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Enhancing Users' Perceived Significance of Academic Library with MOOC Services

Flora Charles Lazarus et Rajneesh Suryasen

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Résumé de l'article

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Methods – The academic library's MOOC services are derived from the extensive literature review and subsequently a research model based on extant literature has been developed to evaluate user behaviour. The research model is evaluated using confirmatory factor analysis methods.

Results – The academic library's services for MOOCs have been categorized as, (a) user support services, (b) information services, and (c) infrastructure services. The study shows that each of these service categories have a positive impact on the library usage intention of the users. This in turn has a positive effect on the library's perceived significance.

Conclusion – The library services for MOOC users defined in this research and the findings are useful for librarians to develop new service strategies to stay relevant for the user.

Evidence Based Library and Information Practice

Research Article

Enhancing Users' Perceived Significance of Academic Library with MOOC Services

Flora Charles Lazarus
Research Scholar, Department of Library and Information Science
Banasthali Vidyapith
Niwai, Rajasthan, India
Email: flora.charles4@gmail.com

Rajneesh Suryasen
Faculty, Department of Library and Information Science,
Banasthali Vidyapith
Niwai, Rajasthan, India
Email: rajnishsuryasen15@gmail.com

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Abstract

Objective – Academic libraries have been impacted by the tremendous changes taking place in higher education due to the arrival of the internet and web-based technologies. Several articles have shown the decline in library usage and user need for electronic resources. The entry of MOOCs into higher education has repurposed the library's roles and services. This research aims to explore the possible MOOC services of academic libraries and their effect on the user perception towards the significance of academic libraries.

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Conclusion – The library services for MOOC users defined in this research and the findings are useful for librarians to develop new service strategies to stay relevant for the user.

Introduction

Online education and distance education has been available for many years now, but many experts agree that Massive Open Online Courses (MOOCs) have been a driver of change in higher education by providing innovative ways of learning (Zhang et al., 2019). According to a report published in 2017 by the European Association of Distance Teaching Institutions (EADTU), the number of higher education institutions offering MOOCs is increasing steadily, and the number of students opting for such courses in Europe is significantly higher than in the US. In this report, Jansen & Konings (2017) also underline that the cooperation of libraries is an important factor in open education.

Studies indicate that academic libraries are facing increased competition like every other business entity due to technological advances in information and technology. They are striving harder to maintain their role as an information provider in academic communities (Iwu-James et al., 2020). Academic libraries are not considered as the heart of the university anymore by the top leadership as academic and research information is also available from other sources (Cox, 2018). Osman & Ahlijah (2021), studied to examine the relevance of university libraries in the 21st century. They found that user expectations from the academic library have changed, and the traditional roles of the library need to adapt to the new learning behaviour of users. The study showed that less than 10 percent of users prefer to visit the library but most of them prefer to use the library's electronic resources, due to their easy access and availability. This study argues that the library is the centre of information and knowledge for the students and the academic library is an integral part of the university set-up. Hence, the academic library must fulfil the core objectives of the parent institution for the curricular needs of the learners, teachers, and researchers. The library is a service-based institution that must strive to upgrade its potential users to habitual users. Providing greater access to resources and user-centric services can help achieve this.

MOOCs are perceived as a disruptive innovation in higher education, with reach and potential much higher than traditional online courses. According to Patru & Balaji (2016), MOOCs are different from traditional online courses in four ways, (1) it is highly scalable, and designed for a theoretically unlimited number of users, (2) it is accessible without any fees, (3) there are no pre-requisites, and (4) entire course is online. MOOCs offer an opportunity for academic librarians to have a greater influence on the faculty and students. Academic libraries can involve themselves in MOOCs in many forms, ranging from traditional roles of information, instruction, and reference services, or in the form of advanced services like copyright check, OERs, content creation, policy framework, and guidelines (Wu, 2013).

MOOCs have gained importance in emerging economies like China (Zhang et al., 2019), India (Mahanta, 2020), Malaysia (Albelbisi, 2020), Africa (Rambe & Moeti, 2017), etc. due to their potential to reduce the burden on university infrastructure, increase enrollments, improve quality of education and creating opportunities with equal access through digital means (Badi & Ali, 2016). Academic libraries and MOOCs

have yet to be examined together in the recent academic literature. Most published articles on this topic appeared in the years 2013-17 (as per the current literature review), focusing on issues like copyright and licensing, open educational resources (OERs), production of new courses, and policy issues. The goals of this exploratory study are to explore the suggested academic library services for MOOCs in the available literature; to propose MOOCs as a library service; to create a research model to find out possible library services for MOOC users, and to determine its effects on the library's perceived significance for users.

Literature Review

An extensive literature survey was carried out using the following keywords: library and MOOCs; MOOC services; library services; MOOC success; library in MOOC era; MOOC and higher education; MOOCs and librarian; user significance of library; library significance; academic library trends for a period of 2010 to 2021. Most appropriate research articles were selected for carrying out the literature review. Relevant citations from the primary literature survey were also explored for broadening the understanding of the research issues. Research articles in the English language have only been considered for this review, although a considerable amount of research literature is available in the Chinese language, mostly for which the abstracts were only available in English. Such vernacular articles haven't been considered in this research. This section can be discussed in two parts: academic library MOOC services, and user-perceived significance of academic library.

