

Lappeenranta University of Technology
School of LENS, LUT School of Engineering Science
Industrial Engineering and Management
Master's Programme in Software Engineering and Digital Transformation

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**SYSTEMATIC MAPPING STUDY FOR IMPACT OF GAMIFICATION
ON MONETIZED ONLINE EDUCATION BUSINESS**

Master's Thesis

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ABSTRACT

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Context: This research study is a Master's thesis study and its purpose is to plot a Systematic Mapping Study (SMS) visually using bubble plotting on impact of gamification on monetized education. The ultimate goal of this thesis is to design a systematic mapping study on the gamification impact on online education system and plot the summary in bubble plotting and present a business model canvas based on the result of SMS.

In present days, Massive Open Online Courses (MOOC) has become one of the most popular monetized education platforms. There is a vast research area on MOOC platform as it is

continuously changing the way of learning process in a traditional classroom learning. In this process, gamification feature, with its significant and effective game elements, enhance MOOC more than before. However, it is note that there are both positive and negative impact are present for gamification impact. This thesis has studied the research area of gamification impact on MOOC platform by implementing systematic mapping study on this specific area. This paper also presents the PICO framework on thesis topic and based on the results of SMS (systematic mapping study), this study portrays the business model canvas of effective gamification application on e-leaning platform.

In background section, this paper has presented several studies that conducted research on the implementation of gamification feature on monetized education system. Later on, in methodological part author presents the PICO framework and systematic mapping study process applied for this research study. To carry out this thesis, a set of primary search string has been used to find out the proper scientific papers. Based on these screened papers, further research of mapping study was carried out. Based on the screening paper database, author presented a hypothetical business model canvas to identify business factors of monetized education where gamification feature has great impact on MOOC platform.

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I am very happy to conclude this study because I wanted to explore the research areas of this gamification development, and after these months of long hard work, I feel proud to achieve my goal. Lastly, I would not want to miss, but I want to thank my husband Md Zulfiquir Islam from my inner heart for his continuous support not only during my thesis period, but also for this whole study period. He is a proud alumnus of LUT master's degree program. Once again, thanks a lot to you, my both parents and siblings for being there with me.

Author

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TABLE OF CONTENTS

1	INTRODUCTION	6
1.1	Research Questions	8
1.2	Structure of the thesis.....	9
2	BACKGROUND	11
2.1	Related Research.....	11
2.1.1	Gamification – Related definition and Description	12
2.1.2	Contribution of Gamification on Online education	13
2.1.3	What is Game elements	14
2.1.4	Challenged based gamification to improve learning practice	17
2.1.5	Gamification to improve MOOC experience	18
2.2	Evolution from E-learning to Gamification	21
2.2.1	E-learning and its major platforms	21
2.2.2	Evolution of e-Learning	24
2.2.3	Massive Open Online Courses (MOOC)	26
2.2.4	Benefits of MOOC	27
2.2.5	Major platforms of MOOC	28
2.2.6	Recent Concerns of MOOC dropout and Possible reasons	29
2.2.7	Gamification to solve this dropout rate issue	32
3	METHODOLOGY AND RESEARCH DESIGN	34
3.1	PICO framework	34
3.2	Systematic Mapping Study (SMS).....	35
3.2.1	Definition of the research question	35
3.2.2	Conduct search	36
3.2.3	Screening of paper	37
3.2.4	Keywording using abstracts	39
3.2.5	Data extraction and mapping process	39
3.3	Searching process.....	40
4	RESULTS AND ANALYSIS	42
4.1	Mapping: Research Type Vs Category	46

4.2 Mapping: Knowledge Area Vs Category	49
4.3 Mapping: Application Domain Vs Category	53
5 DISCUSSION	58
6 CONCLUSION	64
REFERENCE	67
APPENDIX 1	72

LIST OF FIGURES

Figure 1: Focused Thesis work area at a glance	9
Figure 2: Pyramid format of Game elements.....	15
Figure 3: MOOC technology without Gamification feature.....	19
Figure 4: MOOC technology with Gamification feature	20
Figure 5: Six characteristics of E-learning to perceive online learner satisfaction	22
Figure 6: Statics results of MOOC participants' dropout rate in a graph.....	30
Figure 7: Reasons of MOOC dropout rate.....	31
Figure 8: The Systematic Mapping Process.....	35
Figure 9: Top Eighteen conference venue	42
Figure 10: Bubble plotting of mapping between Categories and research type	48
Figure 11: Bubble plotting of mapping between Categories and knowledge Domain.....	51
Figure 12: Bubble plotting of mapping between Categories and Application Domain	54
Figure 13: Business model canvas (BMC) for gamification impact on monetized education	60

LIST OF TABLES

Table 1: Research questions.....	8
Table 2: Gamification related descriptions	12
Table 3: Pyramid stages of game elements with stage breakdown.....	15
Table 4: From e-learning 2000 to innovative e-learning 2010	25
Table 5: PICO framework.....	34
Table 6: Databases and search results of papers based on search strings	36
Table 7: Inclusion standards for selecting papers	37
Table 8: Number of screening papers from different databases	38
Table 9: Database with search strings.....	40
Table 10: Description of four research type	46
Table 11: Description of Knowledge domains	49
Table 12: Description of Application domains	53

LIST OF ABBREVIATIONS

MOOC	Massive Open Online Courses
SMS	Systematic Mapping Study
LMS	Learning Management System
PICO	Populations Intervention Comparison Outcomes
TVET	Technical and Vocational Education and Training
BMC	Business Model Canvas

1 INTRODUCTION

In present days, e-learning or studying using internet has become a significant educational medium over the old traditional classroom education system. Thus, the traditional classroom is being replaced by online education system as students sometimes get bored with the regular class presence, regular lecture from teachers with the normal question-answer session [1]. Moreover, distance from the education provider is also a factor here behind the evolution of this education medium. Among all e-learning platforms, Massive Open Online Course (MOOC) has already become the most popular monetized education system at present [2]. This whole advancement was possible due to the fantastic level of conveniences such as openness, free of cost, no limit of age and variety of sectors that are participating in MOOCs process over traditional education system [3]. However, in the past few years, the participation rate of online courses has been dropping out at a considerable scale [4].

In this circumstances, online education is now remodeled with gamification feature which not only offers the education to the learners but also provides the scope to gain knowledge and vital skills such as communication and problem-solving [5]. In this era of such technological advancements, gamification is being seen and used in many different non-gaming web platforms to engage users well with the parent website. Interestingly, some researchers have proposed to integrate gamification process with monetized education platform such as MOOC ([6]; [7]; [8]). Moreover, in certain researches, researches proposed gamification as a solution to the problem of MOOC participation dropout rate as gamification gives an idea and process of gaming and stimulation in parent platforms and including this into a monetized education platform will create a collaboration concerning user's engagement ([9], [10], [11], [12]). From the vast area of this integration opportunity, it can be assumed that there can be both positive & negative impacts of the gamification process on a monetized education platform. There are number of journal articles and conference papers which are conducting researches on this concept due to increasing importance over time.

This research paper intends to analyze the impacts, both positive and negative, of gamification on monetized education platform through **Systematic Mapping Study (SMS)** to summarize

significant overview from different research articles. In this area, there are several types of researches took place on gamification impacts except for Systematic Mapping Study. We will analyze all related papers in our study and will place a systematic mapping study on gamification impact on online education such as a MOOC platform.

Previously, systematic mapping study is performed for gamification in education by Darina et al. [8] ; however, as of now, there is no specific mapping study on the impact of gamification in specific online education platform such as MOOC. There are some research papers which showed different methods to analyze both positive and negative effect of gamification in online education.

Using the specific search strings for this research, we found 1212 scientific papers related to the mentioned topic of the thesis. In this thesis paper, to analyze, summarize the reports and results of a total thirty (30) paper articles on gamification impact in MOOC, Systematic Mapping Study (SMS) by Bailey et al. [13] method will be implemented. At this stage, instead of conducting only from a single point of view SMS, in total three two-dimensional SMS have been conducted to draw a versatile understanding. Most specifically, a proper categorization and mapping of the reviewed papers can be done successfully. While doing so, this thesis will also focus on developing a business model canvas based on the result of mapping study which can be connected to the gamified monetized education system.

However, there will be some limitations in this research as the whole **SMS** process will be done by human reading and research. Hence, there are chances to include any duplicate data or exclude a point of data. Though, to reduce this limitation, several reviews have been conducted during the research work, but an automated system can reduce the time needed for a human being. Secondly, the mapping study is shallow to cover all the significant information from all the reviewed papers. Thirdly and most importantly, there is only an analysis of gamification impact on monetized education which can overlook the deeper analysis such as some other advanced methodology of gamification in monetized education. Thus, in future, there are plenty of scope to come up with more accurate systematic mapping study with more appropriate analysis of the reviewed scientific papers.

1.1 Research Questions

The main research question of this research paper is catered to analyzing how the monetized educational application (explain the impact on business model) are being impacted by gamification (positive or negative find out). Taking the primary research question into consideration, there are three consequence sub-research questions, as shown in Table 1:

Table 1: Research questions

Research Questions (RQ)	Goal
RQ1: What is Gamification in monetized education (MOOCs)?	Identifying the leading role of gamification technology in the monetized education business.
RQ2: What kind of business models have been previously applied?	Identification of the business model applied in a different area of online education systems.
RQ3: What is the influence of gamification on online learning systems, such as MOOCs?	Understanding the significant gamification influences in MOOCs

At a glance, below Figure 1 shows the focuses exertion of this thesis paper. This thesis paper will focus on the impact of gamification on monetized education primarily. In terms of monetized education, this study will refer to **Massive Open Online Courses (MOOC)**. Correspondingly, we will attempt to develop a Business Model Canvas based on the impact of gamification on monetized education as well.

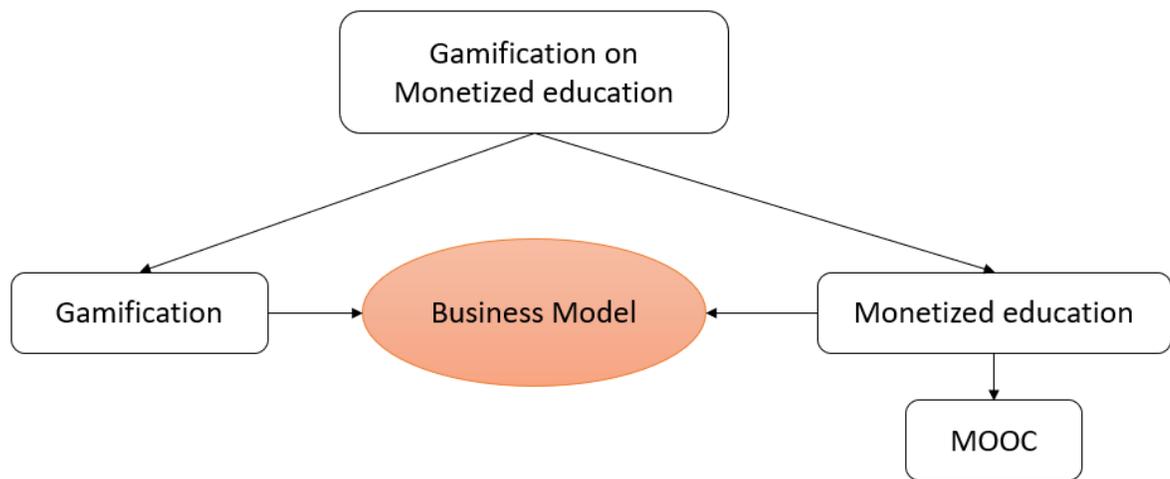


Figure 1: Focused Thesis work area at a glance

The thesis will not cover the detail discussion of the different techniques of gamification in online education platforms. However, this research will discuss the field and research topic in details using SMS.

1.2 Structure of the thesis

This thesis paper will be designed with seven different and elaborative chapters. The breakdown of the chapter is given in below,

Chapter 1 is Introduction which will provide the background of the research and information that covers the research area. Also, it will cover the goal and delimitations of the research work.

Chapter 2 is titled as State of Art which mainly explain the literature related to this research work of gamification impact in monetized education. Moreover, the author will explain what the common methodologies or experiments are found in their research papers.

Chapter 3 will illuminate the methodology of Systematic Mapping Study with the theory of collecting data and analysis. Moreover, this chapter will contain the justification of the whole process of collecting data and the process of analysis.

Chapter 4 will explain the result received from the analysis and will show the description of the analysis with the systematic mapping study.

Chapter 5 will explicate the answers of the research questions and will discuss the impact of the gamification on monetized education with achieved results.

Chapter 6 will cover the summary and the future work for the research including some research undertakings.

2 BACKGROUND

From the very beginning of education providing system, having students and teachers to go to class or specific location had been a widespread culture. For wider education service, this ideology started changing and at the beginning, the process was known as "Distance learning" or "Long-Distance Learning" where the concept of getting an education from different remote places started. Back in 1728, a person named Caleb Phillips, teacher of shorthand learning took the first attempt to provide teaching from a distant place [14].

Since then, the whole system has seen an excellent form of evaluation. Today, with the magical touch of technology, every process around us is getting optimized and efficient. The traditional education system also embraced the technology eventually. Since the last decade, the mode of teaching and learning environment have seen the latest form of evaluation. With that evaluation, online education or e-learning has become an excellent option to reach a vast audience at a low level of cost than the usual teaching methods. Having seen the convenience and benefits, different colleges and universities from the whole world are participating in this education system revolution.

On top of that, gamification added the an attractive feature in the online education process [15]. There is an enormous number of scientific papers which are working on analyzing the significant influence of gamification on monetized education. Based on that, for further research, there needs to be a summary of the related researches on the topic. Likewise, in this research paper, a systematic mapping study will be conducted after analyzing related papers on the impact of gamification and reviewing those based on the research questions. Further in this chapter, some related researches will be discussed, and all the way of evaluation from e-learning to gamified MOOC process will be presented to enlighten the significant influences of gamification in monetized education.

2.1 Related Research

This research paper is about the systematic mapping study on the impact of gamification on monetized education. There are numerous numbers of research papers that have analyzed the

positive and negative effect of gamification on online learning system. However, there are very few researches on the direct impact of gamification on monetized education. Most of the researches focus on the sector of challenge-based gamification on eLearning and learning analytics with the use of gamification. The main idea of this section is to gather information on gamification, the contribution of gamification in online education, elaborating the concept of game elements, explaining how challenged based gamification improves learning practice and explaining the process of gamification to improve MOOC experience. At this point, a fast overview of gamification definition and description will give the starting point for literature review for this research.

