0.102, both below 0.3 needed. Correlation between each of the independent variables is also checked. In this case correlation is  $0.555 < 0.7$  so bivariate correlation is avoided. From Coefficients table, tolerance describes how much of the variability of the specified independent is not explained by the other independent variable, with both outcomes in our case being significantly high ( $>0,1$ ) therefore no violation of multicollinearity assumption was made. Cook's distance is also  $<1$  indicating no casewise diagnostics problem as the sample is normally distributed. R square in model summary is 0.052, indicating a very low percentage (5.2%) of the dependent variable (test scores) is explained by the model (CTD and MOT). From Standardised Coefficients table, beta value is higher for CTD = 0.244, meaning that this variable makes the largest unique contribution to explaining the dependent variable – test scores. Sig value though is less than 0.05 for both CTD and MOT, indicating no significant unique contribution to the prediction of test scores.

Summarizing up, both of the scales (CTS and MOT) don't seem to correlate substantially with test scores. A not significant regression equation was found ( $F(2,77) = 2.094, p=0.13$ ), with an R square of 0.052. Participant's predicted test scores is equal to  $0.379 - 0.008(\text{MOT}) + 0.052(\text{CTD})$ . Test Scores increased 0.052 points for each CTD point. Perceived Critical Thinking Dispositions (CTD) and Motivation (MOT) were not significant predictors of Test scores.

**Table 17: Correlations**

		TEST_Scores	CTD	MOT
Pearson Correlation	TEST_Scores	1.000	0.225	0.102
	CTD	0.225	1.000	0.555
	MOT	0.102	0.555	1.000
Sig. (1-tailed)	TEST_Scores		0.022	0.184
	CTD	0.022		0.000
	MOT	0.184	0.000	
N	TEST_Scores	80	80	80
	CTD	80	80	80
	MOT	80	80	80

**Table 18: Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,227 <sup>a</sup>	0.052	0.027	0.08863

a. Predictors: (Constant), MOT, CTD

b. Dependent Variable: TEST\_Scores

**Table 19: ANOVA<sup>a</sup> analysis**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.033	2	0.016	2.094	,130 <sup>b</sup>
	Residual	0.605	77	0.008		
	Total	0.638	79			

a. Dependent Variable: TEST\_Scores

b. Predictors: (Constant), MOT, CTD

**Table 20: Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B
		B		Beta			Lower Bound
1	(Constant)	0.379	0.111		3.420	0.001	0.158
	CTD	0.052	0.028	0.244	1.828	0.071	-0.005
	MOT	-0.008	0.032	-0.033	-0.250	0.803	-0.072

**Coefficients<sup>a</sup>**

Upper Bound	Correlations			Collinearity Statistics	
	Zero-order	Partial	Part	Tolerance	VIF
0.600					
0.108	0.225	0.204	0.203	0.692	1.445
0.056	0.102	-0.028	-0.028	0.692	1.445

a. Dependent Variable: TEST\_Scores

**Table 21: Collinearity Diagnostics<sup>a</sup>**

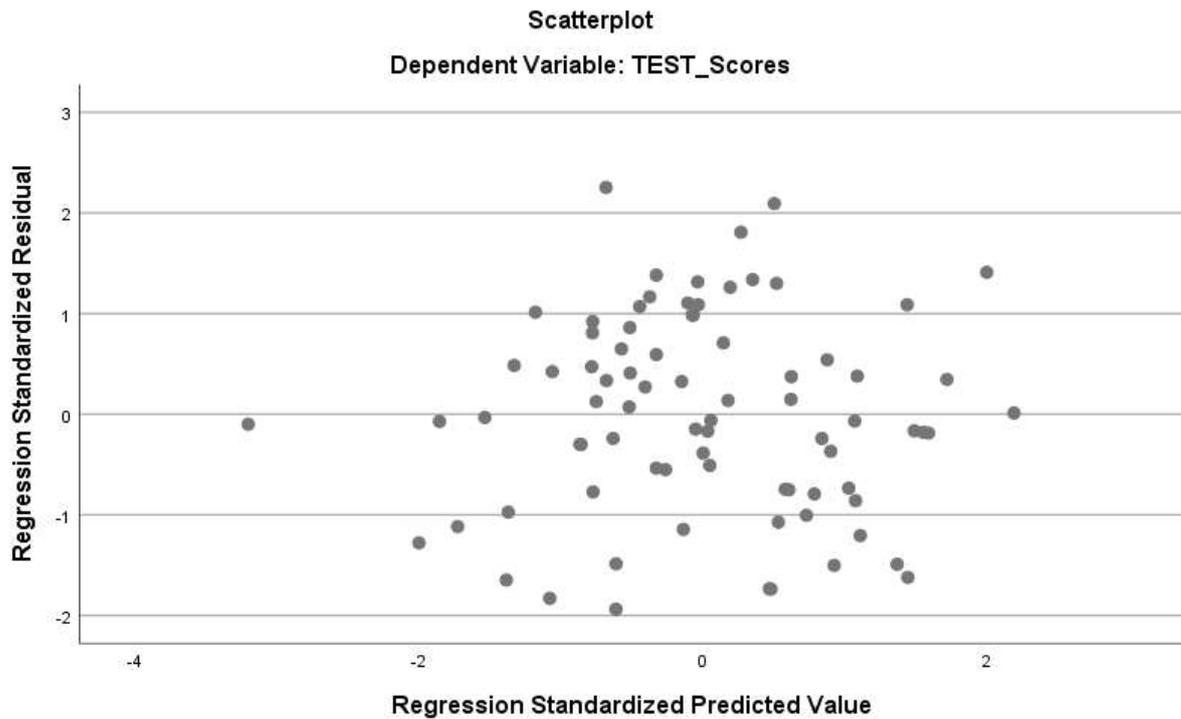
Model	Eigenvalue	Condition Index	Variance Proportions (Constant)	CTD	MOT
1 1	2.990	1.000	0.00	0.00	0.00
2	0.006	22.088	0.59	0.75	0.00
3	0.004	26.798	0.41	0.25	1.00

a. Dependent Variable: TEST\_Scores

**Table 22: Residuals Statistics<sup>a</sup>**

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	0.4788	0.5890	0.5441	0.02041	80
Std. Predicted Value	-3.200	2.197	0.000	1.000	80
Standard Error of Predicted Value	0.010	0.033	0.016	0.005	80
Adjusted Predicted Value	0.4803	0.5888	0.5447	0.02007	80
Residual	-0.17172	0.19970	0.00000	0.08750	80
Std. Residual	-1.938	2.253	0.000	0.987	80
Stud. Residual	-2.007	2.274	-0.003	1.005	80
Deleted Residual	-0.18423	0.20347	-0.00055	0.09078	80
Stud. Deleted Residual	-2.048	2.340	-0.003	1.015	80
Mahal. Distance	0.002	10.262	1.975	2.138	80
Cook's Distance	0.000	0.103	0.013	0.020	80
Centered Leverage Value	0.000	0.130	0.025	0.027	80

a. Dependent Variable: TEST\_Scores



**Figure 4: Scatterplot (dependent variable: Test scores)**

### 4.3 Educational game's impact in CTD

A paired-samples t-test was conducted to evaluate if there is a significant change in participant's Critical Thinking Despositions (CTD) following participation in a simulation game and no statistically significant increase was found.

Categorical independent variable is time, with two different time levels – before and after the game practice, while the continuous, depended variable is in self perceived questionnaires in CTD for the same people, as measured before and after practising the game. Categorical independent Variable is Time (Time1 where PRE\_CTD took place and Time2 with the POST\_CTD after the game's practice) and continuous, dependent variable is outcomes from CTD questionnaire. Having a sample size 30+ we don't violate the assumption about the normal distribution of difference between the two scores obtained for each subject. There was not a statistically significant increase in CTD from Time1, PRE\_CTD (M=3.7999, SD= 0.52972) and TIME2, POST\_CTD (M = 3.8056 , SD = 0.48635),  $t(79) = -0.092$ ,  $p = 0.927$ . The mean increase in CTD was -

0.00575 with a 95% confidence interval ranging from -0.12979 to 0.11829. The eta squared statistics (0.0001) indicated a small effect size (Cohen, 2013).