MOOC Services of Academic Libraries

Higher education institutions globally have included MOOCs in their curricula in various forms (Fox, 2013). Based on current trends in higher education, MOOCs are going to be integrated into the academic curriculum of higher education in the coming years (Yanxiang, 2016).

The advent of MOOCs means change not only for the ways universities operate, but also the function of academic libraries. Due to the different needs in diverse courses, libraries need to revive their services as the present ones are not enough to fulfil the emerging needs of MOOC-based curricula. New services related to copyright, intellectual property, information literacy education, data synthesis, metadata, information sharing services, and others will be needed by the users to complete these courses (Liu, 2016).

The relationship between MOOCs and academic libraries has been emphasized in the literature by several authors such as Mahraj (2012), Creed-Dikeogu & Clark (2013), Gore (2014), Yanxiang (2016), and others. The logic of relating these two entities is based on the following similarities (Deng, 2019):

Table 1
Similarities Between MOOCs and Academic Libraries

Objectives	Information sharing and dissemination of knowledge.
Users	The students/ learners are the primary users.
Focus	Knowledge services.
Freedom	There is freedom to select the kind of resource and knowledge acquired by the user.

The academic library specializes in information and services. This makes it the most suitable organization in the higher education system to drive the inclusion of MOOCs in the curriculum (Luan, 2015). From an extensive literature review on the relationship between MOOCs and academic libraries, we realized that although many researchers have discussed the importance of academic libraries in the MOOC era, the literature does not provide a consolidated account of possible MOOC services of an academic library concerning its current roles and functions.

The discourse on academic libraries' MOOC services was started by Becker (2013) of San Jose State University, California. Becker states that the MOOC literature is 'sparse', and there needs to be an exploration of the possible involvement of academic libraries in MOOC-based education. The primary focus in Becker's research was the development of a collection of open access resources for MOOC users, as MOOCs have an international appeal, and the resource distribution seemed to be the most important issue on MOOCs.

Gore (2014) also supported this idea and discussed the issues and challenges for academic libraries due to MOOCs. They are considered a disruptive technology in the field of education and Gore suggests that librarians cannot have any subordinate role in MOOC-based education. Information literacy, involvement in the MOOC production process, influencing instructors, copyright and licensing issues, the role of IT infrastructure in MOOC distribution and the scale of the MOOC courses were some of the issues proposed in Gore's research, which directly concerned academic libraries.

In other words, the stage for academic library MOOC services started getting prepared right after MOOCs arrived in 2012 (Sanchez-Gordon & Luján-Mora, 2014). Followed by many other research articles on the relationship between MOOCs and academic libraries, as mentioned in table 2, these possible MOOC services have been carefully collected from the literature and have been summarized to form the possible academic library services for MOOC users.

In the following section, the research literature on issues pertaining to MOOC-based higher education curriculum has been explored and mapped against the features and roles of academic libraries. Based on this method, this study proposes the possible roles of any traditional academic library in providing services to MOOC users. Table 2 summarizes these library services for MOOC users.

Table 2
Academic Library Services for MOOC Users

	Current roles and features of academic library		Possible MOOC services	
	Roles	Citation(s)	Roles	Citation(s)
1	Technical infrastructure	Kassim, 2009	Broadband and technical infrastructure	Marrhich et al., 2020
2	Constant upgradation of technology for changing information needs	Kaushik & Kumar, 2016	Managing MOOCs for various departments, meeting needs of different users.	Mune, 2015
3	Cataloging and classification services	Kassim, 2009	Cataloging and classification of MOOCs	Jie, 2019
4	Information services for all departments	Kassim, 2009	MOOCs for all departments	Wang, 2017
5	Use of integrated library system (ILS) and online catalogs (OPAC)	Kassim, 2009	Need of integrated platform for managing MOOC information, instruction, evaluation and support services to all the users	Jie, 2019
6	Procurement, distribution, management, preservation of reading and multi-media resources.	Kaushik & Kumar, 2016	Open educational resources, online resources, embedded content for MOOCs	Yanxiang, 2016; Shapiro et al., 2017
7	Services like reprography, document search and delivery, plagiarism check, printing, research assistance etc.	Gardner and Eng, 2005	Users also need all these services for successful completion of MOOCs.	Shapiro et al., 2017
8	Library advisory committee for planning, developing and managing information needs of all the departments.	Liu, 2010	Library can provide administrative services for MOOCs to all the departments.	Marrhich et al., 2020
9	Library services are available at all times for its users.	Gardner and Eng, 2005	MOOC services on mobile platforms, self-support services and technical assistance for remote users.	Wang, 2017; Kaushik, 2020
10	Instruction support services	Kaushik & Kumar, 2016	MOOC instruction support services	Luan, 2015
11	Inter-library networks for resource sharing	Kassim, 2009	Resource sharing on library networks	Wang, 2017
12	Training and orientation programs for library users	Gardner and Eng, 2005	Language training, technology training,	Gulatee and Nilsook, 2016;

			information retrieval training,	Marrhich et al., 2020
13	Publicity and Awareness programs	Kaushik & Kumar, 2016	Publicity and awareness of MOOCs	Jie, 2019
14	Departmental libraries and special libraries	Kaushik & Kumar, 2016	Departmental needs for advanced and customized information for specific MOOCs.	Mune, 2015
15	Copyrights and licencing of library resources	Kaushik & Kumar, 2016	Copyrights and licencing of library resources for MOOCs	Kaushik & Kumar, 2016