2.1.1 Gamification – Related definition and Description

There are many types of researches where gamification has been description plotted. Below table presents the related definition and description of gamification,

Table 2: Gamification related descriptions

Researches	Definition and description
Deterding et. al. “Gamification: Toward a definition”[16] and “From Game Design Elements to Gamefulness: Defining Gamification” [17]	“the use of game design elements in non-game contexts”
Raymer, R. “Gamification: Using Game Mechanics to Enhance eLearning.” [18]	“these elements are not the center of the system, but have the purpose of motivating users to use it”
Brett Terill. “My Coverage of Lobby of the Social Gaming Summit.” [19]	“taking game mechanics and applying them to other web properties to increase engagement”
Huotari, K. and Hamari, J. “Gamification” from the perspective of service marketing.” [20]	“a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation”
Huotari, K. and Hamari, J. “Gamification” from the	“gamification" from a service-marketing perspective as a “service packaging where a core service is enhanced by a rules-based service system that provides feedback and

perspective of service marketing.” [20]	interaction mechanisms to the user with an aim to facilitate and support the users’ overall value creation.”
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From the above descriptions and definitions quoted from different research papers in Table 2, it is noticeable that gamification means having gameful experiences for the non-game framework. Gamification is applied in different units with the focus of engaging people. This background has been used to engage the student and increase their completion rate on online education.

The definition of gamification makes a significant standpoint of engaging people in certain sections. Though some other facts lead how to make this engagement process and what is the actual impact of it. Huotari, K. and Hamari, J stated that this gamification not only enhances the service but also it cares about the user’s value creation [20]. The definition of gamification itself emphasizes the impact of gamification in order to engage people in certain activities and to increase value creation as well.

2.1.2 Contribution of Gamification on Online education

There is a range of reasons that gamification on online education is gradually replacing the textbooks from the modern learning system. Stockdale stated in an interview of RC Cancer Centers that, “Years ago, we had a mechanistic view of the body. Now we know that the mind and body communicate seamlessly. It is a constant conversation between mind and body” [21].

Some studies happened on the impact on the gamified education process. Douglas Thomas and John Seely Brown argued in their book A New Culture of Learning [15] that “curiosity, imagination, and a sense of play-three aspects integral to learning-are largely missing from the traditional textbook-and test-based education system.”

On the other hand, in the social gaming world, Thomas and Brown also mentioned that, "learning happens on a continuous basis because the participants are internally motivated to find, share, and filter new information on a near-constant basis" [15]. They come up with the point that game associated learning is more fun and explorative, unlike the exams. In this game associated learning, students have the freedom to make trial & error, and are allowed to exchange ideas as they do not have much pressure from the unwanted closed syllabus.

In this context, Alan Gershenfeld, who serves on the advisory board of nonprofit organization Games for Change, observed that “Game addiction becomes a much more complex issue when studying and learning is involved.” Though Alan also referred at another 2011 SXSW Interactive panel that designer considers the game addiction concept while they are designing the gamified education environment as they also can make the character that would ask the student to take a break when the students are getting tired [21].

2.1.3 What is Game elements

Learning by experience is more efficient than learning by reading. In this situation, Game elements help to improve the learning experience as well as learning outcomes. These game elements also known as Game atoms [22] and therefore in some context we can say these game elements are the set of Building blocks which holds the characteristics of the game. Game elements are representing the main feature of the game which leads the learner to get the learning outcomes properly.

Now, this is the concern, what are the aspects that game element contains? In “Ten Ingredients of Great Games,” Reeves and Read enlisted [23] the following factors which belong to a set of Game elements. Such as,

1. Three-dimensional environments
2. Narrative Context
3. Feedback
4. Reputations, ranks, and levels
5. Marketplaces and economies
6. Competition under rules that are explicit and enforced
7. Teams
8. Parallel communication systems that can be easily configured and
9. Time pressure

Kevin Werbach shows the game elements in a pyramid format for gamification in his book “*The Gamification Toolkit: Dynamics, Mechanics, and Components for the Win.*”[22] Below Figure 2 displays Kevin’s game elements pyramids for Gamification process.

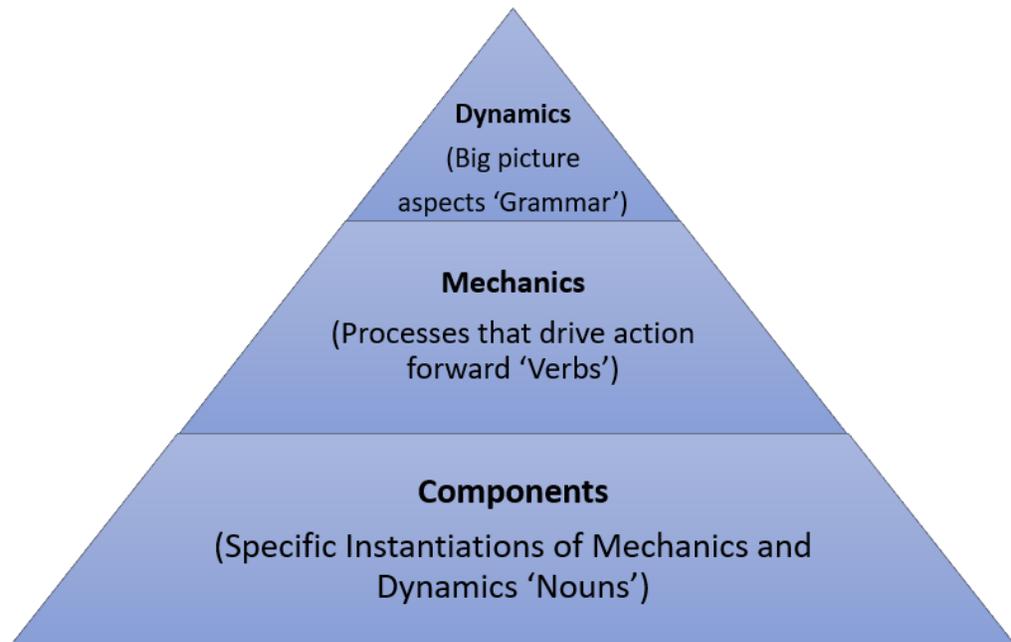


Figure 2: Pyramid format of Game elements [22]

Kevin divided the game elements into three parts, such as components, mechanics and dynamics. Below Table 3 shows the breakdown of each stage of the pyramid which contains the game elements regarding nouns, verbs, and grammar accordingly,

Table 3: Pyramid stages of game elements with stage breakdown [15]

Pyramid Stages	Stage breakdown
Dynamic (Grammar)	Emotions
	Constraints
	Narrative
	Progression
	Relationship
	Challenges
	Chance
	Competition

Mechanics (Verbs)	Cooperation
	Feedback
	Resource Acquisition
	Rewards
	Transactions
	Turns
	Win States
Components (Nouns)	Achievements
	Avatars
	Badges
	Boss Fight
	Collections
	Combat
	Content Unblocking
	Gifting
	Leaderboards
	Levels
	Points
	Quests
	Social Graph
	Teams
	Virtual Goods

This game elements effect on the outcomes of learning as Juul [24] stated in his own model of “classic game model” that, “A game is a rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome, and the consequences of the activity are optional and negotiable.” The statement of Juul pointed out that the gamified learning outcomes mostly depend on the game elements as the players as well as the learners are acting towards the outcome of their activities.

2.1.4 Challenged based gamification to improve learning practice

Gamification can help a learner to improve their learning process more if it is presented in a challenging way. It is proved in several surveys that; the traditional way of learning is perceived as boring and very ineffective to the students. This factor is the reason for facing the major problem of student engagement and motivation to learn [25]. As a solution to this issue, gamification has become the most growing field in different platforms. Hence, the challenge-based gamification helps to improve the learning process more than the traditional educational system. In 2008, the document of gamification was introduced, but it became more and more popular before the second half of 2010. However, the challenge-based gamification such as ranks, and badges is not a new concept as those were being used in the age old Soviet era army system.

It was a myth that gamification and game-based learning are the same thing. Likewise, Karl Kapp [26] stated in his article that, in learning, game learner have to start with a game unit, play game, and end. On the other hand, in gamification learner do not have to participate in activities from a start to end. The learner uses some game elements such as earning points, incapacitating challenges or getting badges by performing tasks during the learning process. From this statement, it is noticeable that not only gamification and game-based learning are not the same, but also gamification has challenge based activities than game-based learning.

Elvira G. Rincón Flores, María Soledad Ramírez Montoya, and Juanjo Mena also pointed out one important thing in their conference paper [27]. They conducted a research in May 2016 with 48 students from engineering and calculus courses of University of Technologic de Monterrey, Mexico. They pointed out that the design of the Challenge based gamification task. Because of immediate results, the design of the gamification task had to be focused on the emotional dimension as well. Nevertheless, Elvira et al. also highlighted that gamification as an exceptional educational strategy that attracts the students most [14].

Challenge based gamification can also improve the learning capability of the student if designed carefully. On the other hand, participants will be disappointed if they are required to perform more than their capability based on the knowledge and skill they received or perceived.

Considering this fact, challenge based gamification could be a tricky process to handle if proper attention was not paid while designing the task. [28]

2.1.5 Gamification to improve MOOC experience

Massive online open courses (MOOC) is the most featured online education system which is highly influenced by gamification strategy. It is to mention that, MOOC dropout rate is decreasing with the use of gamification on it. Oriol Borrás Gené et al. also identified some factors for a dropout rate of MOOC participants as [29],

1. Lack of time to follow courses
2. Lack of motivations
3. Interest on the specific part of courses
4. Different level of courses than expected
5. Disappointment with the course design.

As a solution to these factors, gamification has been one of the comprehensive approaches as stated by Karl Kapp in his article [13]. Moreover, gamification in education has become a severe method to speed up the curve of the learning experience now-a-days.

Fidalgo et al. proposed the cooperative MOOC model with the combination of MOOC in e-learning platform (xMOOC) and MOOC on learning community of social networks (cMOOC) [30]. Below Figure 4 shows the Cooperative MOOC model without gamification feature and collaboration flows of the cooperative layer.

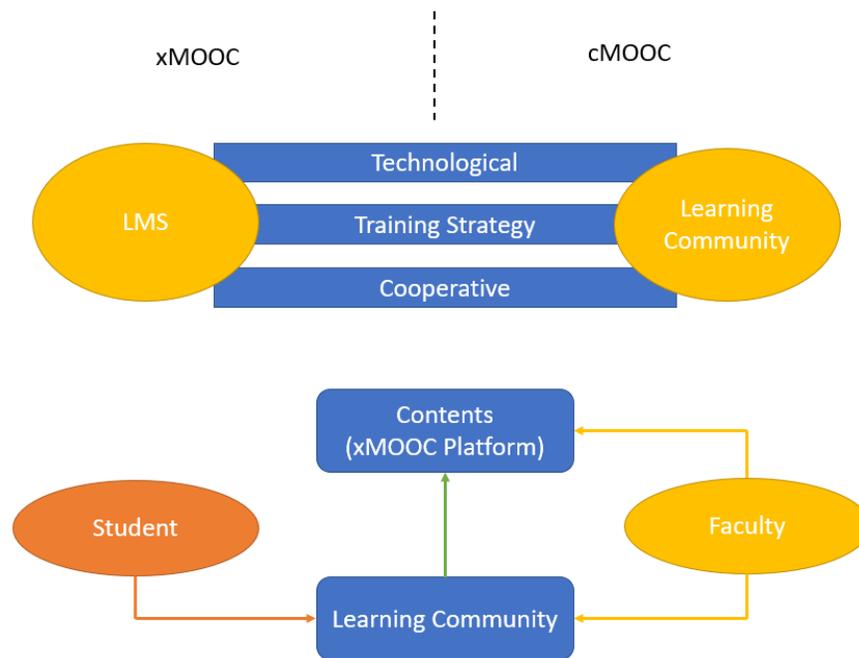


Figure 3: MOOC technology without Gamification feature [30]

In Figure 3, the first layer is Technological which contains all the course contents and the second layer holds the instructional design of the courses. Finally, the third layer belongs to the outcomes of the courses generated with the cooperation of both instructor and the participant of the courses. Below figure shows the MOOC model with a gamification layer which improves the MOOC experience more.

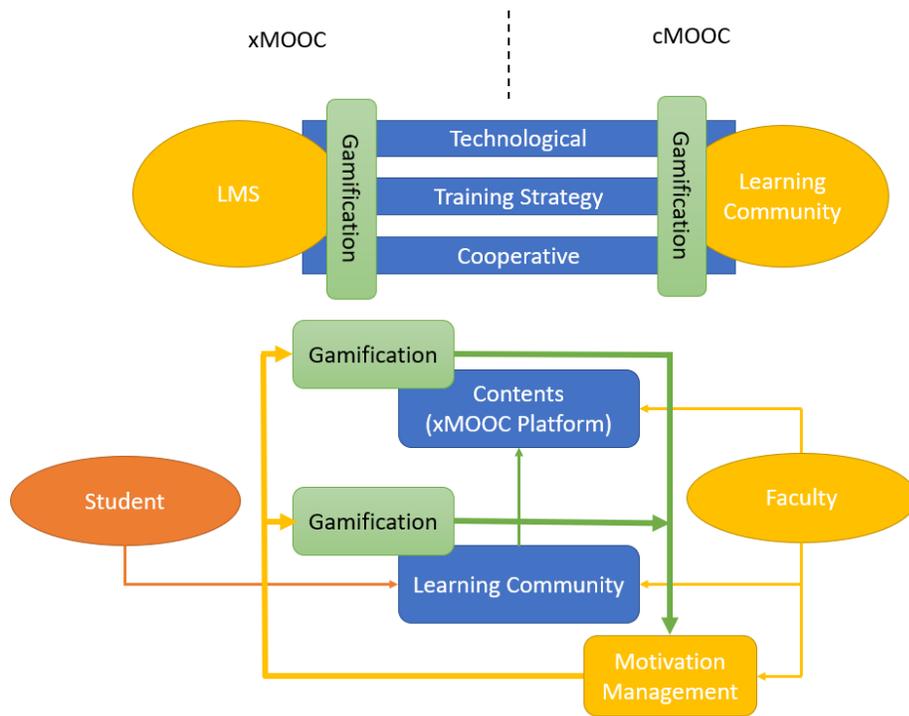


Figure 4: MOOC technology with Gamification feature [30]

In Figure 4, the technological layer uses the tools and all the features of platforms and social networks to manage the learning community as elements of gamification. Thus, there are some actions needed to be taken in the design phase. Therefore, the above figure shows that the motivation management from faculty is applied in the cooperative layer.