**Table 23: Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE_CTD	3.7999	80	0.52972	0.05922
	POST_CTD	3.8056	80	0.48635	0.05438

**Table 24: Paired Samples Correlations**

		N	Correlation	Sig.
Pair 1	PRE_CTD & POST_CTD	80	0.401	0.000

**Table 25: Paired Samples Test**

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE_CTD - POST_CTD	-0.00575	0.55737	0.06232	-0.12979	0.11829	-0.092	79	0.927

#### 4.4 Teamwork Skills and their effect to the learning outcome

The relationship between perceived team skills (as measured by Teamwork Scale for Youth) and game scores (as measured from the scores teams had in Practice Marketing

simulation game) was investigated using Pearson product – moment correlation coefficient. Preliminary analysis was performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. There was a strong, positive correlation between the two variables,  $r=0,54$  (Cohen, 2013),  $n=40$ ,  $p<0.001$ , with high levels of perceived team skills associated with higher levels of game scores. Coefficient of determination is 0.291, which indicates a 29% variance between the two variables, meaning that team skills help to explain nearly 29% of the variance in game scores.

**Table 26: Descriptive Statistics**

	Mean	Std. Deviation	N
TSS	3.6023	0.84253	40
Game_Scores	73.6000	13.97030	40

**Table 27: Correlations**

		TSS	Game_Scores
TSS	Pearson Correlation	1	,540**
	Sig. (2-tailed)		0.000
	Sum of Squares and Cross-products	27.684	248.016
	Covariance	0.710	6.359
	N	40	40
Game_Scores	Pearson Correlation	,540**	1
	Sig. (2-tailed)	0.000	
	Sum of Squares and Cross-products	248.016	7611.600
	Covariance	6.359	195.169
	N	40	40

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## Correlations

			TSS	Game_Scores
Spearman's rho	TSS	Correlation Coefficient	1.000	,397*
		Sig. (2-tailed)		0.011
		N	40	40
	Game_Scores	Correlation Coefficient	,397*	1.000
		Sig. (2-tailed)	0.011	
		N	40	40

\*. Correlation is significant at the 0.05 level (2-tailed).

## 4.5 Impact of gender, pc skills and gaming hours per week to learning achievement

### 4.5.1 Impact of gender, pc skills and gaming hours to test improvement

A two way between groups analysis of variance was conducted to explore the impact of gender, pc skills and hours of game play per week on total improvement between the two tests. Participants were divided in three groups according to their pc skills (group 1: fair, group 2: medium, group 3: good) and three groups according to gaming hours per week (1: up to 3 hours, 2: 3-5 hours, 3: more than 5 hours). As sig level in Levene's test of equality of error variances is greater than 0.01, we can conclude there was no violation in homogeneity of variances assumption. Tests of Between-Subjects Effects indicate no significant difference in the affect of hours of game play per week and gender (gender \* Game\_Play sig=0.603, > 0.05), gender and pc skills (gender \* pcSkills sig=0.502, > 0.05), or hours of game play per week and pc skills on test improvement (Game\_Play \* pcSkills sig=0,594 > 0.05). There is also no significant effect for each independent variable (genderSig = 0.755, Game\_PlaySig= 0.828 and PcSkillsSig = 0.327), meaning that each of these groups don't differ in terms of improvement in test scores and gender does not moderate the relationship between pc skills, hours of game playing and test improvement. As no significant main effect or interaction effect was found in the overall (omnibus) analysis of variance test, a post hoc test and multiple comparisons to compare the difference occurrence were not necessary.

**Table 28: Between-Subjects Factors**

		Value Label	N
gender	1,00	male	45
	2,00	female	35
Game_Play	1,00	up to 3 hours	59
	2,00	3-5 hours	12
	3,00	more than 5 hours	9
pcSkills	1,00	fair	11
	2,00	medium	24
	3,00	good	45

**Table 29: Descriptive Statistics**

Dependent Variable: improvement

gender	Game_Play	pcSkills	Mean	Std. Deviation	N
male	up to 3 hours	fair	-,0367	,08737	3
		medium	,1220	,16574	5
		good	,0721	,12177	19
		Total	,0693	,13006	27
	3-5 hours	fair	,0300	,08485	4
		medium	,0300	,04243	2
		good	,0500	,07246	5
		Total	,0391	,06745	11
	more than 5 hours	medium	,1300	,14142	2
		good	-,0340	,13520	5
		Total	,0129	,14807	7

	Total	fair	,0014	,08611	7	
		medium	,1033	,13491	9	
		good	,0500	,12036	29	
		Total	,0531	,12036	45	
female	up to 3 hours	fair	-,0933	,18824	3	
		medium	,0357	,16741	14	
		good	,0800	,11699	15	
		Total	,0444	,15067	32	
	3-5 hours	medium	,0600	.	1	
		Total	,0600	.	1	
	more than 5 hours	fair	,0600	.	1	
		good	,0900	.	1	
		Total	,0750	,02121	2	
	Total	fair	-,0550	,17176	4	
		medium	,0373	,16144	15	
		good	,0806	,11305	16	
		Total	,0466	,14412	35	
	Total	up to 3 hours	fair	-,0650	,13487	6
			medium	,0584	,16694	19
			good	,0756	,11794	34
Total			,0558	,14097	59	
3-5 hours		fair	,0300	,08485	4	
		medium	,0400	,03464	3	
		good	,0500	,07246	5	
		Total	,0408	,06459	12	
more than 5 hours		fair	,0600	.	1	

		medium	,1300	,14142	2
		good	-,0133	,13110	6
		Total	,0267	,13134	9
	Total	fair	-,0191	,11878	11
		medium	,0621	,15251	24
		good	,0609	,11745	45
		Total	,0503	,13045	80

**Table 30: Levene's Test of Equality of Error Variances<sup>a,b</sup>**

		Levene Statistic	df1	df2	Sig.
improvement	Based on Mean	1,177	10	66	,322
	Based on Median	,541	10	66	,855
	Based on Median and with adjusted df	,541	10	46,685	,852
	Based on trimmed mean	1,115	10	66	,364

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.<sup>a,b</sup>

a. Dependent variable: improvement

b. Design: Intercept + gender + Game\_Play + pcSkills + gender \* Game\_Play + gender \* pcSkills + Game\_Play \* pcSkills + gender \* Game\_Play \* pcSkills

**Table 31: Tests of Between-Subjects Effects**

Dependent Variable: improvement

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	,188 <sup>a</sup>	13	,014	,825	,632	,140
Intercept	,052	1	,052	2,982	,089	,043
gender	,002	1	,002	,098	,755	,001
Game_Play	,007	2	,003	,189	,828	,006
pcSkills	,040	2	,020	1,137	,327	,033
gender * Game_Play	,018	2	,009	,509	,603	,015
gender * pcSkills	,024	2	,012	,697	,502	,021
Game_Play * pcSkills	,049	4	,012	,701	,594	,041
gender * Game_Play * pcSkills	,000	0	.	.	.	,000
Error	1,156	66	,018			
Total	1,546	80				
Corrected Total	1,344	79				

