Exploring the Factors Affecting Learners' Retention in MOOCs:
A Systematic Literature Review

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ABSTRACT

MOOCs have emerged as an important form of open and distance learning. The success of a MOOC platform depends on the support services and the motivational environment that it provides. This paper presents a comprehensive picture of the literature on motivations that drive learners to enroll in MOOCs, published between the years 2011 to 2020. In this study, an attempt has been made to examine various research papers, for identifying key motivation factors related to the learners, platform, course, and facilitating conditions for enrolment in MOOCs. Using the systematic literature review strategy, the papers are classified based on the technologies adopted to facilitate the discovery of directions displayed by the available literature and determining the current gaps, so that they may be addressed in the future. It was further found that various important hidden factors are still untouched or have limited literature on them, which makes MOOCs systems successful.

KEYWORDS

RATIONALE

Massive Open Online Courses (MOOCs) are a rapidly growing mode of education, holding the potential to open up access to world-class teaching and educational resources outside geographical and social boundaries. In MOOCs, there is a variety of motivations among learners who use MOOCs as a result of the open nature of MOOCs, which allows anyone to participate (Kizilcec, R.F, Piech, & Schneider, 2013). (Shah, 2019) reported that in 2019 there were around 2,500 courses offered by MOOCs provider while the total number of learners registered in MOOCs reached 110 million excluding China butcourse completion ratio is very low (O'Malley, 2019). (Hart, 2012) revealed that learners' motivation was one of the most important components of persistence in online learning environments (Barak, Watted, & Haick, 2016) defined motivation as "a reason or a goal a person has for behaving in a given manner in a given situation". Investigating such motivations offers insights

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for MOOCs providers into the potential solutions for improving their services to increase learners' engagement, satisfaction, completion rate, as well as meet their needs and requirements. The basic objectives of this research are to present a broad and systematic review of the literature related to this topic to highlight the current research directions and gaps that can be addressed in the future, and to explore the factors which affect MOOC completion/learner retention as it is an important measure of MOOC success.

To address the gaps in the literature,the following research questions (RQ) are posed:

RQ1: How many research papers are introduced in various publications related to learners' retention? How can these papers be classified?
RQ2: What data collection methods and techniques have been used by the researchers?
RQ3: What are the key motivational factors that characterise MOOC learners?
RQ4: What platform and geographic distribution of participants was selected during the data collection stages in the related literature?
RQ5: Is there any important motivational factor which is still not explored in the research?

RELATED WORK

(Hew & Cheung, 2014) aimed to identify the learners' and instructors' motivations and challenges of using MOOCs. (Latha & Malarmathi, 2016) examined the factors influencing learners to complete MOOCs. This section summarises previous literature synthesis that was focused on identifying the motivational factors affecting learner's intention to use MOOCs. The literature has been examined based on different research questions. Table 1 presents the detailed literature review of the research papers which are related to research questions presented in the previous section.

Table 1. Literature review

| Authors	Title	Major Findings
(Lei, 2010)	Intrinsic and extrinsic motivation: evaluating benefits and drawbacks from college instructors.	Lack of motivation is directly related to learners' discontinuation of learning in MOOCs
(Liyanagunawardena, Adams, & Williams, 2013)	MOOCs: a systematic study of the published literature	It highlighted several gaps in the literature including a lack of exploration of MOOC experiences in the developing world and a lack of research considering the perspective of MOOC non-completers.
(Khalil & Ebner, 2014)	MOOCs Completion Rates and Possible Methods to Improve Retention - A Literature Review	This study investigates and identifies the most significant factors that cause high attrition rate of MOOCswith accurate data analysis and personal observations
(Alraimi, Zo, & Ciganek, 2015)	Understanding the MOOCs continuance: the role of openness and reputation	The objective of this study is to identify factors that enhance an individual' intention to continue using MOOCs, which a limited amount of research has previously explored.
(Greene, Oswald, & Pomerantz, 2015)	Predictors of Retention and Achievement in a Massive Open Online Course	This study reported that learners' expected investment, including the level of commitment, expected number of hours devoted to the MOOC, and intention to obtain a certificate, related to retention likelihood.
(Gamage, Fernando, & Perera, 2015)	Factors leading to an effective MOOC from the participants perspective	This research identified 10 dimensions which affect an effective MOOC; namely interactivity, collaboration, pedagogy, motivation, the network of opportunities/ future directions, assessment, learner support, technology, usability, and content.