Based on MOOC Model with gamification Oriol Borrás-Gene et al. did one research to show the result of an application of gamification in the cooperative layer to improve the MOOC experience. In their study, they have the evidence with the result that the consolidation of virtual communities and gamification methodologies increase the rate of participants motivation in Engineering MOOC courses. [16]

2.2 Evolution from E-learning to Gamification

E-Learning is a modern learning process which can be performed from a remote place using the internet. The term e-learning was introduced in the late 90s and it was an application to enhance the teaching mechanism through a web-based platform, and anyone can participate in the courses without presenting in a classroom or from anywhere in the world. In Europe, many studies say that the effectiveness of e-learning is about 93% and United states distance learning associations stated that, “Distance learning encompasses all technologies and supports the pursuit of lifelong learning for all.” [31]

2.2.1 E-learning and its major platforms

In 2006, Pei-Chen Sun et al stated in their paper that the market growth of e-learning is about 35% though it has a significant failure rate also [32]. As e-learning is one kind of long-distance learning, its assessment is mostly depending on users’ satisfaction. Figure 5 shows that, user satisfaction depends on mainly six Categories such as, student, teacher, course, technology, system design, and environmental dimension ([33]; [34]; [35]; [36]; [37]; [38]; [39]; [40]; [41]). Therefore, these six dimensions can be called the nature or characteristics of e-learning. Below figure shows the dimensions of the six characteristics.

If we think about student dimensions, it will focus on the attitude of learner towards the computer whereas in terms of the instructor, it is the attitude towards the response timelines. Course dimensions mainly focus on the course quality and flexibility and technology dimensions also focuses on internet quality. Ease of use can be the focus area of the design category, and finally, the learner interaction with others is the focusing sector of the environmental dimension. Altogether, the nature of e-learning with which learner will be satisfied. [32]

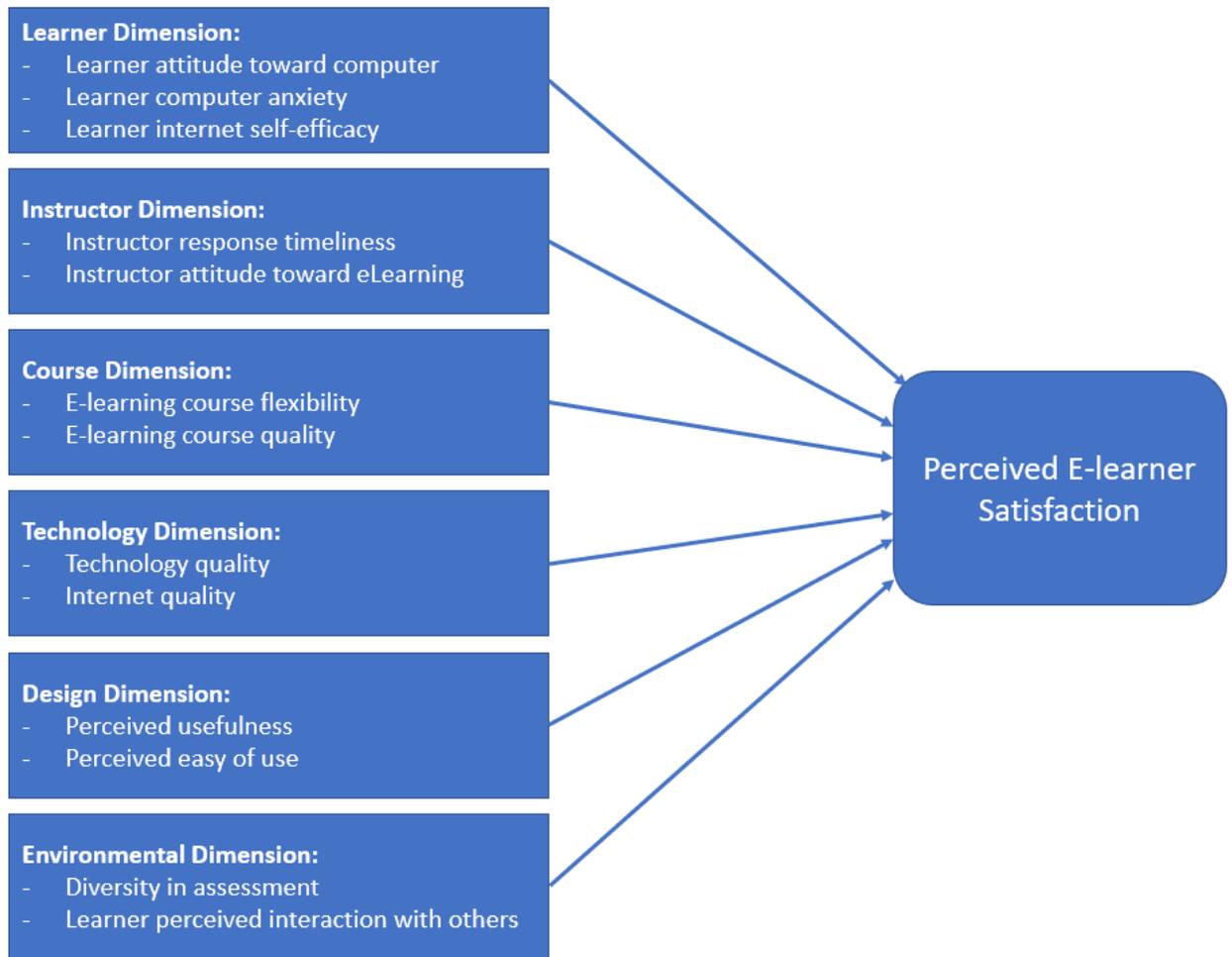


Figure 5: Six characteristics of E-learning to perceive online learner satisfaction.[32]

Nowadays, there are several well-reputed platforms which are providing their course system through an online and central feature of their learning process is gamification. Based on Disruptordaily, most top 10 e-learning platforms in 2018 is, [42]

1. Adobe Captivate Prime

Adobe Captivate Prime is one of the unique online learning platforms, which uses the fluidic player. This product allows the learner to take notes on the go. Likewise, it guides the user to a schedule of their completed and pending task through the online dashboard.

2. Docebo LMS

Docebo is an award-winning e-learning platform which provides both social and formal learning system to the learner. The main feature of this e-learning platform is gamification to engage more and more users. Also, it has the feature of stimuli like badges, ranking, awards and so on.

3. Talent LMS

Talent LMS is a learning management system of e-learning, uses gamification feature to engage the learner, and it has the learning materials existence for a real customized learning environment for better user experience.

4. The Academy LMS

This LMS has the pride as "We wage war on dull online learning." It uses the most popular gamification features like badges, awards and has an interactive classroom with a full suite of reporting tools. Correspondingly, this e-learning platform uses social learning with discussion groups and one to one.

5. ExpertusOne

ExpertusOne is one of the largest LMSs which designed for large enterprises with advanced feature of gamification, social learning, e-Commerce and so on. It provides the opportunity of public and private chatting throughout the online session.

6. DoKeos

This learning management system of e-learning provides ten languages compatibility with smart quiz scenario and social tools like wikis, surveys and so on. Also, it allows users to get the courses and share them through Dropbox. Moreover, there is an opportunity to insert the power point presentation and audio-video conversation during the online session.

7. Scitent

The most popular monetized education platform is Scitent. It works with the target users to create a customized learning system for the adult learner. This e-learning platform mainly focuses on distribution, monetization of the system to the new target audience.

8. Coursera

Coursera is a common e-learning platform as it provides all well-known university professor's lecture online and free. Most importantly, this LMS covers almost all discipline like history, computer science, painting and so on.

9. Udemy

Udemy is an e-learning platform which offers a corporate learning system to explore the business-related content to the learner. It also allows the learner to customize the training courses. Moreover, Udemy focused on making a partnership with the corporate companies to offer specialized online lessons to their employee.

10. Udacity

Udacity is a career based online learning platform. The main feature of this e-learning system is, it offers online university for credit courses by the university professors.

2.2.2 Evolution of e-Learning

John Chambers, Chief Executive Officer of Cisco said in an interview that, E-Learning creates universal, on-demand learning opportunities for people from all part of the world by eliminating the several barriers such as time, distance, etc. [43]. With the power of information and communication technologies, the educational system has dramatic changes through the transformation of the learning process. E-learning becomes the primary key of the knowledge economy which mainly characterized by learning organizations and learning management systems.

During the late 1980s and beginning of 1990s, there was a significant number of learners who used to study through distance learning. In last quarter century, students' profile have changed remarkably in three dimensions such as socially, economically and culturally. However, there was a lack of funding which leads to the e-learning context commercialization. In 1999, World trade organization's education service reported that by 2025 there would be 159 million learners of which 87 million participants will be from Asia whereas China expected the growth of the learner would be 240 million people by 2020 [44].

Tom Kelly from Cisco also mentioned the e-learning with the analogy of movie industry as the traditional education system like a classroom as like as stage performance while online learning

is the education system as like as motion pictures [43]. Nowadays students have become more independent of their studying style in terms of when, where and how they will learn. Moreover, in the present, e-learning also gives students the sense of equality as in online lessons, no one will interrupt anyone and will never talk before anyone finish to make their opinion. Kassop also stated that e-learning offer learners to become a part of an active learning community rather than a traditional individual classroom [45]. Correspondingly, the development of the e-learning process brought several social tools, blogs, wiki, many software to support the online communication of learning communities. The significant evolution of e-learning from 2000 to 2010 are listed in below Table 4,

Table 4: From e-learning 2000 to innovative e-learning 2010 [46]

E-learning 2000	Innovative E-learning 2010
Found distribution knowledge	Generate new knowledge
More e-tutoring	In possession of a student
Student can be isolated	Create a learning community
Comes from provider or institution	The tool is to support partnership
Ignores the context of students' prior knowledge.	Builds on students' prior knowledge and context
Suppresses student creativity	Stimulate students' creativity and strengthening the spontaneous dimension of learning fun
Pushes the role of teacher and trainer	Enriches the role of teacher and trainer
It focuses on technology and content	It focuses on quality, process and context of learning

Substitute sitting in the classroom	Embedded in the organizational and social transformation process
Privileges to those who had taught	Interventions and motivate those who have not been taught.

Jeremy B. Williams and Michael Goldberg stated e-learning evolution in their report that, the ‘sage on the stage’ is giving way to the ‘guide on the side’ [44]. Meaningfully, e-learning is more to be evolutionary than revolutionary, and some institute makes benefits with the quality full learning system and e-learning evolution.

Based on these facts, there has been a gradual evolution, can be said as development too, of Massive Open Online Courses (MOOC). In the next part of our discussion, we will be focusing more on MOOC, its characteristics, perspective, and its evolution.

2.2.3 Massive Open Online Courses (MOOC)

As mentioned before that several universities and schools from around the world are using these platforms of e-learning to deliver their service. This collective action has led to the creation of Massive Open Online Courses (MOOC).

MOOC is the new evolution of e-learning which primarily focuses on large scale collaborating participants through the internet, and mostly it should allow participants an open access platform. MOOC is a new idea with a vast phenomenon of distance learning.

MOOC mainly consist of four words; first word is **Massive** which indicates a substantial number of participants in a course, and that would be more and larger than a traditional class can hold. The second word stands for **Open**, which characterizes three facts. One on hand, it indicates that the participants can take part in the courses through internet or web with qualifications of their former studies. On the other hand, the course materials such as lectures note can be free for participants or the course will be open so that others can use this course on another platform if anyone wants. Thus, **Online** courses can be done remotely through the web platform and no

physical attendance is needed indeed. The fourth word is **Courses**, which mainly emphasizes on learning objectives. The courses should have some activities between teacher and students.

MOOC is a part of monetized education, and it has some differences from traditional e-learning. Josh Squires, Chief Operating Officer of Docebo EMEA stated that all MOOC are e-learning but not all e-Learning MOOC [47]. First, MOOC comprehends many participants at a time as it has the basic definition by the word Massive where traditional e-learning courses do not have that much of space for the participants. Secondly, most of the traditional e-learning cost for courses whereas MOOC is free to access for the Learner. Thirdly, MOOC has an open environment with dynamic content which evolves with learner participation while e-learning platform belongs to a closed environment with static content. Fourthly, MOOC mainly focused on learning process whereas e-learning always an emphasis on evaluation and certification process. Fifthly, MOOC uses social networks to communicate with the mass learners while e-learning mainly makes the communication through several debate forums. Likewise, in the MOOC platform, a learner can become an implementor or vice versa. In that case, participants can either become a consumer and creator as well.

2.2.4 Benefits of MOOC

As discussed earlier, the traditional characterization of MOOC is that it is a free platform for courses offered by universities and colleges. Mainly, MOOC is for all type of learner like adults and for whom who are not so known to the course area also.

There are several advantages that come with MOOC platform. MOOC provides a good variety of subjects as there are limited courses in schools and sometimes schools are not offering some subjects which can be interesting to some student also. As discussed, it is free to access for all people all over the world. Therefore, anyone with the internet can access the MOOC classes. Most importantly, it has a great communication tool such as social networks tools, which can aid any learner to share and take help from other any time in any circumstances.

Mitros et. al. [48], stated in their article that, the massive scale of the classroom has participants on-line 24/7, allowing students to ask questions and receive peer answers in almost real-time.

Mainly the scientist in the field of Educational data mining and learning analytics found MOOC very interesting, not only for big learning data but also have a very assorted student. Moreover, through MOOC courses, researchers can get a different kind of social network methods as well. In future, with the innovative uses of MOOC classes Learning data, it is possible to improve teaching system such as drawing significant historical data researcher can find out the paths taken by a successful or failed learner.

MOOC can also provide some fruitful research arenas such as competency management, e-portfolio systems, technical assistance for the lifelong learning process and so on. Furthermore, MOOC offer some future corporate options which can improve the business idea also such as employer can deliver their specific content to their employee and employee can complement this through learning communities.

In 2014, in an interview, Peter Gunderson, project manager of "Learning without borders," University College Zealand, Denmark, stated that MOOC would give some people a platform and an opportunity to take other educations than what they could do before. Science, without having to move away from their local situation, which they may not feel like doing, because they might have kids or other obligations.

2.2.5 Major platforms of MOOC

MOOC also has publicly shared curriculum, courses with free registrations and open-ended learning outcomes [49]. Since 2012, there were many popular platforms established such as Udacity [50], Coursera [51], Edx [52] and so many. In this section, some primary platform of MOOC will be described in short.

Coursera is the platform which has the most MOOCs features such as credentialing, course diversity, course features, social features, and partner institutions. That means Coursera has the most scale of learning pathways and most variety of languages.