## Profile Plots

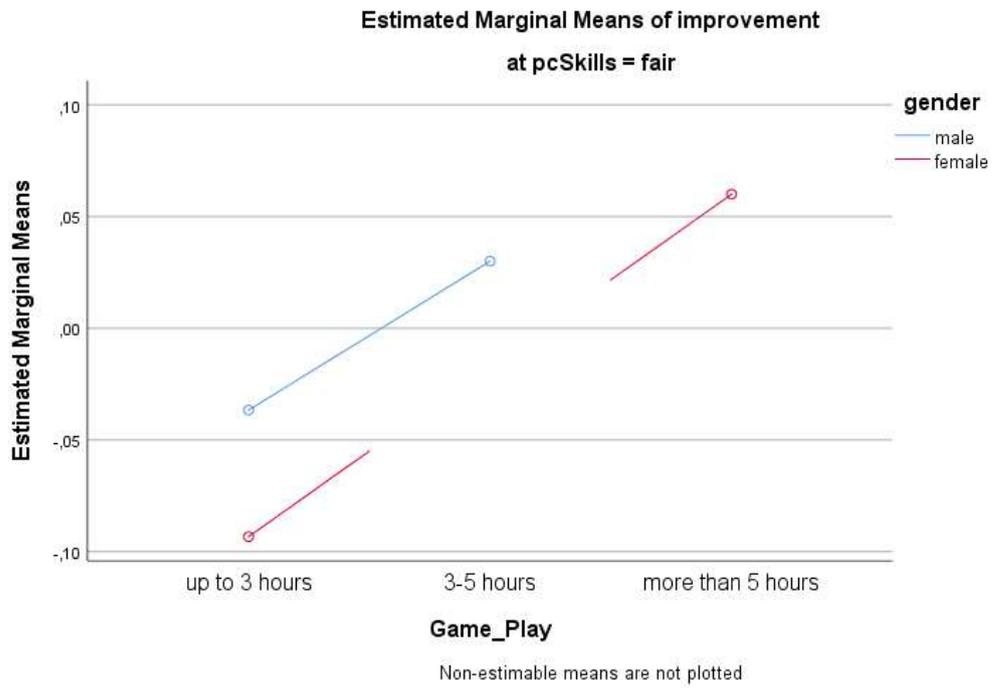


Figure 5: Estimated Marginal Means of Improvement at PC skills = fair

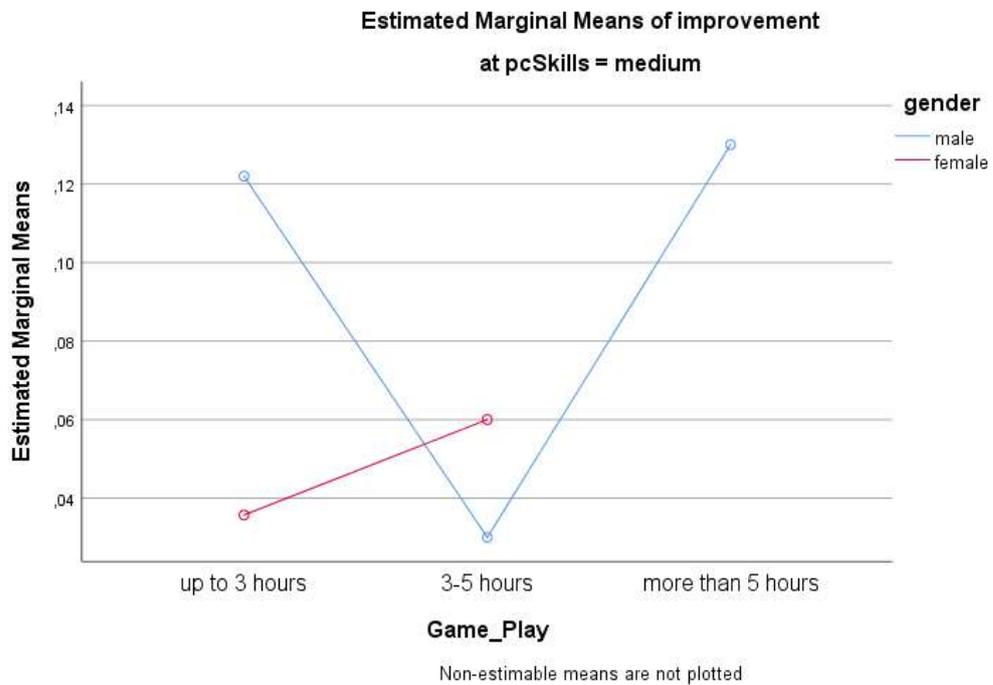
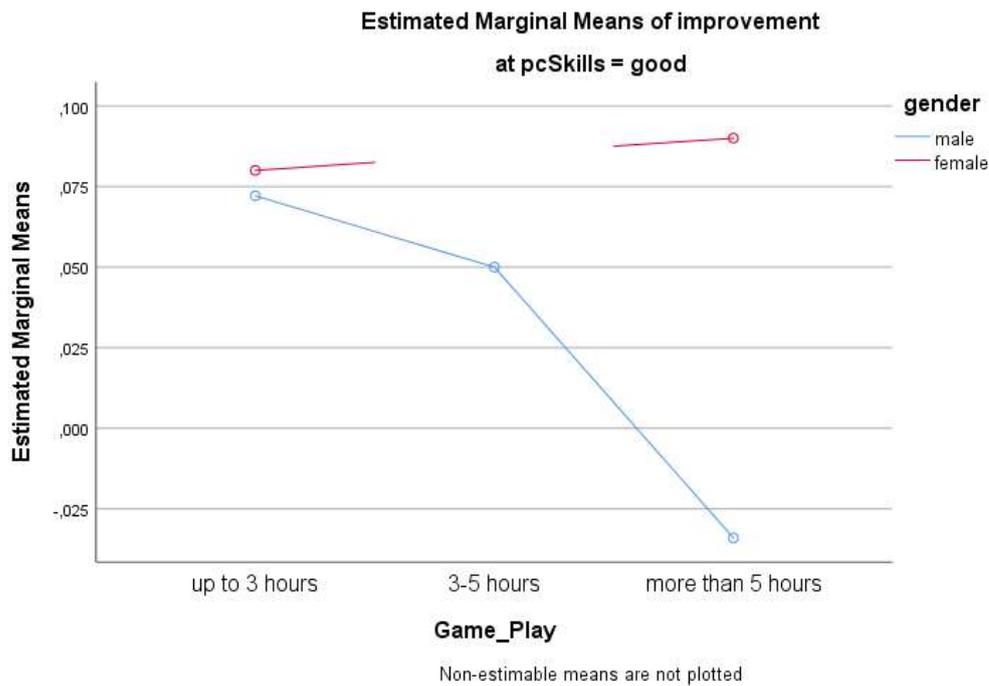


Figure 6: Estimated Marginal Means of Improvement at PC skills = medium



**Figure 7: Estimated Marginal Means of Improvement at PC skills = good**

#### 4.5.2 Impact of gender, pc skills and gaming hours to test scores

A two way between groups analysis of variance was conducted to explore the impact of gender, pc skills and hours of game play per week on total test scores. Participants were divided in three groups according to their pc skills (group 1: fair, group 2: medium, group 3: good) and three groups according to gaming hours per week (1: up to 3 hours, 2: 3-5 hours, 3: more than 5 hours). As sig level in Levene's test of equality of error variances is greater than 0.01, we can conclude there was no violation in homogeneity of variances assumption. Tests of Between-Subjects Effects indicate no significant difference in the affect of hours of game play per week and gender (gender \* Game\_Play sig=0.360, > 0.05), gender and pc skills (gender \* pcSkills sig=0.809, > 0.05), or hours of game play per week and pc skills on test improvement (Game\_Play \* pcSkills sig=0,439 > 0.05). There is also no significant effect for each independent variable (genderSig = 0.555, Game\_PlaySig= 0.466 and PcSkillsSig = 0.411), meaning that each of these groups don't differ in terms of improvement in test scores and gender does not moderate the relationship between pc skills, hours of game playing and test scores. As no significant main effect or interaction effect was found in the overall

(omnibus) analysis of variance test, a post hoc test and multiple comparisons to compare the difference occurrence were not necessary.