Table 1 continued

Authors	Title	Major Findings
(Fahmy Yousef, Chatti, Marold, & Ulrik, 2015)	A Cluster Analysis of MOOC Stakeholder Perspectives	In order to have better understanding of the learners' behaviour, the authors clustered and analysed the different objectives of MOOC stakeholders. The main finding was a set of eight clusters, i.e., blended learning, flexibility, high-quality content, instructional design and learning methodologies, lifelong learning, network learning, openness, and student-centred learning.
(Hone & El Said, July 2016)	Exploring the factors affecting MOOC retention	Based on the survey study of 379 participants enrolled at university in Cairo, who were encouraged to take a MOOC of their own choice as part of their development, the authors reported 32.2% completion rate. They found that course content affects MOOC learner retention via perceived effectiveness.
(Umer, Susnjak, Mathrani, & Suriadi, 2017)	Prediction of Students' Dropout in MOOC Environment	In this study authors used event logs of five MOOCs courses and used to predict students that are most likely to have dropped out. Study has founded that Random Forest, Logistic Regression, K Nearest Neighbour and Naive Bayes Machine learning algorithms are able to make predictions of dropout.
(Arora, Goel, & Mehrotra, 2017)	Learner Groups in Massive Open Online Courses	This article was aimed at grouping massive heterogeneous population of learners into more homogeneous groups after extensive data pre-processing. The K-meansclustering technique is used with careful seeding to obtain clusters of learner's withsimilar interactions in the course. Learners are grouped based on their interaction with course material, video lectures, discussion forums, and assessments. Based on the analysis of thirteen courses, five learners' classes were reported as Uninterested, Casuals, Performers, Explorers, and Achievers.
(Dalipi, Imran, & Kastrati, 2018)	MOOC Dropout Prediction Using Machine Learning Techniques: Review and Research Challenges	The following types of factors are highlighted viz. lake of time, insufficient background knowledge and skill, Course design, hidden costs.
(Gupta & Sabitha, 2018)	Deciphering the attributes of student retention in massive open online courses using data mining techniques	The authors predict the attributes that lead to minimising attrition rate and analyse the different cohort behaviour and its impacts ondropouts using data mining technique.
(Lee, 2018)	Using Self-Organizing Map and Clustering to Investigate Problem-Solving Patterns in the Massive Open Online Course: An Exploratory Study	This study applied self-organising map and hierarchical clustering algorithms to the log files of a physics MOOC capturing how students solved weekly homework and quiz problems to identify clusters of students showing similar problem-solving patterns.
(O'Malley, 2019)	MOOCs fail in their mission to disrupt higher education	The researchers found that the initial bubble of interest in MOOCs has been deflated by the drop-out rate. More than half of those who register (52%) never enter the courseware. Similarly, there is a sharp drop-off after the first year of a course, with only 12% of the largest cohort, the 1.1 million learners in 2015-16, taking a course in the following year. Second-year retention rates fell every year, dropping from 38% in 2013-14 to 7% in 2016-17.Researchers also reported that the MOOCs drew more than 80% of their learners from highly or very highly developed countries.
(Semenova, 2020)	The role of learners' motivation in MOOC completion	This study, estimated the role of motivation in a MOOC's completion, controlling for the characteristics of participants and their level of engagement with the course materials.

Based on systematic review of the literature the attempt has been made to find potential factors that may influence student retention in MOOCs are reported in Figure 1. The student retention in MOOCs may vary across contexts and settings. Therefore, to narrow the focus of this study, the following factors were classified under main categories: learner related factors, instructor related factors, platform and course-related factors, and technology related factors.