Users' Perceived Significance of the Academic Library

The current research needs to evaluate the effect on the perceived significance of academic libraries for its users if the MOOC services are offered to them. According to the Merriam-Webster Dictionary (n.d.), the definition of the word "significance", is the "quality of being important". To measure the significance of the library for its users, which is an abstract idea, the current research proposes to measure the user's desire to use the library, as has been discussed in the concept of e-commerce systems success by Molla & Licker (2001). The higher the user's intention to use a service, the higher the perceived significance of the academic library (the service provider).

This correlation between the library service usage and its perceived significance is in line with the research document *Academic library impact: improving practice and essential areas to research* prepared by the Association of College and Research Libraries (ACRL) and the Online Computer Library Center (OCLC) and authored by Connaway et al., (2017). In this report, the code for "how library services need to be measured", is its 'usage and attendance'.

Users' intention to use an information system is a widely researched topic. The information systems-success model was proposed by DeLone and McLean (1992). This feedback model is applicable to information systems (IS) applications. An updated model was proposed by DeLone and McLean in 2003 owing to the high acceptance of their earlier model and the vastly changing landscape of the information industry due to the onset of e-commerce businesses in the 2000s.

The quality antecedents of this new IS-success model are service, systems and information. These three independent variables of this model can be altered individually. Together these three independent variables influence the user's derived satisfaction and usage intention of the information service. This model is explained in the form of a line diagram in Figure 1.

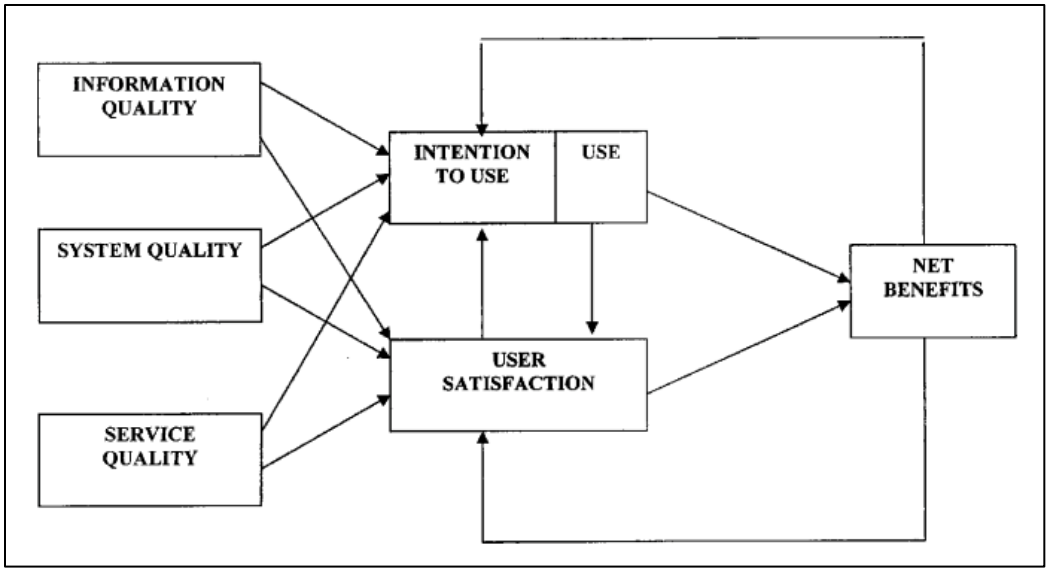

Figure 1
Information systems success model (DeLone and McLean, 2003).

The MOOC service of an academic library is also an information system, where the main users are the learners. So, it is logical to analyze the academic library's MOOC services in the light of the D&M ISS model.

The academic library services for MOOC users are also categorized into primary antecedents like in the updated D&M ISS model (2003), namely, (i) System quality, (ii) Information quality, and (iii) Service quality. The adopted primary antecedents for this study in the context of MOOC services are, (i) Infrastructure services, (ii) Information services, and (iii) User support services. They together influence the perceived significance of the library for its users.

The three adopted primary service categories for the library services for MOOC users are displayed in table 3, with more details included. In all, a total of eighteen MOOC user services have been listed in this table, classified into three primary service categories.