**Table 32: Between-Subjects Factors**

		Value Label	N
gender	1,00	male	45
	2,00	female	35
Game_Play	1,00	up to 3 hours	59
	2,00	3-5 hours	12
	3,00	more than 5 hours	9
pcSkills	1,00	fair	11
	2,00	medium	24
	3,00	good	45

**Table 33: Descriptive Statistics**

Dependent Variable: Total\_Test\_Score

gender	Game_Play	pcSkills	Mean	Std. Deviation	N
male	up to 3 hours	fair	,5233	,14572	3
		medium	,5360	,05941	5
		good	,5432	,10786	19
		Total	,5396	,10136	27
	3-5 hours	fair	,6125	,08016	4
		medium	,6850	,03536	2

		good	,5640	,11929	5
		Total	,6036	,09943	11
	more than 5 hours	medium	,5500	,08485	2
		good	,5580	,10085	5
		Total	,5557	,08942	7
	Total	fair	,5743	,11208	7
		medium	,5722	,08333	9
		good	,5493	,10508	29
		Total	,5578	,10068	45
female	up to 3 hours	fair	,5300	,11533	3
		medium	,5379	,06589	14
		good	,5133	,07247	15
		Total	,5256	,07206	32
	3-5 hours	medium	,5400	.	1
		Total	,5400	.	1
	more than 5 hours	fair	,4600	.	1
		good	,6100	.	1
		Total	,5350	,10607	2
	Total	fair	,5125	,10046	4
		medium	,5380	,06349	15
		good	,5194	,07407	16
		Total	,5266	,07125	35
Total	up to 3 hours	fair	,5267	,11759	6
		medium	,5374	,06261	19
		good	,5300	,09381	34
		Total	,5320	,08620	59

3-5 hours	fair	,6125	,08016	4
	medium	,6367	,08737	3
	good	,5640	,11929	5
	Total	,5983	,09656	12
more than 5 hours	fair	,4600	.	1
	medium	,5500	,08485	2
	good	,5667	,09266	6
	Total	,5511	,08652	9
Total	fair	,5518	,10741	11
	medium	,5508	,07180	24
	good	,5387	,09543	45
	Total	,5441	,08985	80

**Table 34: Levene's Test of Equality of Error Variances<sup>a,b</sup>**

		Levene Statistic	df1	df2	Sig.
Total_Test_Score	Based on Mean	,995	10	66	,457
	Based on Median	,788	10	66	,640
	Based on Median and with adjusted df	,788	10	53,782	,640
	Based on trimmed mean	,999	10	66	,454

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.<sup>a,b</sup>

a. Dependent variable: Total\_Test\_Score

b. Design: Intercept + gender + Game\_Play + pcSkills + gender \* Game\_Play + gender \* pcSkills + Game\_Play \* pcSkills + gender \* Game\_Play \* pcSkills

**Table 35: Tests of Between-Subjects Effects**

Dependent Variable: Total\_Test\_Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
Corrected Model	,090 <sup>a</sup>	13	,007	,833	,625	0.14
Intercept	6,798	1	6,798	818,866	,000	0.925
gender	,003	1	,003	,352	,555	0.005
Game_Play	,013	2	,006	,773	,466	0.023
pcSkills	,015	2	,007	,900	,411	0.027
gender * Game_Play	,017	2	,009	1,039	,360	0.031
gender * pcSkills	,004	2	,002	,213	,809	0.006
Game_Play * pcSkills	,032	4	,008	,954	,439	0.055
gender * Game_Play * pcSkills	,000	0	.	.	.	0.000
Error	,548	66	,008			
Total	24,324	80				
Corrected Total	,638	79				

## Profile Plots

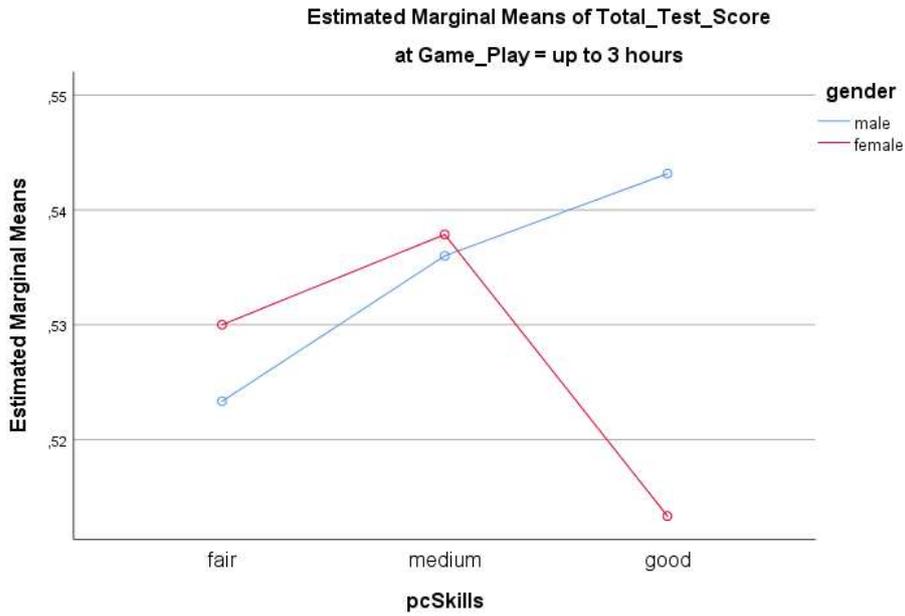


Figure 8: Estimated Marginal Means of Improvement at Game Play = up to 3 hours

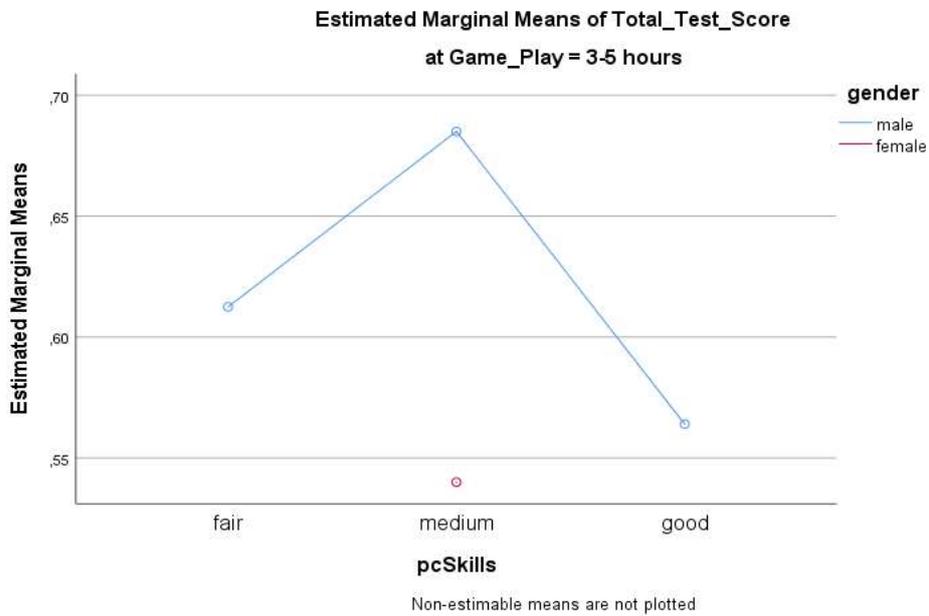
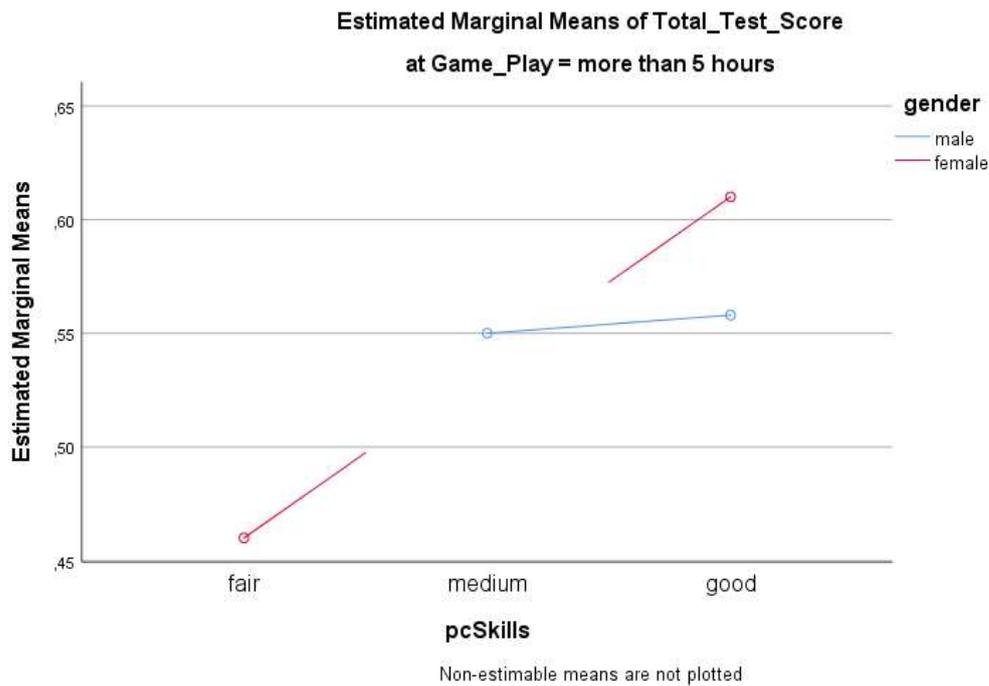