Figure 1. *Learners' Related Factors*

Figure-1: Learners' Related Factors.
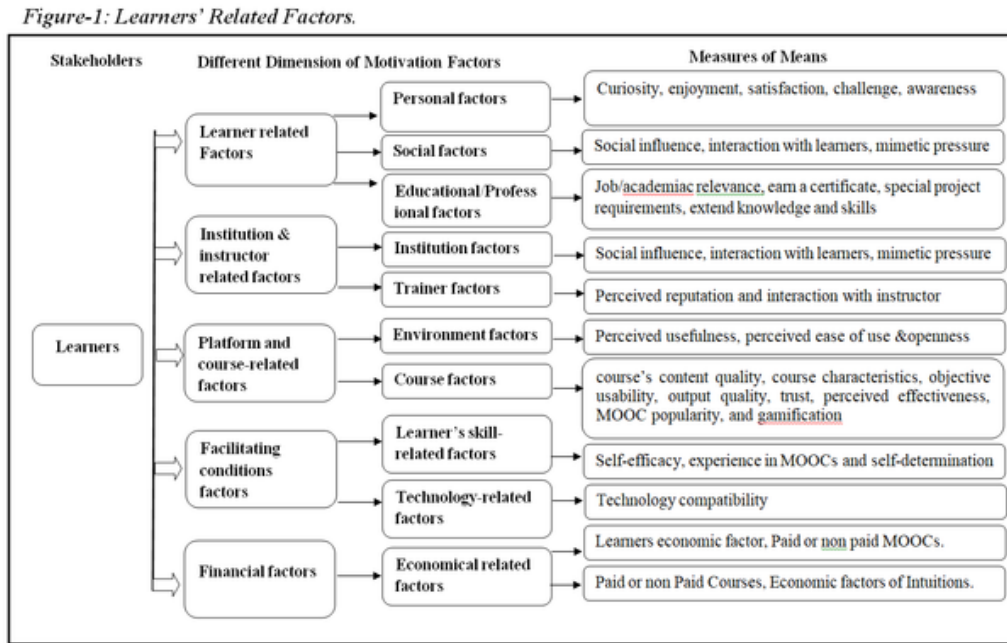
METHODS

To address research questions, systematic literature review strategy suggested by (Kitchenham, 2004) was used. The approach suggests five activities viz. (A) Explain research question, (B) Analyse search keywords, (C) Identify the resources, (D) Search process, (E) Compare and analyse the result according to criteria. The search keywords used were "MOOCs Learner Motivations", "MOOCs Completion OR MOOCs Retention", and "MOOCs Learner Behaviours". The following journals and academic databases listed in Table 2, were searched and relevant papers were identified:

Table 2. List of Journals to be searched forliterature, papers, and manuscripts

Journals Name	Academic Databases
American Journal of Distance Education	IEEE Xplore,
British Journal of Educational Technology	Elsevier's Science Direct
Computer Assisted Learning	Wiley Online Library
Distance and E-Learning	Springer Link and Scopus
European Journal of Open	dblp computer science

Tables 2, 3 and 4 represent the ratio of search output from the journals/database to relevant papers using the given search keywords. It was found that a number of search results were returned from the Journals and academic databases listed in Table 2 when the keyword "MOOCs Learner Motivations" was used. Several returned search results were common as some of the journals are listed in more

than one database/index. Therefore, redundancies were discarded and each paper with same title and author/s is considered only once.

After removing the redundancy, the search results were significantly reduced. Therefore, additional related keywords with lower priority were used to increase the search results.

After following the strategy suggested by (Kitchenham, 2004), the following search keywords were identified:

- "The factors that influence the MOOCs" (Which are the factors that influenced learners to join the MOOCs.)
- "The learner's motivations for MOOCs completion / retention."
- "The factors influencing the success of MOOCs"
- "Identifying learners' behaviour for MOOCs completion / retention" "Identifying learners behaviour for MOOCs completion / retention"

These additional search keys were used to increase the probability of finding the research papers which may contain the factors that are directly related to the motivation of using MOOCs. It was found that most of the returned search results consist of the research papers which were written in English language and published between the years 2011 to 2020.

Constant-comparative method suggested by (Glaser, 1965) as used in the data analysis phase to classify the identified papers.

Table 3. The output of the search using the keyword "MOOCs Learner Motivations"

Journals Name	*SR:RP
British Journal of Educational Technology	50:6
American Journal of Distance Education	22:8
Open Learning: The Journal of Open, Distance and e-Learning	51:7
European Journal of Open, Distance and E-Learning	0:0
dblp computer science	3:3
IEEE Xplore	42:8
Elsevier's Science Direct	4:4
Wiley Online Library	0:0
Springer Link and Scopus	8:5

*SR:RP Ratio of search results to relevant papers

Table 4. The search result using the keyword "MOOC Completion OR MOOCs retention"

Journals Name	*SR:RP
British Journal of Educational Technology	20:3, 12:2
American Journal of Distance Education	0:0, 14:3
Open Learning: The Journal of Open, Distance and e-Learning	1:1, 32:4
European Journal of Open, Distance and E-Learning	0:0, 0:0
dblp computer science	13:0, 11:5
IEEE Xplore	85:8, 19:5
Elsevier's Science Direct	40:4 10:2
Wiley Online Library	19:3, 3:0
Springer Link and Scopus	5:2, 12:4