Gaps Identified From Literature

The literature review on academic libraries and MOOCs in higher education has shown two research gaps that are addressed in this research:

- Research gap: The library services for the MOOC users have been discussed in the literature but there has been no available record of classifying them according to the traditional roles and functions of the library.
- Research gap: The diminishing perceived significance of academic libraries due to the internet and social media and the change in the learning and information-seeking behaviour of the students has been discussed in the literature (Luan, 2015). Also, the shift in the role of an academic library from passive academic support to active service and information provider for a MOOC-based curriculum has been discussed (Yanxiang, 2016). But, the change in the perception of the library's significance for users due to this changing role in the MOOC era has not been properly addressed in the available literature.

Table 3
Primary Antecedents and Measures (MOOC Services of Academic Library)

Primary antecedents	Measures	Citation(s)
Infrastructure Services	Technical facilities of the academic library	Marrhich et al., 2020
	Infrastructure facilities of the academic library	Ning et al., 2016
	Embedded content in online courses	Luan, 2015
	Broadband connection	Chen, 2014
	Library resources on mobile platforms	Yang, 2015
User support services	Technical support for MOOC users	Jie, 2019
	User specific information services	Yang, 2015
	Information literacy programs for MOOC users	Ning et al., 2016
	Technology training for users	Marrhich et al., 2020
	Training users in English language	Gulatee and Nilsook, 2016
	Support services for MOOC users	Kaushik, 2020
	MOOC specific question and answers for user self service	Mune, 2015
	Inter-library resource sharing	Wang, 2017
Information services	Digital resources	Shapiro et al., 2017
	Open educational resources	Yanxiang, 2016
	Course material	Ackerman et al., 2016
	Continuous updation and MOOC resources	Yanxiang, 2016
	Classification and cataloging of MOOCs	Jie, 2019

Aims

This exploratory study has two main objectives:

1. To explore the possible services of an academic library for MOOC users.
2. To establish the relationship between the library's MOOC services and the perceived significance of the library for its users.

Hypotheses and Research Model

The three categories of academic library services for MOOC users form the primary antecedents. These antecedents as described in table 3, are Infrastructure services, User support services, and Information services. These independent variables are proposed to influence the library user's desire to use the library services, the "intention to use" is proposed to have a positive influence on the perceived significance of academic library for its users. The research model indicating these relationships is illustrated in figure 2.

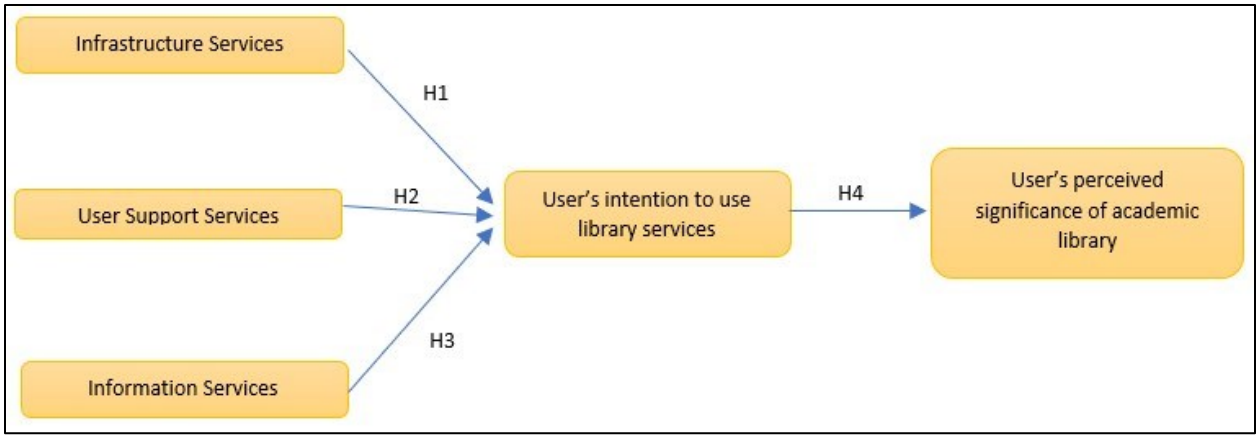

Figure 2
Research model.

The primary antecedent of "system quality" proposed in the D&M model (2003) has been modified in the current research as "infrastructure services" for MOOC users. This refers to the consistency of service and the features of the service provided to users to support MOOC consumption. This encapsulates the performance characteristics and features of the physical and technical infrastructure provided and maintained by academic libraries. This would also include making MOOCs accessible to students with disabilities, or for students without sufficient hardware and software (Bohnsack & Puhl, 2014). MOOC infrastructure should be scalable and modular, making it suitable for long-term maintenance (Chunwijitra et al., 2020). Providing MOOC infrastructure services is easier said than done, as traditional universities globally are not equipped to support such a highly demanding and ever-evolving environment. Many outsourcing companies are now moving quickly to provide such e-Learning infrastructure (Baggaley, 2013). There would be challenges regarding quality assurance and standards, and training of teachers and students on the e-learning systems, to ensure the quality of the MOOC-based education (Baggaley, 2013). The study intends to explore whether the 'MOOC infrastructure services' positively influence the user's desire to use the library services. The subsequent hypothesis can be stated as:

H1: The MOOC user's desire to use the library services depends upon user's attitude towards the features and consistency of its infrastructure services.