Figure 9: Estimated Marginal Means of Improvement at Game Play = 3-5 hours



**Figure 10: Estimated Marginal Means of Improvement at Game Play = more than 5 hours**

## 5. Conclusion

Recent research on game based learning (GBL), though quite controversial in many cases, has provided a more complete understanding of the benefits educational games provide and the requirements needed for their efficient use. This work's findings agree with current research regarding GBL providing a deep and sustained learning, improving understanding ability of content and leading to a significant increase in learning achievement. As a total score for all learning levels, a statistically significant increase was found after the game practice. What is interesting though is that this increase was not recorder for each level of Bloom's Solo taxonomy. In particular, a significant increase was found only in two levels: uninstructural, concerning basic knowledge, and extended abstract level which refers to higher cognition levels of generalization and synthesis.

There was however a significant decrease in relational level, which refers to theory integration and comparison. This is in contradiction with research in simulations facilitating a progressively learning procedure as they enable students to repeatedly practice and eventually move up Bloom's taxonomy to higher levels of mental abstraction. A possible explanation for this outcome though might be some student's lack of interest in completing the second part of the test.

There is a lot of research regarding motivation and its impact in learning outcome. Educational games practice has been proven to promote involvement, motivation and interest in learning and also decrease dropout behaviour. Current literature though focuses on factors defining and influencing motivation level and their total influence on learning performance. Research also shows that students with greater CTD demonstrate better learning results after practicing business simulation games which also have a positive influence in motivation, cognition, and metacognition. This wasn't recorded in this work however, where there was an attempt to define the possible impact that motivation combined with CTD may have in learning achievement, as well as to identify the variance each one might have on final learning outcome. Results denied our hypothesis as a very low percentage (5.2%) of the test scores is explained by the model of CTD and motivation. No significant unique contribution to the prediction of test scores is recorded for each of CTD and motivation, while CTD makes a largest unique contribution to explaining learning achievement.

Results also showed no statistically significant increase in CTD after practicing the game. Current research also proves that gamers and non-gamers do not differ significantly on critical thinking dispositions and that playing computer games has no significant effect on critical thinking. The only available outcomes from educational games practice refer to increased higher self-reported problem solving skills and practical reasoning skills.

Results also showed a strong, positive correlation between perceived team skills and game scores in the second group of students who practiced the game in teams, indicating a 29% variance, meaning that team skills help to explain nearly 29% of the

variance in game scores, a quite high percentage regarding the vastness of all possible factors defining the final learning outcome. This high percentage is easily justified though as this correlation refers to game scores and not the final test scores; it's quite possible students who performed better as a team during the game to help each other and cover each other's weaknesses. Current research also proves curricula to be more effective when they address more teamwork principles, while certain team structure and quality factors make a team more cohesive and help avoiding mistakes in the game, resulting to a better task quality.

This work also attempted to define any possible impact of gender, pc skills and hours of game play per week to learning achievement, as measured by test scores and test improvement, and no significant effect for each independent variable was found. There was not a significant difference in the affect of 1. hours of game play per week and gender, 2. gender and pc skills or 3. hours of game play per week and pc skills on learning achievement. There is also no significant effect for each of these variables, meaning that each of these groups don't differ in terms of improvement in test scores as well as that gender does not moderate the relationship between pc skills, hours of game playing and learning achievement. This came to contradiction with current research demonstrating role-playing game players to gradually acquire new problem-solving skills and knowledge, as well as that different game design features to be effective for skills improvement. However, it aligns with research showing no significance difference regarding gender on learning achievement through game based learning.

This work attempted to investigate a range of variables in 4 weeks – that could be considered a quite short period of time regarding to the importance of the factors recorded. Another question that might occur is the fact that all collected data regarding motivation, CTD and team skills came from self perceived levels by students. These questions were based on proven reliable questionnaires; however, when it comes to searching the relationship between a number of complicated factors a combination with other methods of data collection such as observation and test should be more reliable.

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## APPENDIX I

### Consent Form<sup>2</sup>

The purpose of this research project is the measurement of the impact that simulation game “Practice Marketing” has on student’s learning outcomes. This is a research project being conducted by Andromachi Boikou for University of Macedonia, under the supervision of prof. Anastasios A. Economides. You are invited to participate in this research project as undergraduate students participating in a marketing course.

Your participation in this research study is voluntary. If you decide to participate in this research survey, you may withdraw at any time.

The procedure involves filling 4 questionnaires that will take approximately 35 minutes and playing “Practise Marketing” game for approximately 50 minutes. Your responses will be confidential and no identifying information will be stored after the end of this project. The survey questions will be about general knowledge of the basic strategic marketing theory.

All responses are treated as confidential. Rather, all data will be pooled and published in aggregate form only. All data is stored in a password protected electronic format. The results of this study will be used for academic purposes only and may be shared with other Universities’ representatives.

If you have any questions about the research study, please contact Andromachi Boikou on [mis17015@uom.edu.gr](mailto:mis17015@uom.edu.gr) This research has been reviewed according to GDPR procedures for research involving human subjects.

If you are 18 years of age or older, understand the statements above, and freely consent to participate in the study, click on the "I Agree" button to begin the experiment.

Consent

Yes

No

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<sup>2</sup> <https://www.socialpsychology.org/consentform.htm>

## APPENDIX II

### Questionnaires

#### 1st Questionnaire

Please answer the following questions before practicing the game

	Fair use of word, excel, ppt, outlook, internet	Basic use of word, excel, ppt, outlook, internet	Good use of word, excel, ppt, outlook, internet
Pc Skills			
	0-3 hours	3-5 hours	5+ hours
Hours I play video games per week			

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree	
I am able to identify both my weaknesses and my skills regarding this course						C.T.D.(II)E
I'm enjoying connecting theory I'm learning in the classroom with things I meet in everyday life to see if it actually works in practice						C.T.D.(I)B
I like to associate what I learn in this course with other course's theory						C.T.D.(II)D
I enjoy dealing with problem's solutions and trying to identify their cause						C.T.D. (II) C
I find this course interesting						IM2 1
I think what we learn in the course will be necessary for my later career						EM2 1

Main reason for my participation in this project is not because I have to do it if I want the extra degree						<i>EM1</i>
I chose to take part in this project because I want to have a high score in the class						<i>EM2</i>
I chose to take part in this project because it is important for me to have the opportunity to practice more						<i>EM3</i>
I don't feel bored during class						<i>IM4</i>
I find course's theory very relevant to the real world of business						<i>Amotivation</i>
I am interested in identifying the points of the theory that I can relate to their practical application in business						<i>C.T.D.(I) B</i>
I enjoy learning new things						<i>IM2</i>
I spend more time studying a lesson than necessary in order to just pass the exams						<i>IM3</i>
I like to look for more information about what I learn from other sources, internet - books, etc.						<i>IM3</i>
My study is not limited to the main topics that I think are more likely to get into the course's final examination						<i>IM3</i>
I am interested in analyzing what I am learning, but not simply learn by heart what is needed to pass the exams						<i>IM3</i>
I consider it important to cooperate and exchange views among the students about the themes analyzed in the course						<i>C.T.D.(III) A</i>
I am interested in working together with my fellow students to solve problems within the course, without deferring the contrary opinion						<i>C.T.D.(III) B</i>
I am interested in the willingness of the students to be cooperative, with mutual respect						<i>C.T.D.(III) B</i>
I am interested to hear the opinion of my fellow students about the solution of a problem						<i>C.T.D.(III) A</i>

## 2nd questionnaire

Please answer the following questions after practicing the game

Through game's practice:

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree	
I identified my weaknesses as well as my skills regarding the lesson I had not previously understood						<i>C.T.D.(I) D</i>
The game made me want to find the solution						<i>IM 3</i>
helped me to connect theory with its practical application						<i>C.T.D.(I) B</i>
I enjoyed practicing in a way that I will meet in my later career						<i>EM 2</i>
I found deficiencies I had in understanding the theory with regard to its practical application						<i>C.T.D.(II) E</i>
It rose my interest for this course						<i>IM2</i>
I found practicing the game a fun experience						<i>IM4</i>
The game did not seem insignificant - I found a great correlation with the actual application of the theory						<i>AMOTIVATION</i>
it made me wanting to find out whether the problem solving approach we learned in course's theory was actually practical applied						<i>C.T.D.(I) B</i>
it put me in a process of identifying in detail the problem and the appropriate solution						<i>C.T.D.(II) B</i>
My participation in this game has benefited me						<i>AMOTIVATION</i>
has made me analyze the key components of the problem and identify relationships between them						<i>C.T.D.(I) C</i>

has made me analyze the problem in its core parts and gradually explore each of them						<i>C.T.D.(I) C</i>
it made me imagine and visualize different scenarios for solving a problem						<i>C.T.D.(I) A</i>
It put me in the process of gathering information about what's going on before, after, and during my actions						<i>C.T.D.(I) C</i>
It made me organize this information by trying to find some basic methodology through a recurring pattern						<i>C.T.D.(II) B</i>
The practice of the game has helped me solve the problem by identifying the ways in which the theory can be applied in practice and to agree more about its validity						<i>C.T.D.(II) B</i>
It made me guess possible solutions, check their results and update my actions						<i>C.T.D.(I) A</i>
During the game, there were points where I saw how my methodology was inadequate and I completely changed my strategy						<i>C.T.D.(I) D</i>
It has put me in the process of working backwards - seeing the final result and analyzing step by step the required actions from end to beginning						<i>C.T.D.(II) B</i>

**3rd questionnaire - filled only be 2nd group**

**Please rate your ability on the following topics during the game practice in teams**

	very poor	poor	fair	good	excellent	
I think that teamwork is important						Team Skills
I feel confident in my ability to work in a team						Team Skills
I know how to give my team members feedback that will not hurt their feelings						Team Skills

I ask others for feedback						Team Skills
I make an effort to include other members of my group						Team Skills
I value the contributions of my team members						Team Skills
I treat my team members as equal members of the team						Team Skills
I am good at communicating with my team members						Team Skills
I feel confident in my ability to be a leader						Team Skills

**Critical Thinking Dispositions**

**(C.T.D.)**

CTD (I) A. Seek alternatives (hypotheses, explanations, conclusions, plans, sources), and be open to them;

CTD (I) B. Endorse a position to the extent that, but only to the extent that, it is justified by the information that is available;

CTD (I) C. Be well-informed; and

CTD (I) D. Seriously consider points of view other than their own.

CTD (II) A. Be clear about the intended meaning of what is said, written, or otherwise communicated, seeking as much precision as the situation requires;

CTD (II) B. Determine, and maintain focus on, the conclusion or question;

CTD (II) C. Seek and offer reasons;

CTD (II) D. Take into account the total situation; and

CTD (II) E. Be reflectively aware of their own basic beliefs.

CTD (III) A. Discover and listen to others' view and reasons;

CTD (III) B. Take into account others' feelings and level of understanding, avoiding intimidating or confusing others with their critical thinking prowess; and

CTD (III) C. Be concerned about others' welfare.

**intrinsic motivation (IM)**

IM 1. IM to know(exploration, curiosity, learning goals, intrinsic intellectuality,

IM 2. IM to learn, pleasure and satisfaction while learning,

IM 3. to accomplish things (development psychology, mastery motivation -Harter 1981).

Also, to feel competent, create unique accomplishments - Deci and Ryan 1991. includes achievement motivation. pleasure and satisfaction of accomplishment and creation -

students who extend their work beyond the requirements while attempting to surpass themselves ( IM towards accomplishment)

IM 4. experience stimulation (stimulating sensations -aesthetic, fun and excitement - dynamic and holistic sensation of flow - the excitement of a stimulating class discussion - reading for the intense feelings of cognitive pleasure) .

**extrinsic motivation (EM):**

EM 1. external regulation(behavior is regulated through external means such as rewards and constraints),

EM 2. introjection (individual begins to internalize the reasons for his behaviour - however, not truly self determined.)

**identified regulation** ( to the extent that the behaviour becomes valued and judged important for the individual - especially when perceived as chosen by oneself, then the internalization of extrinsic motives becomes regulated through identification) ,

**Amotivation**, amotivated when they do not perceive contingencies between outcomes and their own actions. perceive their behaviours caused by forces out of their own control.

Team skills questionnaire is based on Teamwork Scale for Youth

## APPENDIX II

### Marketing Mix Theory – key concepts <sup>3</sup>

Marketing manager concentrates on four major decision areas while planning the marketing activities, namely, (i) products, (ii) price, (iii) place (distribution) and (iv) promotion. These 4 'P's are called as elements of marketing and together they constitute the marketing mix. All these are inter-related because a decision in one area affects decisions in other areas. In this lesson you will learn about the basic aspects relating to these 4 'P's viz., product, price, place and promotion.

According to Philip Kotler "Marketing Mix is the set of controllable variables that the firm can use to influence the buyer's response". The controllable variables in this context refer to the 4 'P's [product, price, place (distribution) and promotion]. Each firm strives to build up such a composition of 4 'P's, which can create highest level of consumer satisfaction and at the same time meet its organisational objectives. Thus, this mix is assembled keeping in mind the needs of target customers, and it varies from one organisation to another depending upon its available resources and marketing objectives. Let us now have a brief idea about the four components of marketing mix. Product: Product refers to the goods and services offered by the organisation. A pair of shoes, a plate of dahi-vada, a lipstick, all are products. All these are purchased because they satisfy one or more of our needs. We are paying not for the tangible product but for the benefit it will provide. So, in simple words, product can be described as a bundle of benefits which a marketer offers to the consumer for a price. While buying a pair of shoes, we are actually buying comfort for our feet, while buying a lipstick we are actually paying for beauty because lipstick is likely to make us look good. Product can also take the form of a service like an air travel, telecommunication, etc. Thus, the term product refers to goods and services offered by the organisation for sale. Price: Price is the amount charged for a product or service. It is the second most important element in the marketing mix. Fixing the price of the product is a tricky job. Many factors like demand for a product, cost involved, consumer's ability to pay, prices charged by competitors for similar products, government restrictions etc. have to be kept in mind while fixing the price. In fact, pricing is a very crucial decision area as it has its effect on demand for the product and also on the profitability of the firm. Place: Goods are produced to be sold to the consumers. They must be made available to the consumers at a place where they can conveniently make purchase. Woollens are manufactured on a large scale in Ludhiana and you purchase them at a store from the nearby

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<sup>3</sup> Taken from <http://download.nos.org/srsec319new/319EL20.pdf>

market in your town. So, it is necessary that the product is available at shops in your town. This involves a chain of individuals and institutions like distributors, wholesalers and retailers who constitute firm's distribution network (also called a channel of distribution). The organisation has to decide whether to sell directly to the retailer or through the distributors/wholesaler etc. It can even plan to sell it directly to consumers. The choice is guided by a host of factors about which you will learn later in this chapter.

The mix of product, price, place (distribution) and promotional efforts is known as 'Marketing Mix'.

- Product is defined as anything that can be offered to a market to satisfy a want. It not only includes physical objects and services but also the supporting services like packaging, installation, after sales services etc. 1. Based on use, products can be classified as (a) Consumers goods: meant for personal consumption by the households or ultimate consumers. Based on buying behaviour of consumers, they can be further classified as (i) Convenience goods; (ii) Shopping goods; and (c) Speciality goods.