*SR:RP Ratio of search results to relevant papers

Table 5. The search result using the keyword "Identify learners' behaviour for MOOC completion/retention"

Journals Name	*SR:RP
British Journal of Educational Technology	7:3, 6:1
American Journal of Distance Education	12:4, 8:2
Open Learning: The Journal of Open, Distance and e-Learning	5:0, 2:2
European Journal of Open, Distance and E-Learning	0:0, 0:0
dblp computer science	0:0, 0:0
IEEE Xplore	1:1, 0:0
Elsevier's Science Direct	213:8, 135: 5
Wiley Online Library	397:7, 242:6
Springer Link and Scopus	402:8, 250:3

*SR:RP Ratio of search results to relevant papers

FINDINGS

This section discusses the finding of the analysis of the related studies and an attempt has been made to answer the research questions.

RQ1: How Many Research Papers are Introduced in Various Publications Related to Learners' Retention? How Can These Papers be Classified?

After review and analysis of several studies, total of 50 papers were identified that are related to the concerned topic. It was observed that certain papers intended to develop a model based on identifying explanatory variables that are used to predict the use of MOOCs. In contrast, other papers applied empirical methods such as quantitative and qualitative data collection methods to explore the learners' motivations behind enrolling on MOOCs without modelling the motivational factors. Consequently, the relevant papers were classified into the following categories:

- The study where the objective is to identify motivational factors that influence the use of MOOCs validated by making a model.
- The study which focuses on learners' motivations validated by survey analysis.
- The study with an objective to develop a model of the factors contributing to MOOCs completion and retention.
- The study with an objective to identify factors contributing to the MOOCs completion and retention using various analytical and tools and algorithms.

The search results are categorised into 4 groups and is shown in Table 6. The first category consists of 11 papers, where a model is created to focus on the factors influencing learners' intention to use MOOCs. The second category consists of 17 papers which focus on learners' motivations for taking MOOCs. The 3 papers in the third category consist of those papers which are aimed to develop a model of the factors contributing to the MOOCs completion and retention. Finally, the fourth category consists of 11 papers which indirectly addressed the motivations of learners for using MOOCs or investigated the factors influencing learners' retention or the success of MOOCs using various analytical and tools and algorithms.

Table 6. Classification and references tothe concerned references

Classification	References'
A study where theobjective is to identifymotivational factors that influence the use of MOOCs validated by making a model.	(Xiong, Tripathi, Nguyen, & Najjar, 2014), (Xu, 2015); (Chu, Ma, Feng, & Lai, 2015); (Huanhuan & Xu, 2015); (Gao, 2015); (Chaiyajit & Jeerungsuwan, 2015); (Nordin, Norman, & Embi, 2016); (Aharony & Bar-Ilan, 2016); (Zhou, 2016.); (Sa, 2016); (Alraimi, ZO, & Ciganek, 2015)
A studywhichfocuses on learners' motivations validated by survey analysis.	(Belanger, 2013); (Christensen, Steinmetz, Alcorn, Bennett, D., & Emanuel, 2013); (Nordin, Norman, & Embi, 2016); (Hew & Cheung, 2014); (Davis, Dickens, Leon, & Mar Sánchez Vera, 2014); (Gütl, 2014.) (Kizilcec & Schneider, 2015); (Zheng, Rosson, Shih, & Carroll, 2015); (Liu, Kang, & McKelroy, 2015); (Cupitt & Golshan, 2015); Li (2015); (Salmon, Pechenkina, Chase, & Ross, 2016) (Bayeck R., 2016); (Howarth, D'Alessandro, Johnson, & White, 2016); (Uchidiuno, Ogan, Yarzebinski, & Hamme, 2016); (Zhong, Zhang, Li, & Liu, 2016); (Garrido, Koepke, Anderson, & Felipe, 2016.)
A study with anobjective to develop a model of the factors contributing to the MOOCs completion and retention.	(Adamopoulos, 2013) (Xiong, Li, Kornhaber, Suen, Pursel, & Goins, 2015), (Hone & El Said, July 2016)
A study with anobjective to identify factors contributing to the MOOCs completion and retention using various analytical and tools and algorithms.	(Khalil & Ebner, 2014), (Greene, Oswald, & Pomerantz, 2015), (Gamage, Fernando, & Perera, 2015), (Chang, Hung, & Lin, 2015.), (Shrader, Wu, Owens-Nicholson, & Santa, 2016), (Littlejohn A., Hood, Milligan, & Mustain, 2016), (Rai & Chunrao, 2016), (Latha & Malarmathi, 2016), (Barak, Watted, & Haick, 2016)

RQ2: What Data Collection Methods and Techniques Have Been Used by the Researchers?