The primary antecedent of "service quality" in the D&M model (2003) has been modified in the current research to "user support services" for the users of an academic library. It refers to academic library services, which could facilitate and ease the MOOC consumption and assimilation by the library users. The onset of MOOCs has challenged the traditional concepts of formal education. The learners, teachers, and universities are not equipped and trained enough to assimilate MOOCs in their current form. Technical assistance or training for information search and retrieval are the primary challenges in making MOOCs inclusive. The primary objective of introducing MOOCs in higher education have been their ability to democratize quality education, but the technical and information divide acts as a barrier to achieving this objective. The MOOC support services have been given due importance in the research literature. The role of libraries has evolved from information provider to knowledge provider. This change needs to be supported by advanced IT-based technologies such as machine learning and AI to provide customized knowledge services to various user profiles (Luan, 2015). This would require highly trained library professionals, a specialized technical team, trainers, and counsellors. The role of academic

librarian would change drastically, probably a new generation of information professionals would be required to adapt to the new roles.

MOOC user support services assist users in completing MOOCs (Gregori et al., 2018). This study proposes that an academic library's user support services have a direct effect on the user's desire to use the library services. The subsequent hypothesis can be stated as:

H2: The MOOC user's desire to use the library services depends upon the user's attitude towards its user support services.

"Information services" is derived from the D&M model's antecedent of "information quality". This antecedent may be defined as the nature and significance of the information offered by academic libraries to the MOOC learners. The MOOC model of curriculum is based on the concept of "embedded content" based learning (Yanxiang, 2016). MOOC courses generally require multiple reading or reference materials. Currently, the library resources consist of electronic versions of textbooks and e-books. Moreover, these resources are scattered across various databases in the library. Hence, the most challenging task for the libraries would be to integrate these distributed learning resources into the MOOC platforms with seamlessly embedded links.

Another challenge with resource content for a MOOC's reference needs is the copyright check. The license terms prohibit the use of copyrighted content without permission or payment. The use of open educational resources (OERs) becomes inevitable in such cases, or the need to re-negotiate the license terms with the resource providers and databases, for the use of their copyrighted content for MOOC-based curricula in the university (Luan, 2015). OERs are educational content available for public access (Atkins et al., 2007). If OERs are used as the building blocks of MOOCs, the library would have to spend less time and resources on copyright management of the content. Course-specific self-help FAQs or the need for sufficient focus on each of the university's offered courses for their required content, along with a regular update of the references makes the MOOC information service even more challenging.

One more dimension in this context is the need to establish inter-library cooperation through the network for information resource sharing (Wang, 2017). The establishment of a library network involves several operational issues which govern its functionality. These issues are described by Kaul (2010), as 5 C's: connectivity, cost, computers, client, and content. The library networks in the knowledge economies also involve sharing of tacit (non-published) knowledge acquired by the different institutions. Research shows that only a few library networks sustain after the initial phase of development and initiation. Resource sharing within an international library network is even more difficult with geographic, technical, and institutional barriers (Butler et al., 2006). The subsequent hypothesis can be stated as:

H3: The MOOC user's desire to use the library services depends upon the user's attitude towards its information services.

The current research needs to evaluate the perceived significance of academic libraries for their users. To measure the significance of the library for its users, which is an abstract idea, the current research measures the user's intention to use the library services, as has been discussed in the concept of e-commerce systems success by Molla & Licker (2001). According to *Academic library impact: improving practice and essential areas to research*, the code for how library services need to be measured, the provided value is its "usage and attendance" (Connaway et al., 2017). The higher the user's intention to use, the higher would be the perceived significance of library services. Hence, the hypothesis can be formed as:

H4: The MOOC user's desire to use the library services influences the user's perceived significance of academic library.

Methods

Survey Design

The relationships between the independent and the dependent variables of the research model have been tested using an empirical approach, using feedback from library users on a structured questionnaire. A printed schedule was used with a Likert scale for measuring attitude. The Likert scale ranged from "strongly disagree" to "strongly agree", ranging from a corresponding response of 1 to 5 respectively. Similar scales have been used in previous studies for evaluating information success scales. The questionnaire was prepared in the English language as it is the primary language for teaching and instruction for Indian higher education students. The following scales were used in this questionnaire, derived from the extant literature: MOOC infrastructure services (5 items), MOOC user support services (8 items), MOOC information services (5 items), User's perceived significance of academic library (6 items). Demographic data were collected on age, gender, and education. The full scales can be found in the Appendix.

The scale's content validity was determined with the help of a review done by three subject area experts. The experts' direct personal experience and familiarity with the construct help establish content validity. Deciding upon the number of subject area experts depends upon the researcher's discretion. A greater number of experts may reduce the possibility of reaching a common conclusion. Generally, no less than three and no more than five experts are referred to in the process (Zamanzadeh et al., 2015). This step is essential to ensure that proper language and questions are used and that the design of the research instrument is as per the desired objectives. The validity of the survey instrument is done at several stages of research through many available methods. In this research, the content validity is determined before the implementation of the survey on the survey frame. Following this, a test run on 50 library users was done to ensure the ability of the questionnaire to properly evaluate the research model and its appropriateness for the target respondents, before implementing it in a large-scale survey. The respondents for this pilot study were university students who have enrolled for or completed at least one MOOC course and are academic library users.