Edx is mainly famous for the most variety of free courses. It has a significant course diversity with MOOC features. As Edx has the open source platform technology, its partner institutions can add or improve Edx to facilitate the participants they want to reach.

With a great social feature of MOOC, **Udacity** is one of the most popular MOOC platforms right now. It offers the technical courses mainly for career buildup. It has partner institutions as like as corporation as Amazon, Google, IBM rather than Universities and colleges. Principally, Udacity focused on the gap between career skill, relevant education, and employment.

2.2.6 Recent Concerns of MOOC dropout and Possible reasons

Though there are many platforms which have their services based on MOOC, there are many unresolved questions on MOOC and their effectiveness. It is noticeable that the dropout rate of MOOC is increasing exponentially. Even if thousands of students are enrolling the courses, the completion rate of most of those courses is below 13%. [53]

It is usually claimed that the MOOC will be able to solve several educational issues such as reducing the cost of universities, free access and increasing learner in developing countries [54]. In this circumstance, it is specified by Kolowick that for massive and impressive enrollment and a conversely unimpressive completion rate of courses made MOOC renowned. Likewise, it is an indictment of the MOOC format for having millions of learners and from the majority do not get a certificate of completion [55]. It is also claimed that most popular MOOC platform Coursera has 45% of completion rate of the students if they reach at least the first assessment. [53]

In another study, a research on a specific platform named Coursera, it was found that the statistic result for the enrollment of the online course to complete versus length of the courses. In above Figure 6, it is indicating that very few percentages of students complete the long duration courses. In the figure, course length for 23.4% of the variance was observed with the correlation of percentage of the total enrollment to complete courses. In that case, many students lose their interest in long length courses, and they drop courses in the middle of the lessons.

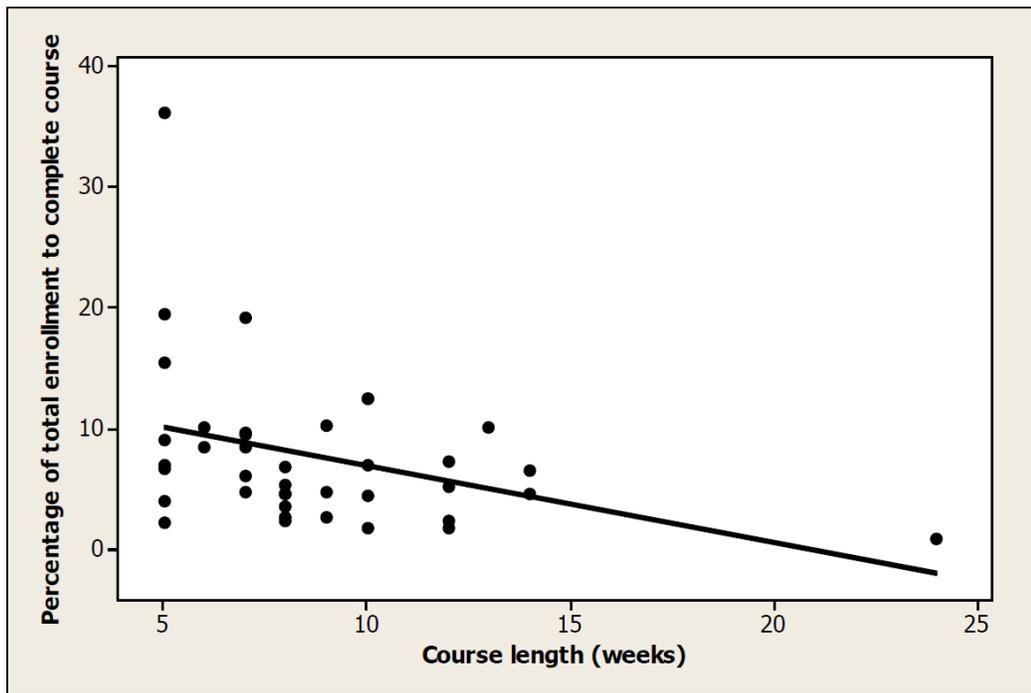


Figure 6: Statics results of MOOC participants’ dropout rate in a graph [56]

There are some other reasons behind the dropout of MOOC course completion. Below Figure 7 shows the bullet point of reasons behind dropout of MOOC. First, the intention of the participants plays the major role here. Grover et al. [57] stated that Intentions and participation in open courses are a by-product novelty of the medium. Secondly, one of the most typical reason is lack of time. Though there are students who fully intended to do complete courses but failed, only because they have insufficient time to dedicate for studying ([58]; [53]). Thirdly, the difficulty level of the courses is also a significant factor behind the dropout. Mackness et al.’s survey mentioned one participant's statement, as, s/he had to stop the courses as it was tough to understand the course discussion any more [59]. Fourthly, technological skills also create a comfortable zone for the learner when they are trying to study online. Evaluation of the Duke Biochemistry MOOC [53] pointed out that student was unable to make the transitions between theoretical and practical lessons in online courses.

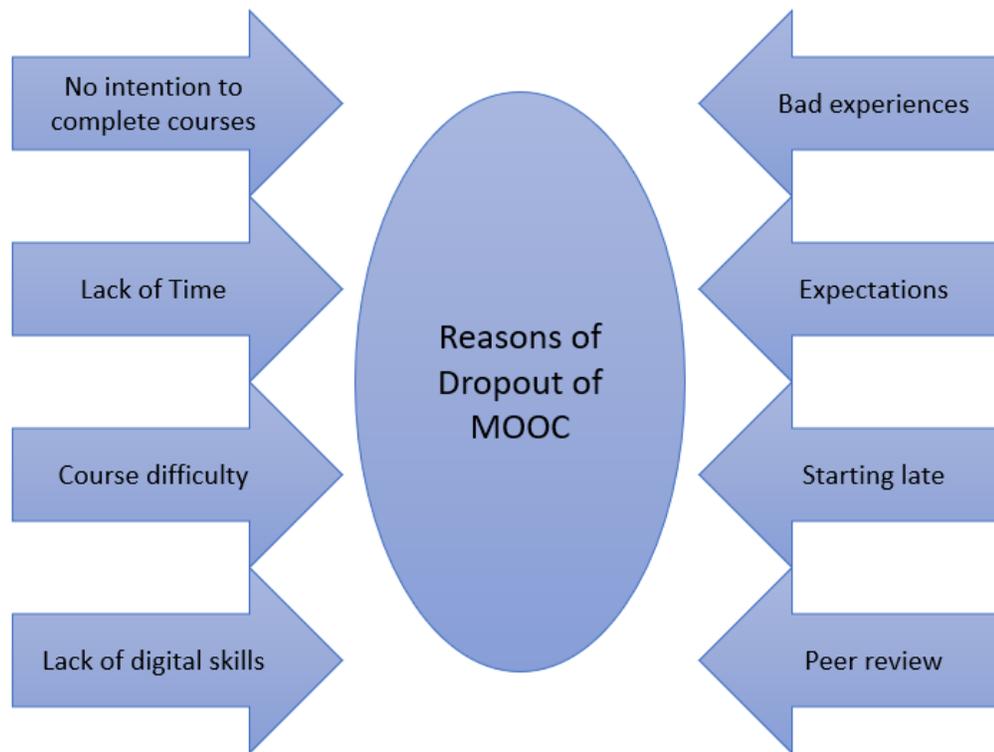


Figure 7: Reasons of MOOC dropout rate

The fifth and the most crucial thing is bad experiences. As Conole [58] pointed out that confusions and frustrations of the learner are a big issue of high dropout rate of MOOC, experiences are the significant factor as well. These adverse experiences can be, lack of coordination in forums, poor quality of materials, inappropriate behavior in the forum, incorrect learning materials and so on ([59]; [60]; [61]; [62]). Sixthly, a learner has more expectation from the courses while the course is not up to their expectation at all. Seventhly, one of the underlying issues is catching up late with learning materials. In that case, newcomers always struggle to fit into the running courses and existing structure. Eighthly, some author noted that the peer review process could increase the dropout rate because of discouraged by lousy practice such as dismissive comments, lack of responses and so on.

Kate et al. had an experiment on 379 participants enrolled at the university in Cairo in their journal paper. All the participants were motivated to take MOOC for their skill development.

From them, 122 participants, which is around 32.2%, successfully went to complete the MOOC courses. [63]

Thommy et al. had an experiment on 34 learners from different degrees who completed at least two MOOCs. The experiment was on the qualitative analysis of the learners' interview. In their experiment, they found some factors behind the dropout of the completion of MOOC courses, such as learners' perception of course content and course design. Not only that but also their social situation, characteristics and their ability to manage the time effectively play important roles here. From their experiment, they found out the most important factor for MOOC course completion dropout rate is 'lack of time' which is also emphasized in Belanger and Thornton's paper also. [4]

In 2013, Rivard published a blog about the MOOC dropout rate. In his article, he emphasizes many types of research work of many universities' professors. The main concern was that fact behind the vast dominant learner fails to complete their free online courses. In this article, an education technology consultant Phil Hill observes that in MOOC there are four categories people such as lurkers, drop-ins, passive participants and active participants. [64]

2.2.7 Gamification to solve this dropout rate issue

To increase the number of participants in these courses, several methods were proposed and among those, one of the most popular methods is Gamification.

Gamification is quite a new concept. In 2002, a British game developer, Nick Pelling invented an idea to boost up enjoyability with a game like accelerated user interface design [65]. In 2011 Deterding et al. [16], stated the gamification as using of the game element in a non-gaming environment. This gamification method mainly focused on enhancing user engagement and also help to develop the courses from a user perspective.

From the definition of Deterding et al. gamification is the use of game and design element in a non-game context. Which can also be defined as,

The gamification is the use of (in contrast of extensions) game (in contrast to playing) design (In contrast to game-based technology) elements (in contrast to full-fledged games) in non-game context (regardless of specific media of implementation) [17].

The concept of gamification mainly comes from the idea of game and game-winning. In a game, different kinds of rewards are there such as points, badges, virtual currency and so on. To earn these rewards, players complete several stages and sometimes players solve complex problems to win the game. Not only that, there are several competitions between players take place. This idea engages more and more players in a game. With the game elements, gamification can engage learners to courses and by this, not only the participation but also the quality of the learners is increasing exponentially.

In the next section, we will focus on describing the methodology used in this thesis to collect and review the related scientific papers. Correspondingly, in that section, we will discuss the whole research design of the thesis has been implemented.

3 METHODOLOGY AND RESEARCH DESIGN

3.1 PICO framework

PICO (Population, Intervention, Comparison, and Outcomes) framework recommended by Kitchenham and Charters [66] to formulate search strings from the research questions. Below Table 5 shows the result to identify several contexts of this research.

Table 5: PICO framework

Population	Intervention	Comparison	Outcomes
<ol style="list-style-type: none">1. Software engineers,2. Web learner,3. Web education system	<ol style="list-style-type: none">1. Gamification,2. Monetized education	<ol style="list-style-type: none">1. Traditional online education	<ol style="list-style-type: none">1. Systematic mapping study,2. Impact of gamification in monetized education (MOOC)

Population: This section mainly focuses on a role, category and application area or any industry group. This research is mainly focused on the learners who are keen to learn from online portals and the applications related to the Gamified MOOC education system [67]. This research also focuses on software engineering & that's why it includes software engineers in population section as well.

Intervention: PICO framework has intervention part which mainly includes the methodology, process, procedure, technology or tools [67]. In the context of this research, we found gamification as a well-known technology or methodology for education and monetized education procedure for web learners.

Comparison: In this part of the PICO framework, the comparison takes places with the different strategies of different methodologies, technologies or procedures [67]. In this study, the first comparison focused on traditional online education such as e-learning and online education with gamification feature.

Outcomes: This segment principally focused on the result of the research. However, it is not mandatory to have some measurable outcome. This thesis is about an empirical study on evaluating systematic mapping study and impact of gamification on monetized education such as a MOOC platform.

3.2 Systematic Mapping Study (SMS)

The main goal of Systematic mapping study (SMS) is to deliver a research area with the identified type and quantity of research papers with the available results. There are some common reasons behind selecting the SMS methodology as Kitchenham et al. stated that “the well-defined methodology makes it less likely that the results of the literature are biased, although it does not protect against publication bias in the primary studies” [57]. We followed the systematic mapping process proposed by Bailey et.al. [13] Thus, below Figure 8 shows the step by step process for the selection of studies in this thesis work where the above steps belong to the processes done in this study and lower steps are the consequence outcomes of the process steps.

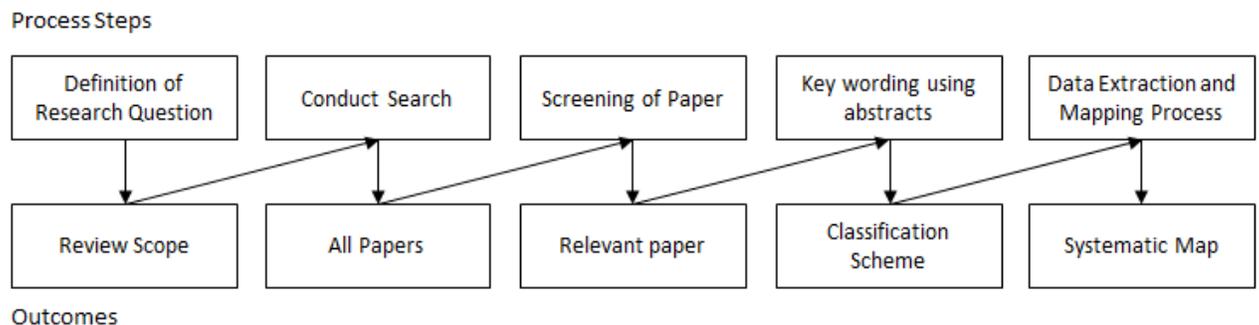


Figure 8: The Systematic Mapping Process [6]

3.2.1 Definition of the research question

The goal is to map several papers and identifying the mediums where research papers were published as it can be reflected in the research questions of the study [67]. Therefore, at the beginning of the SMS process, it is one of the main steps to define the research questions of the study.

Outcomes (Review scope)

Based on the identified research questions, the scope of the thesis is reviewed. This study primarily focuses on Gamification features that has several significant impacts on monetized education such as MOOC. Before the analysis of impacts, it is necessary to clarify the gamification and business model that are being applied to monetized education platforms or systems. Just for reference, the research questions of this thesis were previously defined in chapter 1.