The research paper can be broadly classified in to two categories viz. conceptual research and empirical research. Table 8 represents the findings for data collection methods and testing and analysis methods

in various related papers. Total of 18 research papers of empirical quantitative studies were identified out of which 8 publications have applied survey and activity data analysis methods. Further, 3 research papers utilized empirical qualitative data and interviews technique. Out of the remaining 7 papers, 3 papers were based on interviews and 4 papers were based on literature review and observation.

In the remaining literature, we found three papers based on interviews, four papers based on literature review and observation.

Further studies were also used with the following data collection methods:

Studies based on a mixed-methods approach used surveys and interviews (3 papers); survey, click stream, and event data analysis (6 papers); survey and forum posts and email messages analysis (2 papers).

RQ3: What are the Key Motivational Factors that Characterise MOOC Learners?

The motivational factors that drive individuals to use MOOCs, reported in the related publications are identified and classified into the following main dimensions:

- Learner related factors
- Instructor related factors
- Platform and course-related factors
- Course content
- Finance related factors
  The factors identified under each main dimension are presented in Figure 1. After the detailed analysis, it was observed that several factors are still untouched or very little research was illustrated.

RQ4: What Platform and Geographic Distributions of Participants Have Been Selected During the Data Collection Stages in the Related Literature?

From Table 7 it is visible that most of the studies that were focused on exploring the factors driving users from countries were: China, Israel, USA, India, Greece, Azerbaijan, Egypt, Thailand, Korea, and Malaysia. Coursera, Khan Academy, edx, Udacity etc. are some of the big platforms as participants that have collected the geographic data for their research work.

After careful exploration of the research papers it was found that there are around 11 literatures that provide the data regarding geographic distribution of users of these platforms (Figure 2).

Table 7. List of the participants' geographic distribution in the concerned studies

Name of Countries and Participants'	Number of Papers
USA	8
China	9
India	7
Israel	5
Greece	5
Egypt	5
Thailand	6
Korea	4
Malaysia	5

Figure 2. Collected Geographic Distribution of Participants' Data in the Related various studies
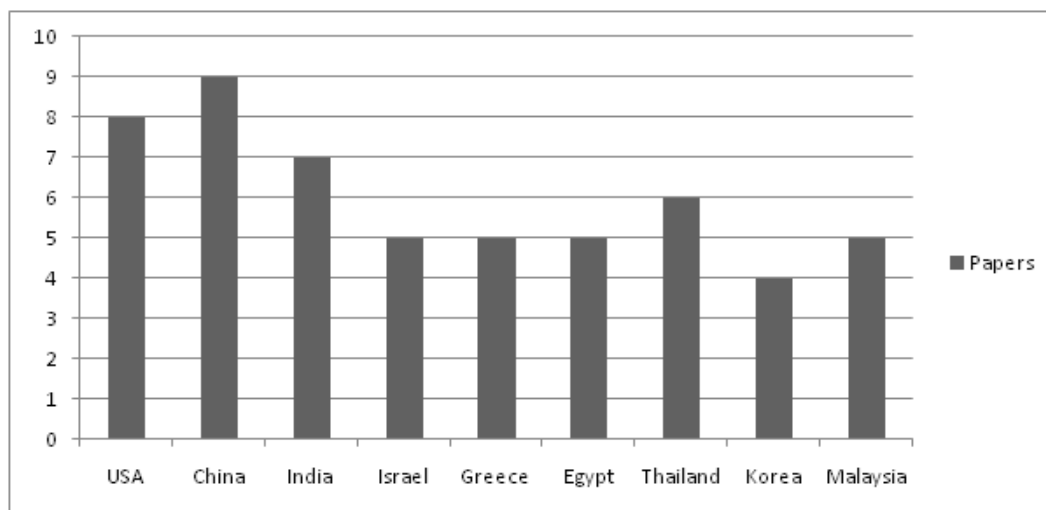
RQ5: Is There Any Important Motivational Factor Which is Still not Explored in the Research?