MOOC Services of Library – Evaluation Scale

MOOC services of library evaluation scale, given below in table 4, is derived from table 3 given above, which forms the basis of the survey scales of this study. The scale is designed based on the assertion that academic library's decision-making regarding suggested MOOC services should be based on user experience. The user's desire to use the library services and the user's perception of the usefulness of the provided services forms the basis of this evaluation scale. The library services for the MOOC users are divided into three categories, as described earlier in this article. These three categories are 'infrastructure services', 'information services', and 'user support services' Table 4 presents this evaluation scale for the users.

Table 4
MOOC Services of Library – Evaluation Scale

Category of Service	MOOC Services of Library	Poor (1)	Below Average (2)	Average (3)	Good (4)	Excellent (5)
Infrastructure Services	Technical facilities of the academic library					
	Infrastructure facilities of the academic library					
	Embedded content in MOOCs					
	Broadband connection					
	Library resources on mobile platforms					
Information Services	E-learning resources					
	Open educational resources					
	Learning resources					
	Continuous updation and MOOC resources					
	Classification and cataloging of MOOCs					
User Support Services	Technical support for MOOC users					
	Customized information services					
	MOOC information literacy programs for users					
	Technology training for users					
	English language training for users					
	Support services for MOOC users					
	MOOC specific FAQs for user self service					
	Inter-library resource sharing					

Sampling and Method

This survey engaged university students who are academic library users from ten universities and institutions from the capital territory of Rajasthan state in India. A survey method is used for this research because of its potential for generalizing the findings for a larger population with similar characteristics. The survey used a tailored design method as proposed by Dillman (2011). This method was used to increase the response rates. The respondents were provided with a pre-notice intimation from their subject instructors. Dillman proposed that by using this technique the response rates are positively affected. The pre-notice primes the respondents about the upcoming survey followed by a gratitude message. The survey was administered in print form after a gap of 2-3 days after the priming. 30 respondents from each university were included in this survey who have enrolled for or completed at

least one MOOC course and are academic library users. The respondents were first briefed about the purpose and usefulness of the study and were assured that their responses would be kept confidential. The respondents were guided through the questionnaire followed by a short gratitude message. This data collection was a part of a larger study done by the researchers, and out of the sample size of 300 participants, 257 forms were included in the study. The forms were selected based on their completeness. Hence, 85.67 percent of the response rate was recorded. The survey participants had a recorded mean age of 21.3 years. In terms of gender distribution, there were 168 males and 89 females. 144 respondents were undergraduates and 113 respondents were postgraduates.

Results

To understand the relationship between the multiple latent variables, Confirmatory Factor Analysis (CFA) was done using a 5-point Likert scale with '1'= Strongly Disagree to '5'= Strongly Agree. The reliability of the research instrument was determined by using composite reliability (CR) values. The discriminant validity is determined using the AVE validity method. It determines that the constructs are independent of each other and are unrelated. The average variance extracted value's positive square root needs to be higher when compared against the highest value of the correlation of each factor against all other factors. The Fornell-Larcker ratio (1981) has been used to identify the convergent validity of the instrument. It gives us the level of confidence in how well the constructs are measured by the survey items. AVE values of more than 0.50 are considered acceptable and values more than 0.70 are considered good. Composite Reliability (CR) values of more than 0.70 are considered acceptable (Chin, 1998). The scale properties shown in table 5 are under acceptable limits. So, it can be concluded that the research instrument has achieved discriminant validity successfully.

Table 5
Scale Properties

Factors	Information services (IS)	User support services (SS)	Infrastructure services (IF)	Perceived significance of library (SIG)
FLR	0.88	0.87	0.74	0.82
AVE	0.58	0.72	0.61	0.68
CR	0.83	0.68	0.76	0.77

The fit indices have been calculated in the confirmatory factor analysis for this model. The indices considered for this study are recorded in table 6. The acceptable value for 'root means square approximation' is less than 0.08, and for all other indices, the acceptable values are equal to or greater than 0.90. The values for all the CFA fit indices are significant.

The regression coefficients of the dependent and independent variables are indicated by gamma (γ) values, as shown in figure 3 with (***). The model shows that all the three primary antecedents of library MOOC services, namely, "information services", "infrastructure services", and "user support services" have a positive influence on the library user's desire to reuse the library services, and this also has a direct relationship with the perceived significance of the library for its users.