3.2.2 Conduct search

In this phase, mapping study identifies the search results of search strings based on research questions and keywords. Upon conducting a proper search using those strings, it is possible to find out a comprehensive overview of the research area. Otherwise, the precise type of studies overview of the research area could be biased and mapping would be inadequate as well. Consequently, searching for paper articles of a research area is a significant phase for mapping study. [67]

Outcomes (All papers)

In this study, with specific search strings of respective databases have search result which is presented in below Table 6.

Table 6: Databases and search results of papers based on search strings

Databases	Search results
Scopus	152
ACM digital library	11
Web of science	10
IEEE Xplore digital library	105
ScienceDirect	30

Google scholar	904
----------------	-----

3.2.3 Screening of paper

In this phase of the SMS process, there are several inclusions, and exclusion criteria are performed to find out the most relevant papers to answer the research questions. Moreover, after excluding the number of papers which barely consist the main topic of the required research area as focused, it becomes more accurate mapping study depending on the defined research questions.

Outcomes (Relevant papers)

We applied several inclusion and exclusion measures to find out the most relevant papers. Below Table 7 shows the inclusion criteria in summary,

Table 7: Inclusion standards for selecting papers

Selection standards for inclusion of research papers	
Paper Publication Date	Work published from the year 2013
Language	Paper published in the English language
Study Type	Full Text and Peer-reviewed published articles (Conference papers and Journal articles), book
Main concept	Gamification in monetized education
Geographical Opportunity	International

The below papers from table 08 are screened based on the frequency of the main concept of the research area on a title and in introductory sentences in abstract of the articles. Moreover, only the papers which discussed gamification approach as the main concept are included for data

extracting, and others are excluded automatically. Below table shows the results of relevant articles after a screening of articles.

Table 8: Number of screening papers from different databases

Databases	Search results	Screening papers in title	Screening papers in abstracts
Scopus	152	39	10 and 8 common papers
ACM digital library	11	6	1 and 3 common papers
Web of science	10	2	1 common papers
IEEE Xplore digital library	105	16	3 and 5 common papers
ScienceDirect	30	4	2 and 2 common papers
Google scholar	904	13	2 and 11 Common Papers

From the above Table data, we found 1,212 papers in total with the search strings based on research questions. All these papers have met the above mentioned inclusion and exclusion criteria. After that, we found in total eighty (80) papers through screening the Title of papers that focuses on the central concept. At the last screening stage, we selected a total of thirty (30) papers from those based on the more frequent use of the central concept in the Abstract of papers.

3.2.4 Keywording using abstracts

In this part of systematic mapping process needs to be done for the categories of the map. When all the research papers found after the screening, reviewers read the abstracts of the paper and review the keywords. If the reviewer found the abstract in poor quality, the reviewer can also choose to read the introduction and conclusion of those papers. Later, different keywords from all papers will be used to develop a set of categories of systematic mapping.

Outcomes (Classification Scheme)

We found a set of eleven categories such as Game element, User engagement, Gamification features, Social engagement, Computer using in education, challenged based gamification, Student Engagement, Learning analytics, Completion rate, Software development, and Gamification on MOOC. These categories are mainly extracted from keywords and abstract of different types of related research papers and related study works. Most of the categories belong to research papers those are shortlisted from the primary search result of around 1,212 research articles. These eleven (11) categories are described in more details in chapter 4.

3.2.5 Data extraction and mapping process

In this section of the process primarily focuses on merging or splitting the selected categories and enter the data as well as the paper information into the scheme. Additionally, reviewers put data of papers into the scheme with a justification of being part of a specific category.

Outcomes (Systematic map)

We used Google Sheet documents to maintain all the data related to papers. Those resources can be found from: *Web reference of Mapping Table* and *Web reference of Selected 30 Papers in more details*. We followed those criteria which provided the information of the reason behind this paper's placement to specific categories. In this study, we extract the data for the papers with below criteria,

- 1 Title
- 2 Author first name
- 3 Paper type (Conference paper or journal article)

- 4 Date of publication
- 5 Significant tags
- 6 The short rationale
- 7 Database sources.

From this excel document, we put all the information in mapping study, and there are two-dimensional tables which contain papers in number. The bubble plotting of the mapping table is described in section 4.

3.3 Searching process

In order to answer the research questions and for searching strings, we chose several databases such as ACM, IEEE, Web of Science, ScienceDirect, Scopus, and Google Scholar to find out the related papers. From these databases, we received a good number of papers. For conducting searching, we created some search strings for the proper result with a reasonable amount of paper. Table 9 shows the specific search strings for specific databases.

Table 9: Database with search strings

Database	Search strings
Scopus	ALL ((gamification) AND ((monetized AND education) OR (moocs))) AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SUBJAREA , "COMP"))
ACM digital library	Gamifi* AND (Monetiz* OR MOOC)
Web of Science	(TS=(Gamification AND (Monetize* OR MOOC))) AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article)
IEEE xplore	((Gamification) AND MOOC)
ScienceDirect	Gamification AND (Monetiz* OR MOOC)
Google Scholar	Gamifi* AND (Monetiz* OR MOOC)

These search strings retrieved about 1,212 papers in total; however, most of those were not relevant to the main concept of the research questions. The result of search strings is shown in section 3.2.3. We screened these papers, and after that, we found 30 papers which were more relevant to the main concept of the thesis. In this part of the searching process, we used Zotero for saving all the relevant paper's information.

4 RESULTS AND ANALYSIS

This research work involves analyzing thirty (30) papers in the field of MOOC, gamification and monetized online education platform. Among these, **eighteen** were conference papers and **twelve** were journal articles. In the below figure 04, the distribution of different sort of papers can be found.

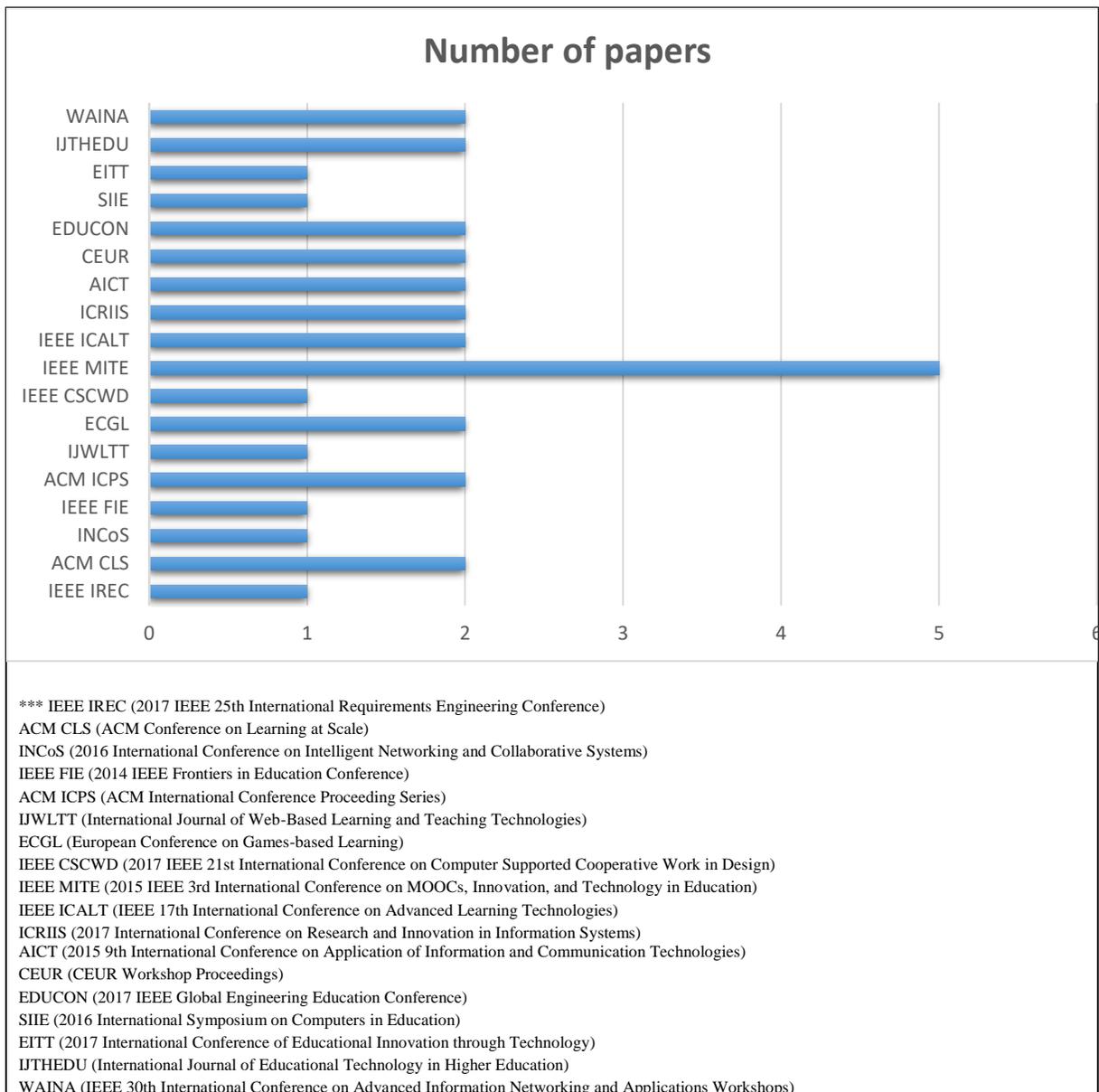


Figure 9: Top Eighteen conference venue

Figure 9 shows the top eighteen conference venues, where most of the articles from the selected thirty papers have proceeded. It is pointed in the figure that, IEEE MITE (IEEE International Conference on MOOCs, Innovation, and Technology in Education) has the maximum number of papers which are mostly related to the main concept of this study which is the impact of the gamification in monetized education platforms. More specifically, these papers exclusively talked about the MOOC experience improvement to engage more users through augmented reality and gamification.

From these research papers, specific data have been extracted based on review protocols where some inclusion and exclusion criteria in studying criteria have been applied. These criteria include studies included in Full Text & Peer-reviewed articles and book. Additionally, those studies have been excluded which are sourced from any website, editorials, newspaper, and non-English language which were mentioned in chapter 3.

As mentioned earlier, this research will use systematic mapping study. To be more specific, three different types of two-dimensional mappings of the studies have been conducted in this research. In each mapping, the dimensions are different and unique. A bit later in this paper, details about each mapping can be found. Different dimensions which were bonded in a single map, are listed in below,

1. Research type Vs. Categories
2. Knowledge area Vs. Categories
3. Application domain Vs. Categories

In this thesis, several categories were identified from these 30 research papers which are cross-checked with different level of characteristics such as knowledge area and research type to do the mapping. Let's have a look at the categories that are being bonded with different research types. There are ten categories considered for this research work,

1. Game element

By the definition of gamification, game element takes the very first place. It is written and mentioned that gamification uses the game elements for engaging user more in non-

game contexts. There are several game elements, which are regularly used by gamification, such as, points, badges, obstacles, levels, competition, and milestones. In section 2.1.3, as described by Kevin Werbach, the Pyramid form of game elements in gamification, which enlightens that there is a significant relation of gamification with game elements which can motivate participants in online courses.

2. User engagement

With the utilization of game elements in online courses, user engagement can be increased more than the traditional ways of learning in online courses. Use of points, badges levels, and other game elements can give users a more attractive learning experience. Nowadays, not only students but also there are several learners from different companies and different organizations take part in MOOC courses to improve their professional skills. From their point of view, they have their office works besides the load of the course studies which may cause them to leave anytime because of the stress. At this point, it is essential to engage the user to online courses through game elements which will encourage them to keep coming.

3. Gamification features

For engaging more and more learners, gamified features are one of the most significant factors for the learning environment. Principally, game elements and gamification features are internally related to each other. To be clear on that point, use of game elements can form gamification features which can motivate users to participate in the learning events. For example, courses are like races, and in between the races, small games act like a small break which provides rest to the users. In that stage, the user can be motivated by participating in a quiz and get some rewards points.

4. Social engagement

There is a big focused area, where people want to do socializing and emerging networks. The network is primarily created between learner to learner or learner to the instructor. Moreover, MOOC uses the most popular Social Network Services (SNS) such as Facebook, Twitter to increase the interaction between millions of teachers and students. This category is also connected with game elements and gamification features. This

connection can increase the social engagement more by providing the experience of fun and challenges for the learners.

5. A computer using in education

Online education has transformed the education industry in a better way. Online education has made the education limitless over the traditional classroom education. As a result, distance learning has become more convenient for learners from all over the world. In that case, computer technology helps a lot to enhance distance learning via the internet. For distance learning, it is also significant for both teachers and learners to stay on the same premises which can only be possible with computer technology. Those MOOC education systems with gamification features can provide facilities for audio and video presentation of lectures and information. Thus, making the education process more interactive and motivating.

6. Challenged based gamification

Gamification is one of the most innovative learning strategies which provides challenge based on the educational environment and where learners are motivated to achieve several extraordinary challenges. These kinds of challenges increase the level of user engagement as well as competitiveness. Most of the challenges are gaming featured such as level, badges or points wins.

7. Student engagement

In recent days, gamification in MOOCs is taken by not only for students but also for employees of any organization. For developing the skill, people are taking several courses online. However, the primary focus of MOOC is replacing the traditional classroom. Thus, the student can participate in the lecture from any part of the world without any physical presence. MOOC can provide such an environment for a student who is willing to do distance learning. Consequently, MOOC is engaging more and more student to the courses through gamification strategy.

8. Learning analytics

With the great popularity of MOOC, there are huge datasets stored in MOOC server. These huge datasets can be called 'Big Data' formally. This huge database needs to be maintained, stored and analyzed. Therefore, learning analytics comes with the need to

understand the attitude and behavior of the learner who is interested in learning from online. Learning analytics has the use in the evaluation of the education environment as well as MOOC.

9. Completion rate

As discussed, earlier MOOC courses provided services to a huge pool of participants from different parts of the world at a time, and there is an enormous number of participants take parts in one course at a time. A gigantic number of learners are taking the courses but never willing to complete the course. There are more than a few reasons behind the completion rate dropout for MOOC courses which already discussed in section 2.2.9. Principally, gamification strategy came to the online education era to halt the completion rate dropout of MOOC courses.

10. Gamification on MOOC

Gamification on MOOC is the last and main topic concerned category. Gamification technology mainly uses to improve the completion rate of MOOC courses and increase learner motivation. The importance to gamification uses in MOOC course are also discussed in detail in section 2.2.10.

4.1 Mapping: Research Type Vs Category

The first mapping has been done between categories and research type of papers. This mapping shows the variety of researches that have been carried out through a wide range of categories related to MOOC, gamification and monetized online education platform.