Figure 1 represents several factors that are possible for motivating and influencing learners. For example, job/academic relevance, learner economic factors, content localisation and government support, goals for the MOOC, prior learning experiences, and learning behaviours may be factors which may play an important role for learner motivation and MOOCs retention.

DISCUSSION

In this study, 50 research papers were examined and careful investigation of these papers unveils various facts and findings. It was noticed that there is limited research on MOOCs influencing factors. Moreover, only a few papers adopt technology acceptance theories. Most of the studies focused on the Platforms and Providers, Credentials/Credit, Institution, Instructor, variable/dimensions. (Littlejohn & Hood, 2016): Some other motivational factors are: goals for the MOOC, prior learning experiences, demographic information, learning behaviours, content localisation, and government support. It was found that these factors are untouched or very limited literature was found.

After the detailed analysis, it was observed that 70% of the papers only used a survey as a method for data collection. The findings of this study also show that the main factors driving learners to MOOCs enrolment were learner-related with the following classification:

- Personal
- Social
- Educational
- Industrial/ Professional development

Due to the different environments, their learning behaviours may be different. Most of the studies have ignored the motivations of users from specific countries or cultures. With regards to the geographic distribution of participants in related studies, the most frequently mentioned country

was China whereas in the studies the main focus was on the USA, India, Spain, Australia, Brazil, Canada, and Germany.

In the last three years, there have been several motivation and technology acceptance theories which have been tested in various contexts. Testing the relevancy of these concepts within the context of MOOCs is a rich area for future research. Many other studies have already accepted the Technology Acceptance Model (TAM) which was built from a quantitative survey study.

One recommended method for future research is to apply data-mining methods with model acceptance theories. In addition, a further study with more focus on understanding the influence of "Learners' knowledge outcome about future use" capabilities on the learner's intention to use MOOCs is also suggested. Investigating the influence of content localisation and the role of government support for MOOCs courses would also be useful research.

The related literature concentrated on the perspectives of users from a few geographic regions. Studied that the reasons for enrolling in MOOC courses varied by country. Similarly, (Davis, Dickens, Leon, & Mar Sánchez Vera, 2014) found that motivational factors of learners can vary in different cultures. (Hone & El Said, July 2016) examined the viewpoints of Syrian and Egyptian individuals respectively.

In light of these findings, for future investigations, it might be helpful to discover the motivational factors influencing users from different countries and cultures such as India or other developing countries.

CONCLUSION

This study attempts to examine the motivation of learners for using MOOCs through studying the available literature, by classifying the papers, analysing the various concepts and theories used, reviewing the methods used for survey, data collection and analysis and defining the factors affecting the learners' motivation. The organised analysis permits a better understanding of literature related to motivations for using MOOCs from the learners' viewpoint.

The SWAYAM platform was inaugurated in July 2017; so much potential is seen for investigating several facts about the MOOCs. Currently in 2020 there are more than 500 courses have opened for enrolment, Nine National level coordinators, like IGNOU, NPTEL, UGC, etc and approx. 40 million learners' are representing the success stories of SWAYAM. In 2019, SWAYAM also started its courses into 8 Indian languages.

This analysis has led to the suggestion of some possible areas for future research. Thus, it would be interesting to find and compare data on Indian learners and those from other countries in terms of their respective motivations determining acceptance of MOOCs. This is so since particular sets of social, cultural and economic conditions usually prevail in specific regions and countries. Besides, the correlation between learners' motives and motivation levels with course completion could be investigated in future studies. Another study could validate the 'Technology Acceptance' and 'Motivation Theories' in the context of MOOCs. Finally, further investigation into the influence of self-regulated learning capabilities on learners' intention to accept MOOCs could lead to desirable insights.

The findings of these studies are likely to improve the understanding of the preferences and motivation drivers of MOOC learners, helping the educator's better design MOOCs for enhancing learner's satisfaction, leading to higher retention.

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APPENDIX A. TABLE 8

Table 8: Data collection methods and technology used in concerned papers.