(b) Industrial goods are meant for consumption or use as inputs in production of other products or provision of some service. 2. Based on durability, products can be classified as (a) Durable goods; and (b) Non-durable goods. 3. Based on tangibility, they are classified as (a) Tangible goods, and (b) Intangible goods

- Price is the consideration in terms of money, paid by consumers for the bundle of benefits he/she derives from use of product/services. The factors determining price of a product are- cost, demand, competition marketing objectives and government regulation.
- The different methods of price fixation are: 1. Cost based pricing: Price is fixed by adding a desired amount of profit margin to the cost of the product. 2. Competition based pricing: Price is fixed keeping in mind the price of competing brands. 3. Demand based pricing: Prices are determined by the demand for the product. 4. Objective based pricing: Here prices for new (innovative) products are kept low. Where the organisation decides to skim the market, prices are kept high.
- Channels of distribution are a vital link between manufacturers/producers and the ultimate consumers/users. It includes the middlemen/agents engaged in the process of transfer of title of goods. It helps in establishing regular contact with customers, facility for inspection of goods, transfer of ownership and delivery, it helps in financing, provision of after sales services and it assumes all risks connected with the distribution function.
- The various channels used for distribution of consumer goods are : (a) Zero stage channel : Manufacturer → Consumers (b) One stage channel : Manufacturer → Retailer → Consumers (c) Two stage channel : Manufacturer →Wholesaler → Retailer → Consumers (d) Three stage channel : Manufacturer →Agent

→Wholesaler → Retailer → Consumers • Factor affecting choice of distribution channel : – Nature of market – Nature of product – Nature of the company – Middlemen consideration • Promotion is an applied communication used by marketeers to convey persuasive messages and information between the firm and its potential customers.

The different tools used for promotional activities are: 1. Advertising : It is a paid form of non-personal communication through different media about a product, idea, service or organisation, by an identified sponsor. 2. Publicity: It is a non-paid process of generating wide range of communication to contribute a favourable attitude towards the product and the organisation. 3. Personal selling: It is a direct presentation of the product to the consumers or prospective buyers. 4. Sales promotion: It refers to short term and temporary incentives to purchase or induce trials of new goods. For example, games, contests, gifts and discounts.

## APPENDIX III

### Tests<sup>4</sup>

#### Test 1

##### Part A

1. .... consists of short-term incentives to encourage purchases or sales of a product or service.

**A. Sales promotion**

B. Advertising

C. Personal sale

D. Direct marketing

2. Discounts offered to channel members for their services are called:

A. Functional Discounts

**B. Quantitative discounts**

C. Discounts due to cash payment

D. Seasonal discounts

3. Refreshments, soaps, and magazines are examples of what kind of products?

**A. wide consumption**

B. Specialized

G. unclaimed

D. Consumers

4. In retail, products are known as

**A. Goods**

B. Processed goods

C. a & b

D. Raw materials

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<sup>4</sup> Taken from additional teaching material (Armstrong & Kotler, 2014)

5. It is the model that combines all promotional activities into a plan to manage them.

A. Product

B. Price

C. Viewing

**D. Integrated marketing communication**

6. Are the decisions made on how to communicate and promote the product, the place and the price of the hotel. It consists of many advertising activities.

A. Product

B. Positioning

**C. Promotion**

D. Integrated marketing communication

7. Market price is the point where supply and demand are met.

**A. right**

B. Wrong

8. What is the target market?

**A. People to whom the business aims to sell**

B. The people the business does not want to sell

C. People who want to work for them

D. a & b

E. None of the above

9. Placement strategies are categorized according to the number of intermediates between the manufacturer and

A. Employees

**B. Consumers**

C. Producers

D. Wholesalers

## **Part B**

**1. Pricing based on buyers' perceptions of value rather than the seller's cost is called:**

- A. Pricing based on value**
- B. Pricing based on the customer
- C. Non-cost pricing
- D. Competition pricing

**2. promotional activities**

- A. provide information to consumers as well as to any interested person
- B. increase demand
- C. diversify a product
- D. all options**

**3. A bicycle manufacturer has a fixed cost of \$ 500,000 and variable costs of \$ 30 per bicycle. If the company sells the bicycle for \$ 80, how many bikes must be sold to have balanced revenue and expenses [dead end]?**

- A. 6,250
- B. 10,000**
- C. 16,667
- D. 20,000

**4. Priceway food stores often advertise some products at very low prices to attract customers to the store, hoping that they will want to buy other things at a regular price. Which price-rebalancing strategy does Priceway implement?**

- A. Promotion pricing**
- B. Reporting pricing
- C. High - low Pricing
- D. Segment pricing

**5. Karen is checking airfare prices on the Internet and noticed that prices were changing throughout the day as well as on different days. This type of pricing that is systematically applied by industries such as airlines and hotels is called:**

- A. Reporting pricing
- B. Dynamic pricing**
- C. Pricing of dependent products
- D. Zone pricing

**6. A cosmetics shop packs together shampoo, hair conditioner, lacquer, and a hair brush, and offers it all to its customers at a price. The retailer performs the channel function**

- A. Information
- B. Promotion / Promotion
- C. Contact
- D. Matching

**7. Consumers have previously been able to buy Dell computers directly from the manufacturer. Today, consumers can buy them from retailers such as Office Depot and directly from Dell. This is an example:**

- A. Horizontal distribution system
- B. Multi Channel Distribution System**
- C. Logistics system
- D. Distribution system with bypassing of intermediaries

**8. When a producer requires a dealer NOT to handle his competitor's products then he goes into:**

- A. Exclusive Area Agreement
- B. Binding Agreement
- C. Exclusive agreement**
- D. Exclusive distribution

**9. Many communities build shopping centres that include luxury shops, restaurants and entertainment, which are located around a conveniently designed "city square". What kind of shopping centres are they?**

- A. Lifestyle centres**
- B. Power centres
- C. Mini- malls [Small shopping malls]
- D. Category killers

**10. Wal-Mart is an example of stores that should be categorized as:**

- A. Special Stores
- B. Self-service retailers**
- C. Restricted resellers

D. Full Service Retailers

### **Part C**

**1. McDonald's Happy Meals have a toy in the pack. The toy is an example of what kind of promotion to consumers?**

A. Coupon

**B. Gift**

C. Lottery program

D. Promotional miniature

**2. Printers have become very cheap. However, ink replacement can cost as much as the printer. Which batch pricing strategy is applied?**

A. Daily low pricing

B. Pricing based on competition

**C. Pricing of dependent products**

D. High-low pricing

**3. Airlines are no longer supplying travel agents with a booking fee for customers. This is an example of:**

**A. bypassing mediators**

B. Selective distribution

C. Hybrid marketing channel

D. Disintegration

**4. Managing upward and downstream flows of added value materials, end products, and related information between suppliers, company, resellers, and end consumers is known as:**

A. Conventional distribution

B. Channel / Channel Management

C. Supply Chain Management

**D. Channel / channel design**

**5. G. M. sends cars by rail from its primary production plant. In some places, cars are unloaded from the train and transported to semi- truck vans, which deliver the vehicles to the Delegations. The automotive industry uses:**

- A. combined transport**
- B. Continuous stock replenishment
- C. An inventory system just - in - time
- D. Integrated management logistics

**6. Abercrombie & Fitch stores have loud music, dark interiors, and great pictures of young people in sexy poses. Which mix of retail marketing represents this?**

- A. A mix of services
- B. stores' atmosphere**
- C. Variety of products
- D. Pricing

**7. An ad shows how a student uses her laptop to take notes during the lesson, to send e-mails to her grandparents, to pay bills electronically, and to do research for a job. Which mode of execution is used?**

- A. Imagination
- B. Lifestyle
- C. Moments of life**
- D. Technical expertise

**8. Public Relations departments can perform all of the following functions**

**EXCEPT from:**

- A. Relations with investors
- B. Lobby [background]
- C. Product publicity
- D. Product Advertising**

**9. Procter & Gamble encourages customers to discuss their products online through various blogs. Many of the discussions are starting with P & G, which is an example of which public relations tool?**

- A. News
- B. Lobby [background]
- C. "Noise" creation marketing**
- D. Special events

**10. Your product is gradually becoming popular and seems to be experiencing a long maturity period, but you soon find that you need to sell abroad to keep sales at a healthy level. In other words, you have to:**