To visualize the information and the papers, bubble plotting seemed an excellent option. Bubble plot from this map has been given below and it shows the result of mapping between categories and research type of the papers. In this map, research papers were distributed in five different types which are shown in below Table 10,

Table 10: Description of four research type

Research Type	Description
Exploratory	Exploratory research paper for problem design which has not been studied more, however, this research type helps determine the best research design.

Solutions	This research type mainly focused on problem-solving results for identified research problems.
Experiment	For this research type researches manipulates a different kind of variables and groups to do an experiment to validate the ideas generated after researching.
Opinion	This type of research paper mainly concerned about surveys or verbal processes. Using the surveys or verbal process opinion research type determines the results of the research.
Validation	Validation research type focused on numerical or statistical data analysis. Therefore, this research collects and analyze the data to validate the ideas or outcomes of studies.

As mentioned above, these research types were compared with the eleven categories. From the figure, it can be observed from the selected papers that they mostly belong to two categories such as challenged based gamification and learning analytics. There are four papers, which mainly go with experimental type research paper. Most of these papers are about the experiment of how gamification-based learning will be challenged and more grounding on analytics. Again, from gamification point of view, from the severe game concept, people are very fond of level winning and badges. This concept helps to increase engagement of the student in challenged based gamification.

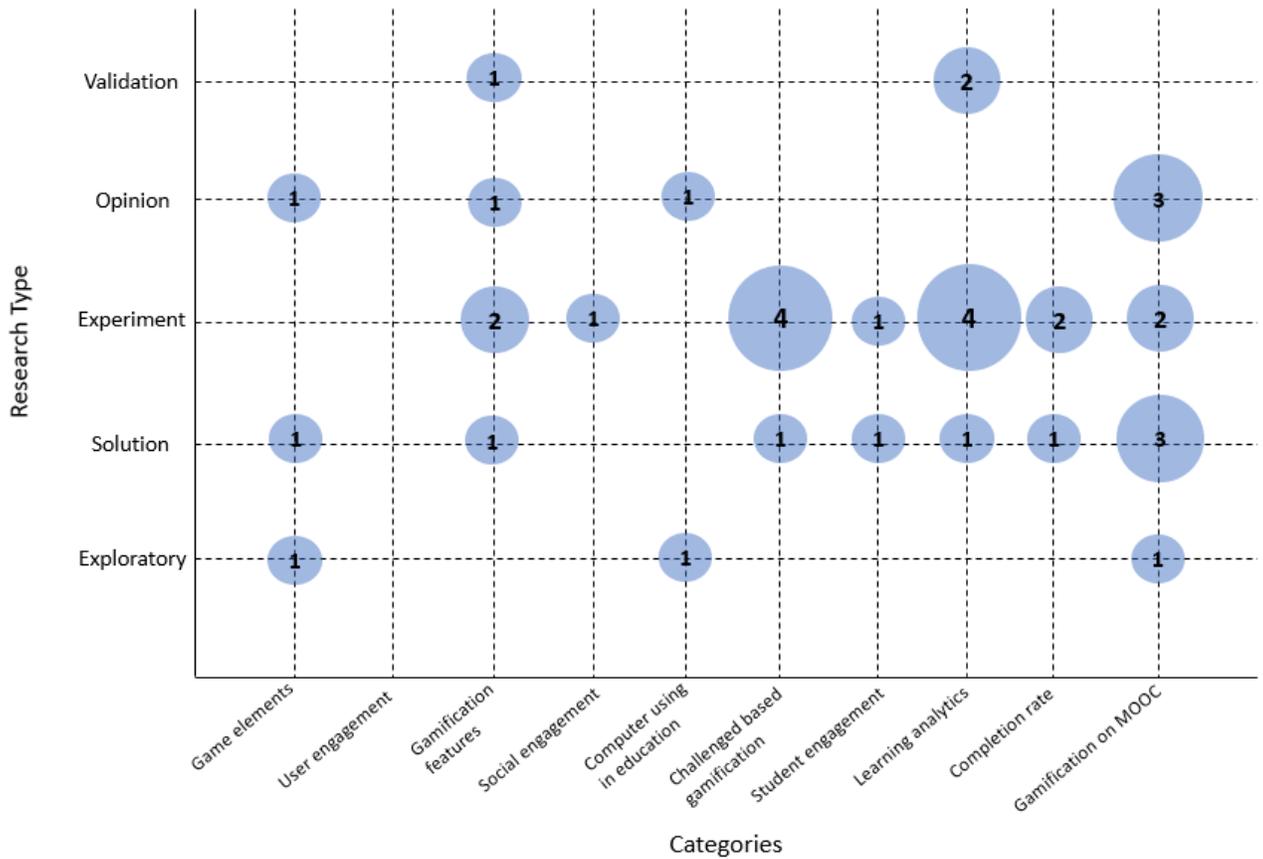


Figure 10: Bubble plotting of mapping between Categories and research type

In figure 10, it is observed that there are three papers on the same category named Gamification on MOOC. However, they fall into two different types of research area such as opinion and solutions. The impact of gamification on MOOC is recommended as a solution in some paper articles, and some research papers also suggested the gamification could be a better match with MOOC for more user engagement on online education.

Moreover, there are some other categories which have two papers in different research sectors. One of them is the completion rate of a participant in online courses. In this case, both papers did some experiment or survey on their research work and showed some results on that.

Also, there are several categories which have at least one paper in different research areas. However, there is one category named ‘user engagement’ which does not have any research paper from listed thirty papers which is also considered because research works mostly focused

on student engagement and social engagement rather than any normal user of the educational site.

4.2 Mapping: Knowledge Area Vs Category

Second mapping study has been done between Knowledge area and Categories. There are several knowledge areas which belong to selected thirty papers for this research study. These knowledge areas extract from different paper's keyword and abstract.

Below Figure shows the bubble plotting of the result of mapping study between knowledge area and categories. According to different knowledge areas of impact of gamification on monetized education, we selected seventeen knowledge area in this study and Table 11 contains the description of the selected knowledge domain,

Table 11: Description of Knowledge domains

Knowledge Domain	Description
Learning at scale	This is scale for separate learning Goal. Learning goal could be the user perspective to the concept of the materials. For example, a concept is new to the user or familiar to the user.
Energy Learning	Energy is a generalized term. However, in this case, knowledge domain energy means, the papers doing research in the energy-specific field.
Open innovation	Open innovation is focused to encourage the internal innovative mindset to create something new.
Cooperative learning	Cooperative learning is a process where learner shares their learning knowledge with their partners.
Game Badges	Game badges mainly the game elements for gamification features. With these game elements, it is possible to motivate learners to complete their online courses.
Educational data mining	This is a research field which focused on data mining mechanism of a learning process. With the combination of gamification, educational data mining provides a better solution to increase an effective learning process.
Online program courses	This is the most popular term of recent education era. Several schools, universities even organizations provide online courses to overcome the issues of physical presence in the conventional classroom system.

E-Learning outcomes	This knowledge domain primarily concerned about results for e-learning courses. Principally, this field observed, whether the e-learning outcomes are effective for the learners or not.
Electronic learning	This domain intense to work with the researches related to electronic mechanisms.
Courseware	This is a computer program or instruction to facilitate educational or training courses. These courses offered in web-based e-learning platform.
Augmented reality	This knowledge domain with gamification facilitates the most interesting learning environment for the students in online courses. Augmented reality uses computer images on the user's sight of the real world.
Interactive content	In online education, for better audience interaction is it important to make lecture's content interactive than having a simple content of only reading and watching.
Adaptive learning	Adaptive learning not only provides an interactive learning environment but also offer customized resources to the learners and instructors.
Computer-aided instructions	The online education system has instructions by means of using a computer. Thus, computer-aided instructions improve teacher's instructions in a better way for the learners.
Learning experience improvement	In online education, system student does not have to present physically. To attract them in courses and motivate to complete the courses this knowledge domain is playing a significant role.
Peer Assessment	With a peer, assessment student can grade the assignments of their peers. In the e-learning process, peer assessment process can involve learners more than traditional assessments from teachers.

From Figure 11 of bubble potting, it is seen that there are numerous numbers of papers belongs to several categories and knowledge areas. Thus, it is observed that there are some popular categories compared to knowledge area which has a high number of papers such as game elements, completion rate and gamification on MOOC categories compared to eLearning outcomes, learning experience improvement knowledge areas.

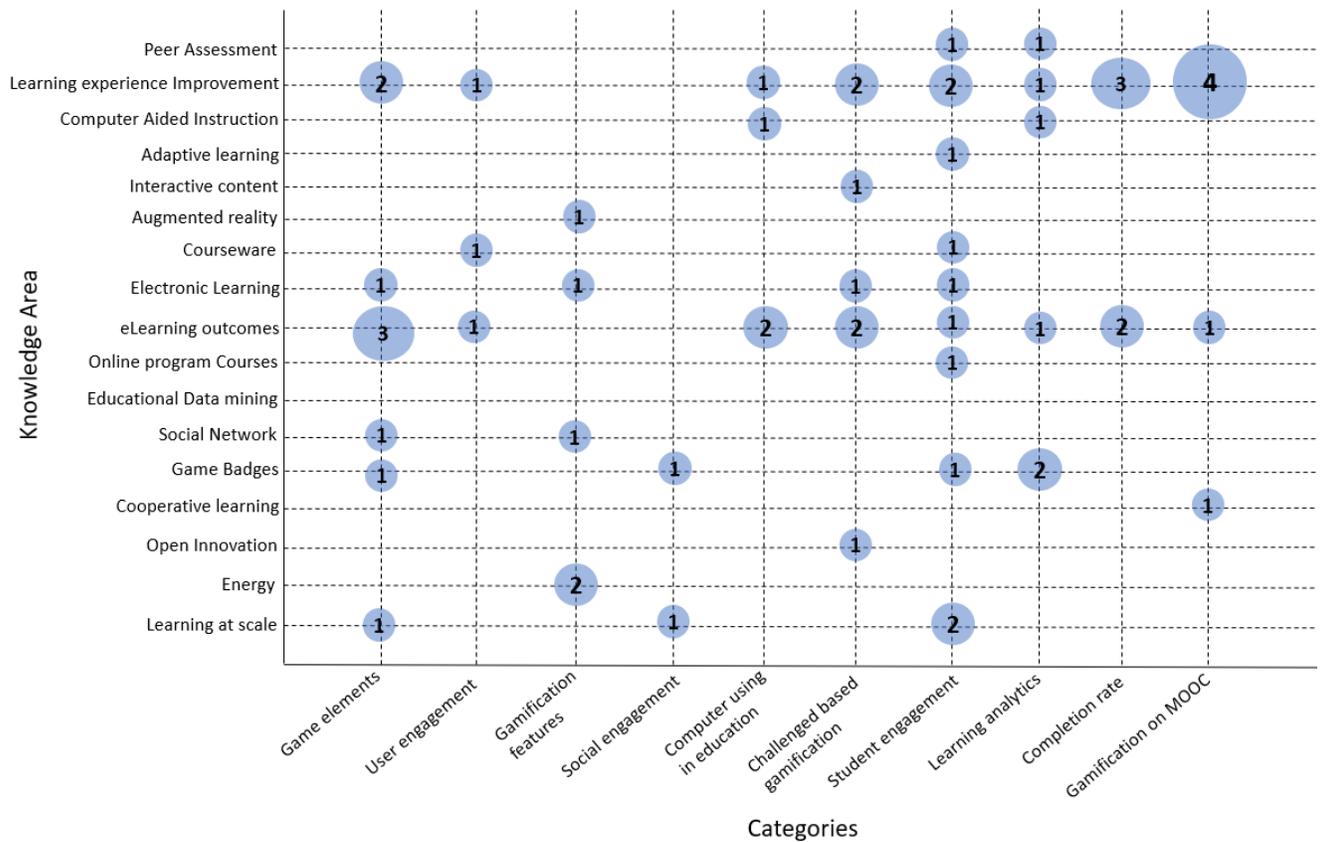


Figure 11: Bubble plotting of mapping between Categories and knowledge Domain

We already have seen that gamification has a significant impact on MOOC platforms and in our research results, we also observed the same state which is seen in the above Figure 11. It is pragmatic that, Gamification on MOOC and learning experience improvement has four papers in this section. These four papers are conference papers 10, journal article 3, 6 and 9 from the list of selected thirty papers.

Conference paper 10 [68] belongs to gamification on MOOC for increasing the learner engagement. This paper is an experimental paper, and this paper has the result of learners successfully completion rate of a gamified task is 28% more than a non-gamified task. The researcher shows the result of denied of taking final test examination of learners decreases 14% for the gamified platform. They took a survey from the candidates of the experimental study and found that 76% learner started having fun on the gamified learning process, 45% felt

changes in learning environment and 79% participants believed that there were excessive improvements in learning as well.

Journal article 3 [1] is about the gamification learning to increase the motivation for the participants. In this paper, Alexandru proposed an educational platform named gamified to motivate the students more and simplifies the educational system of modern schools and universities. He found the results of attendance boosts from 50-72% to 77-93% and full attendance of the students raises from 6-12% to > 50%.

Journal article 6 [29] is about the motivation and learning of engineering education by gamification on MOOC. This is an Opinion type research papers. Primarily, in this article, Oriol et al. suggested practical tools to increase the motivation and completion rate of learners in Engineering education on MOOC with proposed cooperative MOOC model gcMOOC. Moreover, the results of the survey show that most of the students are positive about the use of gamification on the MOOC platform.

Journal article 9 [69] is about the analysis of an analytical process for gamification elements in MOOC courses. This paper is also an experimental research paper. Mainly, this paper is about experimenting of technical and vocational education and training (TVET). They determine the best gamification mechanics for TVET. This study shows the positive impact of gamification elements in students, teachers, universities as well as a country economy where experiential learners facilitated by MOOC courses.

In figure 12, there is another category named game elements compared with eLearning outcomes knowledge area. These papers ([70], [71], [72]) focuses on the use of game elements MOOC and similar eLearning outcomes. One of the papers is journal article 2 [72] and this paper talks about enhancing web education such as wiki page activities among the students using gamification. In the experiment, two groups of learners are using an only wiki page, and another group is using wiki pages with game elements as well as a gamified wiki page. Results of this experiment show that game elements has brought a significant difference between the two groups concerning the content displayed and content edited though there is no such big difference in two groups. However, this paper observed that the student's awareness is also essential to make the effective use of computer technology.

From the figure, category student engagement also observed that it has papers almost in all the knowledge areas. It is observed that student engagement is the most significant category of the leading research concept.