Reference	Title	Findings	Algorithms Used	Data Collection Platform
(Gupta & Sabitha, 2018)	Deciphering the attributes of student retention in massive open online courses using data mining techniques	Study predicts the attributes that lead to minimising attrition rate and analyses the different cohort behaviour and its impacts for dropouts using data mining technique.	Classification algorithms (Decision Tree), to improve course design and delivery for different MOOC providers and learners'.	Blackboard, Canvas.net, FutureLearn, Coursera
(Luis, Romero-, María Soledad, & Aguaded, 2020)	Determining Factors in MOOCs Completion Rates: Application Test in Energy Sustainability Courses	This research analyzes which factors (personal, family, social, labour, and instructional design) are involved in the value expectations and engagement of the MOOCs and to what degree these affect the decision to enrol and the completion of the MOOC.	Use kappa cohen Algorithms	Collected data from MexicoX, edX MOOCs platform
(Suviste, Lepp, Palts, & Tõn, 2017)	What motivates enrolment in programming MOOCs?	In this study the author found three factors of expectancies, three factors of values and one factor of social influence. The highest and lowest rated motivational factors influencing enrolment in programming MOOC are discussed in the paper. Interest in and expectations for the course, personal suitability of distance learning and suitability for family and work are the highest-rated motivational factors for those who enrol in MOOC.	Based on value-expectancy theory, an instrument was developed to measure motivation for enrolling in a programming MOOC.	A study with 1229 adult participants in Estonian-language programming course "About Programming" was conducted to validate the instrument.
(Coleman, Seaton, Chuang 2015)	Probabilistic Use Cases: Discovering Behavioural Patterns for Predicting Certification	This paper adapts the topic modelling approach of Latent Dirichlet allocation (LDA) to uncover behavioural structure from student logs in a MITx Massive Open Online Course, 8.02x: Electricity and Magnetism	Latent Dirichlet Allocation (LDA)	Collecting data from surveys from 11 MITx courses. Over 33,000 participants responded to the entrance surveys.

Table 8 continued

Reference	Title	Findings	Algorithms Used	Data Collection Platform
(Ayub, Wei, & Yue, 2017)	Exploring Factors Affecting Learners' Acceptance of MOOCs Based on Kirkpatrick's Model	The research suggested that self-directed learning environment, user friendly design of course contents, and participation as well as interaction and guidance from the instructors and finally internet speed are factors that affect learner's acceptance of MOOCs.	Building Information Modelling (BIM), Basic Pastry Making, Theory of Malaysian Architecture and Into the Future of MOOCs.	The informants were a group of learners taking the MOOCs provided by Taylor"s University. .
(Lan & Hew, 2020)	Examining learning engagement in MOOCs: a self-determination theoretical perspective using mixed method	Author explored the motivators that prompted the MOOC completers and non-completers to participate in the course activities, and the types of activities they frequently participated in.	Regression analysis, with SDT model.	The surveys at University IRB. This study adopted a sequential explanatory mixed-methods approach
Skand Arora, Manav Goel, A. Sai Sabitha, Deepti Mehrotra 2017	Learner Groups in Massive Open Online Courses	Study finds the behaviour of MOOC learner. By grouping the learners in the MOOC environment and observing their learning patterns, and Mapping the group of learners to the standard learning approaches.	K-means clustering technique g is used to obtain clusters of learners having similar interactions in the course.	The data set used for this study is the HarvardX, MITx Person-Course de-identified data
(Tucker, Pursel, & Divinsky, 2014)	Mining student-generated textual data in MOOCs and quantifying their effects on student performance and learning outcomes	Students' performance and their learning outcomes	Opinion Mining (Sentiment Analysis),	A case study offered by Perm State University and uses Coursera platform, to validate the proposed methodology.
(Tang, Xie, and Wong, 2015)	Mining student-generated textual data in MOOCs and quantifying their effects on student performance and learning outcomes.	quantifying their effects on student performance and learning outcomes	Use Decision Tree Algorithms	Collected real-world MOOC from MITx and HarvardX courses on the edX platform.
(Tardio and Peral, 2015)	Obtaining Key Performance Indicators by Using Data Mining Techniques	Key Performance indicators in MOOC	Use Artificial Neural Network	Collected the data from UniMOOC and a case study.
(N., Kidziński, Jermann, & Dillenbou, 2015)	MOOC video interaction patterns: What do they tell us? In Design for teaching and learning in a networked world	This study reports a large-scale analysis of in-video interactions.	Use K-means Clustering algorithm.	Collect data from MOOCs Cousera: "Reactive Programming (RP)" and "Digital Signal Processing (DSP)" courses.

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