Table 6
Model Fit Values

chi-square value	188.545	significance value	0.110	degrees of freedom	164
chi square/ degrees of freedom	1.149	root mean square error of approximation	0.072	goodness of fit index	0.937
adjusted goodness of fit index	0.932	Tucker Lewis index	0.874	comparative fit index	0.956
incremental fit index	0.945	normed fit index	0.903		

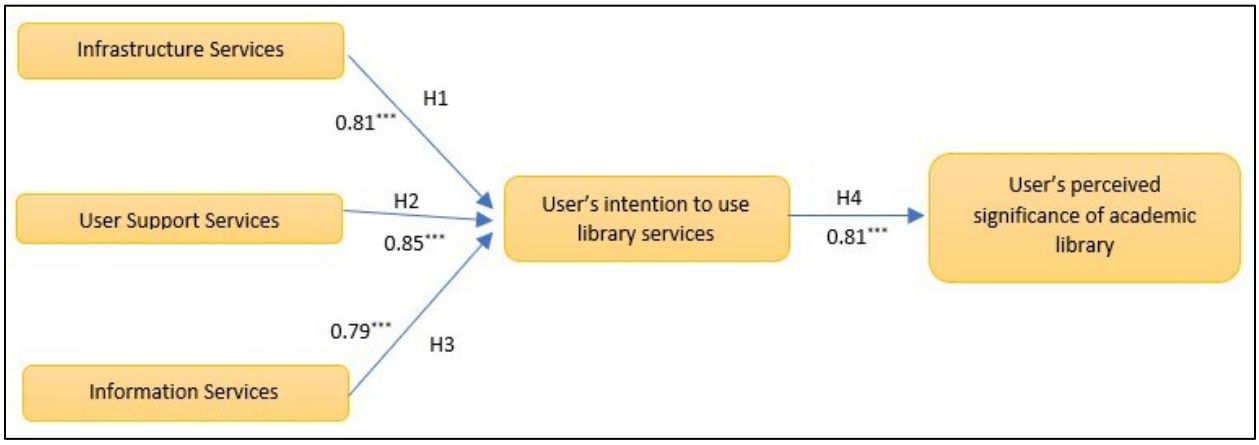

Figure 3
'Library's perceived significance' structural equation model.

Academic Library Services for MOOC Users – Evaluation Scale

Current research on the user perception of the significance of academic libraries allows us to form an evaluation scale for the library's MOOC services. This measurement scale has a total of 18 MOOC services of the academic library. The highest score possible for this scale is 90 (18 * 5), and the possible lowest score is 18 (18 * 1). So, the scores can be easily categorized into three categories, (1) the low score (18 to 42; least 1/3rd cumulative value of scores), (2) medium score (43 to 66; median 1/3rd cumulative value of scores), and (3) high score (67 to 90; highest 1/3rd cumulative value of scores). The respondents of this MOOC service evaluation scale are the learners, preferably from every academic department, to have an equal representation of the library users in this survey. Contrarily, this scale can also be applied to the library users of any specific academic department, to scale the MOOC service perception of any particular department.

The cumulative value of scores received on this evaluation scale would assist in evaluating and benchmarking the library's services to its MOOC users. This tool can be useful for the policymakers, to plan library activities and budgets, for a higher education institution using MOOC based curriculum. The national educational rating agencies and certification bodies can also use this instrument to determine the

level of preparedness of any institution with a MOOC-based curriculum. Many issues about the library's MOOC services can be easily addressed through national knowledge infrastructure and policy initiatives (Yuan et al., 2014).

Discussion

Academic libraries were gradually losing their importance of being the heart of the university. The information collection and services were facing a decline in usage, primarily due to the increasing penetration of the internet and the availability of mobile devices (Cox, 2018). The information and learning resources being available to the learners at any time and from anywhere had diminished the role of the libraries (Luan, 2015).

MOOCs have entered the educational landscape in the year 2012 (also known as the year of MOOCs) (Pappano, 2012), and since then, the MOOC movement has been joined by the elite institutions, private and non-profit organizations, and are now getting rapidly promoted by the government's world-over to increase the reach and quality of higher education (Albelbisi & Yusop, 2020). The adoption of MOOCs by universities across the globe has led their libraries to provide MOOC information services. The academic libraries are specialized bodies for information services within any university, hence, their role in MOOC based higher education curriculum is pivotal (Luan, 2015).

ACRL (2000) has defined information literacy as "the set of abilities requiring individuals to recognize when information is needed and can locate, evaluate and use effectively the needed information". MOOCs have been broadly classified as x-MOOCs (extended MOOCs) and c-MOOCs (connectivist MOOCs). x-MOOCs are more popular and require a lower level of information literacy as the course content is generally prescribed by the developer and the understanding of the content is evaluated through tests. Conversely, c-MOOCs are more participatory with learners required to aggregate, remix, repurpose and feed forward the information, based on the ACRL information literacy standards (Bond, 2015). Libraries can play an important role in providing information literacy for MOOC users. Likewise, many different library services for MOOC users have been proposed, like providing a collection of MOOC resources, copyright services, providing IT infrastructure, mining of MOOC resources, MOOC production, and providing online and offline space for MOOC users (Yanxiang, 2016). The library services for the MOOC learners have been discussed and commented upon by many authors in the available literature. In this article, a comprehensive list of possible library services for MOOCs have been curated, based on the extant literature, and to keep them in perspective these services have been compared and segregated according to the traditional roles and features of an academic library. Such a list would prove extremely useful for the libraries, institutions, and policymakers to decide upon the development and inclusion of MOOC services for their users.