4.3 Mapping: Application Domain Vs Category

Third mapping of this study is between application domains and categories. The application domain is the concept which separates the mechanism of common infrastructure so that they do not affect each other. In our study, we found four application domains of the selected thirty papers such as,

Table 12: Description of Application domains

Application Domain	Description
Massive Online Open Courses	This is the latest development of the e-learning platform and provides a large scale of collaboration and open access to the courses to the learners. It is described in more in details in section 2.2.4.
Distance learning	This is an education technology which provides opportunities to the learner to learn and attend the education program without attending the classroom and lectures physically.
E-learning	This is a learning technology where the teacher can conduct their lectures and student can attend their classes via electronic media. In section 2.2.1, e-learning technology is described in more details.
Gamification	Gamification is an approach which uses the game elements to attract the user of non-gaming background platform. It is described in more details in section 2.2.7

These four application domains are focused on the online monetized education system. For obvious observation of the mapping study, we presented the data of application compared to categories in bubble plotting. Therefore, it is shown the number of papers of each coordinate of the map. From figure 12, we identified that most of the paper is belongs to gamification and MOOC application domain.

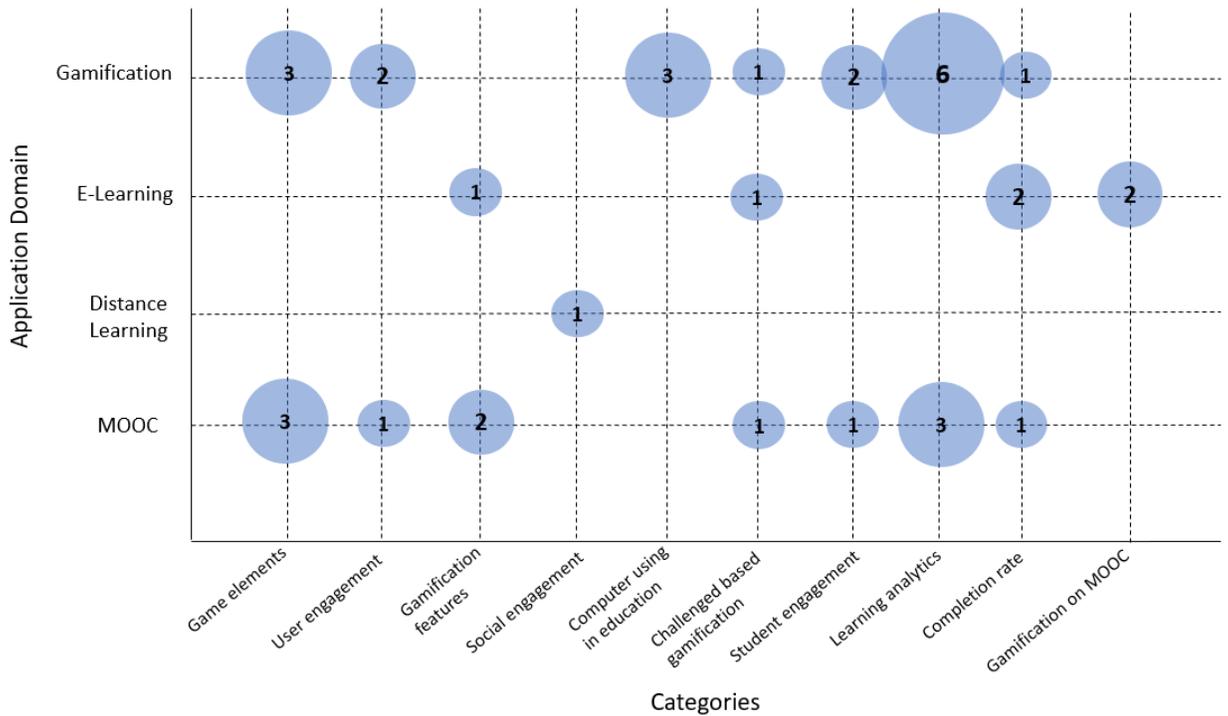


Figure 12: Bubble plotting of mapping between Categories and Application Domain

Major Correlation 01

Thus, gamification application domain compared to category learning analytics has six papers and We identified that the six papers are co-related to each other based on the learning analytics of experiment on Gamified learning environment.

As we can see in Conference paper 10 [68], Vaibhav et al. have an experimental model to build a bridge between MOOC and user engagement through gamification. Also, they set up an experimental environment to compare the results of 100 candidates and do a comparative analysis between gamified and conventional learning method. Moreover, the result illustrates that 28% more completion rate for gamified learning process than the traditional learning system.

In conference papers 12 [71], Staubitz et al., had three platforms such as openSAP, openWHO, and mooc.HOUSE which detects the learning analytics, automated assessment, peer assessment,

team-work and gamification on MOOC education system. In their article, they mentioned the development of MOOC platform from the year of 2013. They implemented two third of their invented gamification features. Now, based on the data they collected from their research studies, they are going to implement the features on openHPI platforms as well.

conference paper 14 [73], Arnab et al., had a pilot study to investigate the impact of gamification in online competition and collaboration and for that reason, they made StarQuest online platform to examine the activities of 20 groups of people in 11 weeks. Also, from this study, they found the positive response from most of the participants (30 out 51) as the platform ease of sharing information and ideas between all members of the groups and more interesting than other conventional learning platforms.

Likewise, Journal article 1 [74], Tenório et al., has the model for peer assessment where peer assessment is supported by gamification which is more likely to have learning analytics for the student who is assessing the other student's papers. Besides, the found the results as students were more interested in peer assessment and the average grade given by students in an essay is alike as the grade given by experts.

Journal article 8 [11], Reischer et al., has an experiment to examine that the gamification features can increase the participation rates or not. For this experiment, researches are focused on to analyze iMooX forums which likewise have a significant effect on learning analytics of gamified featured education system.

Last but not the least, Journal article 9 [69], Yusoff et al., studied different gamification mechanism and determined the best gamification mechanism for vocational education or training. This was an experiment among the group of students and gamified features. Thus, it shows the most significant difference between different groups because of implementation of gamified MOOC usage in public universities.

Major Correlation 02

We identified three papers in application domain Gamification compared to Computer using in Education. It is not possible to implement a gamified learning environment without using a computer. We observed a general relation between those four papers based on the research issue

of using computer-based education system with gamification features to increase the participation on the MOOC platform.

In conference paper 4 [75], Lehtonen et al., studied a nine years old online learning environment for programming. This paper discussed the evolution from C++ to java programming and data collection. Thus, they identified significant effects of leaning processes improvement as we as the reason for dropout. In the result of the study showed the vast difference between gamified and non-gamified system and using of the computer in the learning process.

Conference paper 6[76], Mesquita et al., implemented a combined system of gamification and digital game-based learning (DGBL) in MOOC platforms. Application domain gamification is a part of their proposed learning techniques DGBL. Moreover, they found a positive response from the learners to use DGBL by meeting the learners' desires and needs.

Journal article 2 [72], Özdener studied in a gamified and non-gamified wiki-based educational environment. In recent time, it cannot be denied the use of the computer in the education system is not only for preparing PowerPoint presentation or writing word document for traditional classroom system but also doing assignments and doing adaptive learning through the wiki though she does not find out any significant difference between gamified and non-gamified wiki-based learning process.

Major Correlation 03

MOOC application domain compared to categories game elements and Learning analytics has three papers each. We had Conference paper 3 [70], 15 [9] and journal article 5 [77] belongs to the category game elements compared to application domain MOOC and conference paper 12 [71], journal article 8 [11] and 9 [69] are going to category learning analytics compared to the same application domain.

Three papers in the first coordinates of MOOC and game elements refers that the game elements are responsible for decreasing the MOOC dropout rate. Oriol et al. (CP 3 [70]), stated and explored how to incorporate the social gaming elements in a MOOC platform which can provide and solves specific issues regarding the MOOC. Jen-Wei et al. (JA 5 [77]), conducted an

experimental survey on 5020 MOOC learners to observe the engagingness of learners through 40 different gamification mechanisms.

Second coordinates MOOC and learning analytics has three papers which shows the data collections for observing the trend of MOOC platforms activities. Staubitz et al., (CP 12 [71]) conducted their examination and researches on applying different gamification features on different MOOC platforms such as openSAP, openWHO, mooc.HOUSE and openHPI. Likewise, Matthias et al., (CP 8 [78]) conducted researches on analyzing existing iMooX forum. In their studies, they collected data regarding the examination of the impact of gamification on the participation rate of the teacher to student and student to student communication and interactions. Furthermore, Yusoff et al., (JA 9 [69]) researched vocational education and training and collected data from a conducted experiment to observe the effect of gamification features on MOOC platforms.

Major Correlation 04

Other correlation identified in category game elements compared MOOC and Gamification Application domain. Both coordinates encompass three papers each. In section significant correlation 03. we discussed the coordinates of application domain MOOC and category Game elements.

Further Coordinate of Game elements and gamification comprises three papers. Likewise, these three papers also have internal relations based on the primary research concept. Alexandru (JA 3 [1]) said in his research paper that with proper use of the game element in gamified platform design boost the attendance of the participants 50-72% to 77-93% and full attendance more than 50%. Consequently, Elias et al., (JA 4 [79]) shows the results of participants motivation increases or not form having the badges which is one of significant game elements. Interestingly, he found the less impact of win badges on learners' motivation than expected from his research.

5 DISCUSSION

This thesis paper discussed the systematic mapping study for the field of impact of gamification in Monetized education such as Massive Open Online Courses (MOOC). Systematic mapping study is conducted for understanding the field or topic of research very well [13]. For mapping study, we mainly collected data without any biases and created search strings for proper papers. All the papers, where there are 39% of journal articles and 61% of conference papers are screening through search strings from different databases. Search strings were created based on the study of keyword and abstract of screening papers.

Throughout the research, all the classifications and categorizations are manually done by one researcher and peer-reviewed by another researcher. In this case, the manual process can cause any problematic results because the screening process of the paper done manually based on paper title, abstract and available data on databases. In the thesis, we identified three research questions. In this section, we will discuss the answer of these three research questions based on results we found from mapping study.

RQ1: What is Gamification in monetized education (eLearning or MOOCs)?

The goal of this research question was to identify the primary responsibilities of gamification in Monetized online education. A key focus was to identify the researches which reported that gamification is responsible for increasing online education business and motivate more and more learners on an eLearning education platform. We already discussed in more details in section 2.2.7 that in online education platform like MOOC, gamification used game elements in non-gaming context to motivate and encourage learners more in online courses [17].

Findings

There are some significant findings from the result of mapping study regarding research question 1. This is observed after screening papers that, Gamification is being used in online education on a large scale for motivating and encouraging the learner to the online courses ([68], [1], [80], [81], [71]). Some points are highlighted below,

- In the second mapping study of knowledge area and categories, most of the papers such as conference paper 10 [68] and journal article 3 [70], 6 [76] and 9 [80] are doing their research on gamification on MOOC to improve the learning experience.
- There is a significant number of papers such as Conference Paper 3 [70] ,11 [71] and Journal article 2 [72] in the same mapping which is doing their study on how to use game elements of gamification in positive e-learning outcomes.
- In the third mapping study, it is identified that the gamification application domain focused more on the research area of online learning analytics and this is emphasize the research on role of gamification on monetized education ([82], [71], [9], [74], [11], [69])

RQ2: What kind of business models have been previously applied?

The goal of this question is to find a previously applied business model in monetized education and propose a business model for an e-learning education system with the impact of gamification. Mainly, the business model for online education system refers to a model which can plan the funding source, education material source and the way to present them in e-learning platform and the way to do a campaign for the courses [83].

Findings

From the screening papers, there are two significant research articles which are studying the business model for the impact of gamification on online education.

- In section 2.1.5 we discussed the business model without and with gamification feature and shows the result of the positive influence of business model with gamification in online learning process over the business model without gamification [30].
- Oriol Borrás et al. also emphasized the result as a business model with the traditional learning process has 7% completion rate of the courses whereas the business model with gamification feature increases the completion rate by 39%. [29]

From the above discussion of this research question and based on mapping study result, we propose a business model canvas, which is a tool to describe, analyze and design business models [83], shown in below,

<p>Key Partners</p> <ul style="list-style-type: none"> • University faculty or company • Online course participants • MOOC provider such as Coursera, edx and so on 	<p>Key Activities</p> <ul style="list-style-type: none"> • Increase completion and attendance rate of online courses 	<p>Value Proposition</p> <ul style="list-style-type: none"> • What - Learner is not enough motivated to complete enrolled online courses • How - Gamification feature of online courses can attract learners more than traditional courses 	<p>Customer Relationships</p> <ul style="list-style-type: none"> • Motivate and encourage online participants of the courses 	<p>Customer Segments</p> <ul style="list-style-type: none"> • Online Course participants
<p>Key Resources</p> <ul style="list-style-type: none"> • Gamification • Game elements • Massive Open Online Course • Online Learners • Course materials 			<p>Channels</p> <ul style="list-style-type: none"> • E-learning environment • Internet • Computer based online Education 	
<p>Cost Structure</p> <ul style="list-style-type: none"> • Online education environment setup • Infrastructure related cost • Suppliers related cost • Online advertisement for MOOC provider 			<p>Revenue Streams</p> <ul style="list-style-type: none"> • More participants of online courses will make revenue • More completion rate increase the reputation of that monetized education platform 	

Figure 13: Business Model Canvas (BMC) for gamification impact on monetized education

From Figure 13, it can be said that most important and significant **key partners** of the business of gamified monetized education are online course participants and MOOC service provider such as Coursera, edx and so on. Partially, faculties from different universities also playing a vital role in key partnership of the business of monetized education. For example, nowadays, one of the best monetized education platforms is Khan Academy. There are a good number of faculties share their knowledges with their online virtual students.

Main business **activities** of the monetized education are to focus on strategies to increase the attendance as well as the completion rate of the participants of online courses [17]. For example, Khan Academy implemented gamified feature such as points, badges in their learning process. Consequently, they make all the video lectures so informative within doable short time which involves and motivate more learner to complete taken courses.

Resources of successful business on monetized education can be gamification, using game elements and gamified course materials to increase the interest of the online learners on MOOC. For example, video course materials of Khan Academy is very interactive as any learner can pause the video and can edit samples as s/he can.

The **value proposition** of the business model is a main section which indicates the core value of the business deliver to the customer and specify the customer needs. We found the core value of monetized education is to motivate participants to complete the enrolled online courses and to meet up the needs online courses can be gamified to attract respective learners. For example, Khan Academy identified effective game element and interactive course materials in their learning platform to increase the user engagement more.