- A. Modification of the product
- B. Market change**
- C. Modification of the marketing mix
- D. Modifying the promotion / promotion budget

#### **Part D**

**1. Does market penetration work best when all of the following conditions are EXCEPT from which?**

- A. Consumers are price-sensitive.
- B. Production and distribution costs are decreasing as sales volume increases.
- C. Low prices keep competitors at a distance.
- D. The product has a gift / discount label**

**2. The forward / forward tool that carries the most reliable and plausible message is:**

- A. Advertising
- B. Personal sale
- C. Public relations**
- D. Direct marketing

**3. A low calorie berry drink, attractive for women who need a quick energy boost when on the move "could be considered as:**

- A. Product idea
- B. Product philosophy**
- C. Product image
- D. Strategic marketing

**4. What is the fundamental value of customers for travelers who stay in hotels?**

- A. Free continental breakfast and newspaper
- B. Relaxation and a good night's sleep**
- C. Ironing, hair dryer, and Internet access in the room
- D. Location of the hotel near the airport

**5. Hotel managers must take marketing decisions to gain competitive advantage. In order to make these decisions, they must determine everything except:**

- A. what customers want
- B. the amount of time customers want their services**
- C. how to provide services to customers
- D. how to convince customers to choose the hotel

**6. Determine the order of priority of the amount of marketing budget you will spend - product : mountaineering boot.**

- A. 1. Direct mail marketing 2. Events 3. Social media 4. Public relations
- B. Development website , 2. Brand marketing 3. Social media**
- 4. Google & social media ads**
- C. 1. Public relations 2. Events 3. Website development 4. Sponsors
- D. 1. Social media 2. Google & social media ads 3. Public relations 4. Website development

**1. A product may be classified as material or**

- a. raw material
- b. merchandise
- c. Intangible**

d. another

**2. The refund strategy for the customer by sending the proof and the barcode to the manufacturer is:**

A. Discount

**B. return (rebate)**

C. Coupons

D. Price agreement

**3. The 5P strategy is also known as**

A. life cycle of the product

B. Parallel pricing

**C. Price discrimination**

D. Marketing mix

**4. Wholesalers do all the following EXCEPT FROM:**

A. Sale and promotion

**B. Production**

C. Funding

D. Storage

**5. It can be a meal or other material good that offers a hotel or restaurant to the visitor. It can also be an immaterial service or a hotel or restaurant philosophy.**

**A. Product**

B. Price

C. Position

D. Viewing

E. Integrated marketing communication

**6. It is the amount charged by a hotel for its product.**

A. Product

**B. Price**

C. Position

- D. Viewing
- E. Integrated marketing communication

**7. A retailer sells a product to the consumer in small quantities.**

- A. right**
- B. Error

**8. One who buys large quantities directly from the producer and divides them into smaller quantities is**

- A. Retailer
- B. Consumers
- C. Wholesaler**
- D. Agent

**9.**

**Intermediaries who buy and resell goods are**

- A. Merchants**
- B. sellers
- C. a & b
- D. None of these

## **PART B**

**1. Sheri represents many small wineries in Napa Valley. She has the conventional power to sell all of the winemaking production but never owns the wines. Sheri is:**

- A. Commercial Representative**
- B. Broker
- C. Wholesaler
- D. Wholesaler of cash sales

**2. Many successful companies are developing new products that focus on solving consumer problems to create more satisfaction experiences. What approach to developing a new product is this?**

- A. Focused externally
- B. Client-centric**
- C. Focused on simplicity
- D. Focused on the problem

**3. Harold is willing to pay more for branded products because he believes that achieving greater value. This is:**

- A. The intangible of the brand
- B. Brand superficiality
- C. Brand Enlargement
- D. Brand Value**

**4. Honda, a popular car brand, also sells many other products with Honda name, such as motorcycles, generators and lawn care equipment. This is an example of which brand development strategy?**

- A. Series Enlargement
- B. Expanding a brand**
- C. New Market
- D. Multiple brands

**5. Caroline is married with two children. She is a college graduate with an annual income of \$ 75,000. What kind of variable is used to describe segmentation in the case of Caroline?**

- A. Geographical
- B. Demographic**
- C. Psychographic
- D. Behavior

**6. Which of the following value propositions reflects a high social status and luxury lifestyle?**

- A. More benefits at a higher price**

- B. Less benefits at a higher price
- C. More benefits at the same price
- D. Own benefits at a lower price

**7. Placing the product in a place that is easy for customers to access is**

- A. Product
- B. Price
- C. Promotion
- D. Distribution**

**8. To offer the agent a reduction in the price of the product for a certain period of time is:**

- A. rewarding a loyal customer
- B. Shopping vouchers
- c. price agreement**
- d. Discount

**9. Informative statement on the product made from satisfied customers or people who deal specifically with the "building" of a particular image for the product in social media:**

- A. placement
- B. Advertising
- C. word of mouth promotion**
- D. All the options

**10. A short or long-term agreement with which a company makes the price that returns the maximum profit is**

- A. Product support
- B. short-term pricing
- C. Profit
- D. Profit's aximization**

## PART C

**1. Some Wal - Mart stores in the southeastern US state offer many Mexican brands to cover the large Mexican population in these areas. This is an example:**

- A. Non-differentiated marketing
- B. Conformity marketing
- C. Local marketing**
- D. Financial Marketing

**2. A successful advertising company highlights the care taken when packing, loading, and unloading the customer's existing. The competitive advantage presented is based on:**

- A. Image differentiation
- B. Product differentiation
- C. Diversification of services**
- D. Channel differentiation

**3. Seller must also appreciate**

- A. the life cycle of the product
- B. the estimated value of the product by the customer
- C. the product
- D. marketing mix**

**4. What is aiming in satisfying the customer's needs and requirements is**

- A. product**
- B. price
- C. Positioning
- D. Promotion

**5. Setting a different price in different markets for the same product is**

- A. Marketing mix
- B. psychographic market analysis

**c. price discrimination**

d. Discount offer

**6. The practice of disseminating information between an organization or business and the public is**

A. public image

**B. Public relations**

C. a & b

D. Customer Service Centre

**7. Product placement is done with a strategy**

A. Market

B. Promotion

**C. whereas, agreement with channels - distribution networks**

D. All of the above

**8. Something that is widely offered in the open market is**

**A. Commodity**

B. Product

C. Raw materials

D. Services

**9. An integrated distribution channel:**

a. Producer ----> Consumer

b. Producer ----> Retailer ----> Consumer

**c. Producer ----> Wholesaler ----> Retailing ----> Consumer**

d. Producer ----> Distributor ---> Wholesaler ----> Retailing ---> Consumer

**10. The end point of each distribution channel:**

**a. Consumer**

b. Retailer

- c. Wholesaler
- d . a & b

## **PART D**

**1. The right product should be placed at the right place, at the correct price, at the right ....**

- A. market
- B. Customer
- C. Price
- D. time**

**2. High definition DVD players are relatively new products on the market. There are not many competitors and many consumers are unaware of the benefits associated with the high price. What kind of advertising would be appropriate at this stage?**

- A. Reminder Banner
- B. Informative advertising**
- C. Convincing advertising
- D. Comparative advertising

**3. Want a promotional "mean" that offers high audience quality, flexibility, lack of competition within the same "mean", and personalization. Which "mean" would be the best?**

- A. Direct mail**
- B. Newspapers
- C. Magazines
- D. Television

**4. What instrument would you use to advertise a new sports drink?**

- a. TV**
- b. Internet
- c. Sports event

d. None of the above

**5. When we talk about marketing, what does "product" mean about a hotel?**

- A. The location in which the hotel is built
- B. The philosophy and function of the hotel**
- C. Advertising the hotel
- D. The price at which the rooms are sold

**6. Determine the order of priority of the amount of marketing budget you will spend in product : Handmade Jewelry**

- A. 1. Direct mail marketing 2. Events 3. Social media 4. Public relations
- B. Development website , 2. Brand marketing 3. Social media 4. Google & social media ads
- C. 1. Public relations 2. Events 3. Website development 4. Sponsors
- D. 1. Social media 2. Google & social media ads 3. Public relations 4. Website development**