Furthermore, to understand the effect of MOOC services of the academic library, on the user's perceived significance of the library, an empirical study has been conducted using CFA. The research model is based on the premise that the "significance of library" being an abstract idea, can be measured using the user's desire to use the library service, as has been proposed in the *Academic Library Impact* report by Connaway et al. (2017).

The three categories of academic library services for MOOC users form the primary antecedents, namely, "Infrastructure services", "User support services", and "Information services". These exogenous variables are proposed to influence the library user's desire to use the library services, and, as derived from the information systems success model (DeLone and McLean, 2003), the "intention to use" is proposed to

have a positive influence on the perceived significance of academic library for its users (endogenous variables).

This study on the user perception of the significance of academic libraries makes it possible, to form an evaluation scale for the library's MOOC services. This evaluation scale can be used by the university administration and the national educational policymakers for evaluation, planning and budgeting of knowledge resources.

Conclusion

This research attempts to establish an argument that MOOC services of academic libraries increase the library user's perceived significance of the library. These services, although they seem very logical and feasible due to the current technological developments, have their challenges and difficulties in adoption. This research also presents the issues and challenges for the universities, academic libraries, and information professionals for information needs while adopting MOOC based higher education curriculum.

This research was conducted in the context of Indian higher education, with a generalization of the concepts for developing and emerging economies. Another possible limitation of this research is that it is based on DeLone and McLean's information systems success model, where the user's "intention to use", which is an attitude has been related to 'use', which is a behaviour trait. In real world situations, attitude and behaviour are not always related. The administration of similar studies in other countries and educational systems would improve the findings and generalizations. Suggested future research directions are:

1. Studies to explore the organizational and leadership challenges to be faced by library management for delivering MOOC services.
2. Studies to understand the possibilities and dynamics of international library networks for content and knowledge sharing for offering MOOC services.
3. To keep MOOCs manageable by the libraries and to provide access to the public, OERs play a very crucial role. OERs make MOOCs more accessible. Ideally, OERs should form the building blocks for the MOOC framework to truly democratize higher education. However, challenges regarding worldwide accreditation and adherence to standards with OERs need to be explored.
4. MOOCs face a high student dropout rate, and several reasons for this have been pointed out in the literature (Onah, Sinclair & Boyatt, 2014). Studies have shown that a better planned MOOC instructional design can accommodate the diversity of students with the scope of personalized learning (Guàrdia, Maina & Sangrà, 2013). The use of artificial intelligence and technologies such as machine learning can assist in better understanding students' learning behaviour. Librarians can assist instructors in profiling the learners and developing a better instructional design.

Author Contributions

Flora Charles Lazarus: Conceptualization (lead), Methodology (lead), Investigation (lead), Formal analysis (lead), Writing – original draft (lead), Writing – review & editing (lead) **Rajneesh Suryasen:** Conceptualization (supporting), Methodology (supporting), Investigation (supporting), Formal analysis (supporting), Writing – original draft (supporting), Writing – review & editing (supporting)

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Appendix
Survey Items

Constructs	Items	Measures
Infrastructure services (IF)	IF1	The technical facilities of academic library are important for the success of my MOOC course.
	IF2	Infrastructure facilities of academic library are important for the success of my MOOC course.
	IF3	Embedded content in MOOCs would increase the success of my MOOC course.
	IF4	High-speed internet access is important for the success of my MOOC course.
	IF5	Library resources on mobile devices would increase the success of my MOOC course.
User support services (SS)	SS1	Technical support is important for the success of my MOOC course.
	SS2	Customized information services are important for the success of my MOOC course.
	SS3	MOOC information literacy programs would increase the success of my MOOC course.
	SS4	Technology training would increase the success of my MOOC course.
	SS5	English Language Training would increase the success of my MOOC course.
	SS6	Support services for MOOCs are important for the success of my MOOC course.
	SS7	MOOC specific FAQs for user self service would increase the success of my MOOC course.
	SS8	Inter-library resource sharing would increase the success of my MOOC course.
Information services (IS)	IS1	E-learning resources of the academic library would help me in my MOOC course.
	IS2	Availability of a collection of open educational resources for MOOCs is important for the success of my MOOC course.
	IS3	Availability of learning resources for MOOC users is important for the success of my MOOC course.
	IS4	Continuous updation and MOOC resources is highly desirable for my MOOCs.
	IS5	Indexed, ranked, and organized MOOC courses would be highly desirable.
	SIG1	Library's MOOC services would increase my reliance on the library.

User's perceived significance of academic library (SIG)	SIG2	Library's MOOC services would increase my usage of the library services.
	SIG3	Library's MOOC services would increase my chances of completion of MOOCs.
	SIG4	Library's MOOC services would help me in enhancing my academic performance.
	SIG5	Library's MOOC services would help me become more employable.
	SIG6	Library's MOOC services would increase the overall significance of the library for my academic journey.