To motivate and encourage the online course participants and most importantly, to attend and complete the courses is the vital **customer relationship** in the monetized education business. For example, Khan Academy creates the course structure with a project work at the end of the course and every project work has an option to get help from other participants of the course. Moreover, they keep a feedback and discussion session option at the end of every tutorials and project works so that all the participants of the course can act as a community together.

Without online course participants, it is entirely impossible to do business with monetized education. Thus, we kept online course participant as a significant **customer segment** for BMC of monetized education. For example, online learners and mentors of Khan Academy both are playing significant role to run the platform and make successful learning environment.

Channel is another vital section to identify the critical platform where the business can run successfully. We found out internet, e-learning environment and computer-based online education is the most exceptional channel to communicate customer or online learners of the monetized education. For example, Khan academy is one of the most popular MOOC platforms and having all their course materials online and learner who are willing to learn from online courses via internet.

The **cost structure** of the BMC of the monetized education can behold for the infrastructure, environment setup, suppliers related, and advertisement of the MOOC provider related to the online education business. Specifically, if we look at the critical resources of the BMC, we can say that gamified course materials and gamified environment set up can be the costliest part of this business area. For example, Khan Academy has their own website and web infrastructure which cost to build a flawless learning environment. Thus, most of the MOOC platform as well as Khan Academy offers scholarship to the students to motivate them to take courses.

The **revenue stream** is the central part of the business which directs to a big picture of the business. Increasing the completion rate of the courses can increase the reputation of the MOOC platform which can significantly increase the number of online course participants. More participants in the courses can raise the revenue of the monetized education business as well. If we are talking about Khan academy, they are running their MOOC platform by donation and all the courses they offer are free. However, there are some popular MOOC platform such as edx, which offers paid courses from several reputed university.

RQ3: What is the influence of gamification on online learning systems, such as MOOCs?

The goal of this research question is to detect the significant and significant influences of gamification feature in an online learning environment. MOOC is one of the most popular e-learning platforms, and many papers are studying on gamification application in a MOOC environment.

Findings

There are several papers on experimental research type which mainly studying about challenged based gamification and earning analytics. Gamification has enormous effects on the online education system as the percentage of student attendance, and completion rate is increasing after applying gamification feature to traditional e-learning process [68].

- First mapping study shows that most of the experiment research papers such as conference paper 2 [27],13 [84] and journal article 3 [1], 9 [69], conducted their researches on the impact of challenged based gamification on the e-learning platform.

Moreover, the articles such as conference paper 7 [2], 14 [73] and journal article 1 [74], 4 [79] showed the positive impact of gamification in online education via learning analytics; which by the way, also indicated the researches are more involved to effective impact of gamification in online monetized education.

- In the second map, we found most of the significant number of papers such as conference paper 5 [83], 12 [71], 14 [73] and journal article 1 [74], 8 [11], 9 [69] involves their researches with gamification application domain which shows the significant impact in result via learning analytics.
- In third mapping study foremost number of articles such as conference paper 10 [68] and journal article 3 [1], 6 [29], 9 [69] belongs to online learning experience improvement research when applies gamification feature on MOOC process.

Above points form mapping study of this study lead us to have a view of the positive impact of gamification in Monetized education.

6 CONCLUSION

The purpose of this thesis paper was to understand the impact and significant influences of gamification on monetized education such as MOOC education system via three separate systematic mapping studies of 30 scientific articles which are screening from 1,212 papers. We found the result that most of the authors such as Vaibhav et. al [68], Antonaci et. al [85], Bakar et. al [78], Borrás et. al [29], Topîrceanu et. al [1] mentioned the effective and positive impact of gamification in monetized education platform. We defined different search strings for different databases to retrieve a good number of papers related to gamification impacts on MOOC. Moreover, this thesis paper also proposed and discussed the business model canvas which includes all the essential facts found in the mapping study of analyzing the impact of gamification on monetized education. Most of the mapping studies showed that the papers are related to the research on gamification application on the MOOC platform. There are several significant percentage numbers in the results of the papers shows that applying gamification feature in an ordinary online course increases the motivation of online learners.

Besides that, this thesis paper also showed the evaluation of e-learning methods and how gamification has been applied to enhance the e-learning process more to online participants in our literature review section 2.2.7 ([17], [16]). Additionally, this thesis paper also presented the PICO framework [66] to identify the research string by discussing the gamification feature uses in online courses. We also represented our hypothetical explanation for business model canvas based on gamification influenced e-learning framework. This thesis also enlightened the positive relationship between MOOC and Gamification through the cumulative results of the screening papers of the systematic mapping study and we followed the SMS process proposed by Bailey et. al [13] .

In this research, we found the result of systematic mapping study on gamification impact on monetized education and plotting them in bubble plot and represent a summarized result on visualized form. Though there are scientific articles such as Ortega et. al [12], Dicheva et. al [8] stated SMS on impact of gamification on e-learning platform but we have done the systematic mapping process and presents bubble plotting of the results. We conducted a research on the results of systematic mapping study deeply and tried to present hypothetical business model

canvas on impact of gamification in monetized education as well. Therefore, this study is very important to for monetized education industry to identify the effectiveness of gamification in other researches and can find out the most relevant business model based on proposed business model canvas of this thesis paper.

Limitations

Although this thesis has systematic mapping study which shows the significant impact of gamification on monetized education, there are some shortcomings which can be catered in future researches. All the searching processes and screenings are done by one author and peer-reviewed the results by the other two authors. As the whole searching and screening process are done manually, hence the result of the mapping study can be biased in different ways. However, it is possible to do more accurate searching via more empirical research in the future. Moreover, there will be more scopes to research in business model canvas for gamified e-learning process which we just present in short in discussion session. Furthermore, there is a chance to apply analysis process in MOOC providers organization to get a better view of gamification impact in future as we could not able to do any survey for time constraints.

Future opportunities

On the other hand, this research regarding systematic mapping study will continue with more proper accurate searching string and screening process manually. Thus, there could be an automatic system which will make the paper screening process more time convenient and less biasness with more accurate result. One of the most important part of SMS process is the selection of categories, which can be done more precise by doing more research. Consequently, putting more focus to prepare the complete business model canvas on the positive impact of gamification on online courses, can also improve the result. For business model canvas, researcher can do some research on MOOC provider organization or make some survey to get more appropriate results. Furthermore, this thesis would help the other researchers who are most interested in the summary of results and reports of several screening of a good number of papers on the significant impact of gamification on monetized education.

Finally, we tried to present the summary overview through the systematic mapping studies that the gamification tools aids the online courses and encourages the learner more to attend and

complete their enrolled courses [68]. Likewise, it is imperative to learn a newer way to apply gamification tools and technology in education specifically in online education to encourage online learner more as the extrinsic rewards such as level achievement or badges winning are extra meaningful to the online students. Subsequently, hypothetical business model canvas based on the results of systematic mapping study can be more complete in further future work and can help practitioners to analyze the business of gamified monetized education system.

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APPENDIX 1

Reference list of 30 screening papers

Document type (Conference Paper (CP) or Journal Article (JA))	Reference (IEEE format)
CP1	M. Krause, M. Mogalle, H. Pohl, and J. J. Williams, “A playful game changer: Fostering student retention in online education with social gamification,” presented at the L@S 2015 - 2nd ACM Conference on Learning at Scale, 2015, pp. 95–102.
CP2	E. G. R. Flores, M. S. R. Montoya, and J. Mena, “Challenge-based gamification and its impact in teaching mathematical modeling,” in <i>Proceedings of the Fourth International Conference on Technological Ecosystems for Enhancing Multiculturality - TEEM '16</i> , Salamanca, Spain, 2016, pp. 771–776.
CP3	O. B. Gené, M. M. Núñez, and A. F. Blanco, “Gamification in MOOC: Challenges, opportunities and proposals for advancing MOOC model,” presented at the ACM International Conference Proceeding Series, 2014, pp. 215–220.
CP4	T. Lehtonen, T. Aho, E. Isohanni, and T. Mikkonen, “On the role of gamification and localization in an open online learning environment: javala experiences,” presented at the ACM International Conference Proceeding Series, 2015, vol. 19-22-Nov-2015, pp. 50–59.
CP5	D. Gañán, S. Caballé, R. Clarisó, and J. Conesa, “Analysis and Design of an eLearning Platform Featuring Learning Analytics and Gamification,” in <i>2016 10th International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS)</i> , 2016, pp. 87–94.
CP6	M. A. A. Mesquita, A. M. Toda, and J. D. Brancher, “An open-source MOOC platform for Portuguese speakers with gamification concepts,” in <i>2014 IEEE Frontiers in Education Conference (FIE) Proceedings</i> , 2014, pp. 1–7.
CP7	J. Chauhan, S. Taneja, and A. Goel, “Enhancing MOOC with Augmented Reality, Adaptive Learning and Gamification,” presented at the Proceedings of the 2015 IEEE 3rd International Conference on MOOCs, Innovation and Technology in Education, MITE 2015, 2016, pp. 348–353.

CP8	N. F. A. Bakar, A. F. Yusof, N. A. Iahad, and N. Ahmad, "Framework for embedding gamification in Massive Open Online Course (MOOC)," presented at the International Conference on Research and Innovation in Information Systems, ICRIIS, 2017.
CP9	A. Antonaci, R. Klemke, C. M. Stracke, and M. Specht, "Gamification in MOOCs to enhance users' goal achievement," in <i>2017 IEEE Global Engineering Education Conference (EDUCON)</i> , 2017, pp. 1654–1662.
CP10	A. Vaibhav and P. Gupta, "Gamification of MOOCs for increasing user engagement," presented at the Proceedings of the 2014 IEEE International Conference on MOOCs, Innovation and Technology in Education, IEEE MITE 2014, 2014, pp. 290–295.
CP11	C. Hagedorn, J. Renz, and C. Meinel, "Introducing digital game-based learning in MOOCs: What do the learners want and need?," in <i>2017 IEEE Global Engineering Education Conference (EDUCON)</i> , 2017, pp. 1101–1110.
CP12	T. Staubitz, C. Willems, C. Hagedorn, and C. Meinel, "The gamification of a MOOC platform," in <i>2017 IEEE Global Engineering Education Conference (EDUCON)</i> , 2017, pp. 883–892.
JA1	T. Tenório, I. I. Bittencourt, S. Isotani, A. Pedro, and P. Ospina, "A gamified peer assessment model for on-line learning environments in a competitive context," <i>Comput. Hum. Behav.</i> , vol. 64, pp. 247–263, 2016.
JA2	N. Özdener, "Gamification for enhancing Web 2.0 based educational activities: The case of pre-service grade school teachers using educational Wiki pages," <i>Telemat. Inform.</i> , Apr. 2017.
JA3	A. Topîrceanu, "Gamified learning: A role-playing approach to increase student in-class motivation," presented at the <i>Procedia Computer Science</i> , 2017, vol. 112, pp. 41–50.
JA4	E. Kyewski and N. C. Krämer, "To gamify or not to gamify? An experimental field study of the influence of badges on motivation, activity, and performance in an online learning course," <i>Comput. Educ.</i> , vol. 118, pp. 25–37, 2018.
JA5	J.-W. Chang and H.-Y. Wei, "Exploring Engaging Gamification Mechanics in Massive Online Open Courses," <i>Educ. Technol. Soc.</i> , vol. 19, no. 2, pp. 177–203, Apr. 2016.
JA6	O. Borrás-Gene, M. M.-N. Ez, and A. N. Fidalgo-Blanco, "New Challenges for the Motivation and Learning in

	Engineering Education Using Gamification in MOOC,” p. 12.
CP13	D. Alami and F. Dalpiaz, “A Gamified Tutorial for Learning about Security Requirements Engineering,” presented at the Proceedings - 2017 IEEE 25th International Requirements Engineering Conference, RE 2017, 2017, pp. 418–423.
JA7	M. Morales, H. R. Amado-Salvatierra, R. Hernández, J. Pirker, and C. Gütl, “A practical experience on the use of gamification in MOOC courses as a strategy to increase motivation,” <i>Commun. Comput. Inf. Sci.</i> , vol. 620, pp. 139–149, 2016.
CP14	S. Arnab, R. Bhakta, S. K. Merry, M. Smith, K. Star, and M. Duncan, “Competition and collaboration using a social and gamified online learning platform,” presented at the Proceedings of the European Conference on Games-based Learning, 2016, vol. 2016-January, pp. 19–26.
JA8	M. Reischer, M. Khalil, and M. Ebner, “Does gamification in MOOC discussion forums work?,” <i>Lect. Notes Comput. Sci. Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinforma.</i> , vol. 10254 LNCS, pp. 95–101, 2017.
CP15	S. M. Dos and K. T. Fernandes, “Gamification as a motivational factor to decrease the dropout rates in Massive Open Online Course,” presented at the CEUR Workshop Proceedings, 2016, vol. 1667, pp. 200–209.
JA9	A. M. Yusoff, S. Salam, S. N. M. Mohamad, and R. Daud, “Gamification element through massive open online courses in TVET: An analysis using analytic hierarchy process,” <i>Adv. Sci. Lett.</i> , vol. 23, no. 9, pp. 8713–8717, 2017.
JA10	Y.-C. Lee, H. Sun, Y.-P. Chiu, and P.-Y. Chiu, “Gamification: Using game play process for learning 3D computer software,” <i>ICIC Express Lett. Part B Appl.</i> , vol. 8, no. 3, pp. 639–646, 2017.
CP16	A. Topîrceanu, “Gamified learning: A role-playing approach to increase student in-class motivation,” presented at the Procedia Computer Science, 2017, vol. 112, pp. 41–50.
CP17	A. Ortega-Arranz, J. A. Muñoz-Cristóbal, A. Martínez-Monés, M. L. Bote-Lorenzo, and J. I. Asensio-Pérez, “How gamification is being implemented in MOOCs? A systematic literature review,” <i>Lect. Notes Comput. Sci. Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinforma.</i> , vol. 10474 LNCS, pp. 441–447, 2017.

JA11	A. Antonaci, D. Peter, R. Klemke, T. Bruysten, C. M. Stracke, and M. Specht, “GMOOCs – Flow and persuasion to gamify MOOCs,” <i>Lect. Notes Comput. Sci. Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinforma.</i> , vol. 10653 LNCS, pp. 126–136, 2017.
JA12	Y. P. Anna, N. Evgeny, V. O. Ilya, and A. V. Alex, “Study of Gamification Effectiveness in Online e-Learning Systems,” 2015.
JA 13	R. Klemke, M. Eradze, and A. Antonaci, “The Flipped MOOC: Using Gamification and Learning Analytics in MOOC Design—A Conceptual Approach,” <i>Educ. Sci.</i> , vol. 8, no. 1, p. 25, 2018.