P-ISSN 2664-0422	Pakistan Social Sciences Review	April-June 2024, Vol. 8, No. 2
O-ISSN 2664-0430	https://doi.org/10.35484/pssr.2024(8-II)27	[311-325]

Pakistan Social Sciences Review
www.pssr.org.pk

RESEARCH PAPER

Integrated Significant Predictors Increasing the Overall Effectiveness and Usability of MOOC in Higher Education Institutions in Pakistan From Learners' Perspectives: An Application of the UTAUT Model

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ABSTRACT

The study intends to examine the integrated significant predictors that influence increased MOOC usability in higher education from learners' perspectives in Pakistan. Past MOOC studies revealed that MOOCs may experience a decline in quality education due to disconnected robust integration of significant predictors by failing to integrate technology effectively in their teaching methods with outdated content design regarded by inadequate assessment mechanisms. This research utilized the UTAUT model to determine the significant impact influencing the accessibility of MOOCs. For quantitative method, fifty-one participants especially learners gave their initial responses from top universities for reliability analysis. Reliability analysis was applied, Cronbach's Alpha findings of each construct ranging between **0.878–0.938,** indicated evidently that the measurement instrument was acceptable. This study will contribute strong status to the educators and institutions to integrate high-quality content with effective instructional methods that cater to the aspirations of learners and align online education with international standards.

KEYWORDS Higher Education, MOOC, Sindh Pakistan, Significant Predictors, UTAUT Model

Introduction

Massive Open Online Courses (MOOC) are online learning platforms that offer courses designed for unlimited participation and open access via the Internet technologies. Moreover, these courses often include online lectures, interactive quizzes, discussion forums, and other online resources (Altalhi, 2021). MOOCs cover a wide range of subjects and are provided by various higher institutions to make quality education more accessible for global learners (Albelbisi et al., 2021). Recently, higher education institutions in Pakistan by partnering with MOOC providers, higher education institutions can extend their educational offerings to individuals worldwide, increasing accessibility and global outreach (Khan et al., 2018; Javed et al., 2023). In the recommendation (Shah et al., 2022; Aparicio, et al., 2019; Tsimaras et al., 2022) urged that MOOCs often incorporate innovative and technology-driven teaching methods with new pedagogical approaches, including defined course learning objectives, interactive content, effective assessment mechanisms, and adaptive learning technologies to help learners acquire theoretical and practical skills that are directly applicable to their professions. Furthermore, higher education is actively seeking the successful implementation of MOOCs can be enhanced through the thoughtful integration of teaching methods, course learning outcomes, and assessment mechanisms to promote online learning experience and enhance modernized education worldwide (Qureshi,

2019). The highly progressive MOOC platform requires strong integration of significant factors such as teaching methods, course objectives, and course evaluation plays a crucial role in enhancing the overall success of MOOC (Shah et al., 2022; Aparicio, et al., 2019). Consequently, higher education institutions are actively experimenting with these strategies to make MOOCs more effective usability and aligned with the evolving needs of learners in the digital age (KHALID, 2021; Javed et al., 2023). According to researchers (Sabjan et al., 2021; Tsimaras et al., 2022), by integrating high-quality course content, innovative teaching methods, and ongoing course evaluation, MOOC instructors can optimize usability, enhance learner satisfaction, and maximize the educational impact of their online courses. This holistic approach ensures that MOOCs effectively meet the diverse learning needs and preferences of learners, ultimately improving overall usability and learning outcomes.

Considering MOOC literature (Shah et al., 2022; Aparicio, et al., 2019; Tsimaras et al., 2022), stated that MOOCs may experience a decline in quality education due to disconnected robust significant predictors by failing to integrate technology effectively in their teaching methods, poorly design delivery of course content, and inadequate assessment techniques are regarded as significant predictors. Moreover, these elements serve as crucial indicators that help anticipate assessing the outcomes and impact the overall adaptability and usability of MOOCs for future success (Sabjan et al., 2021; KHALID et al., 2021). By considering the facts, this study aims to examine the integration of significant predictors that influence to increase in the overall effectiveness and usability of MOOCs in higher education from learners' perspectives in Pakistan.

Higher Education Reforms in Pakistan

Education improves knowledge, personality, and confidence level and empowers intellectually to deal with problems and make the right decisions (Iqbal et al., 2016). In today's, competitive world, quality education is a necessity, therefore, higher education helps in getting a prospective position in the domain of study. Additionally, higher education is responsible for formulating strategies, standards, program outcomes, and quality assurance in teaching and learning to align the education standard with the international standards in awarding academic degrees (Enciso et al., 2017). The past research (Iqbal et al., 2016) asserted that Pakistan has a diverse geographical landscape and it has been declared as the 6th populated country in the world, by considering the facts there is a shortage of traditional education institutions and economic issues to facilitate the learners by providing quality education. In this modern era, higher education institutions in Pakistan integrate technology that aims to create an inclusive, dynamic, and effective learning environment and prepare learners for the modernized education opportunities of the 21st century (Ahmed et al., 2017; Shamsi et al., 2017). Recently, higher education partnered with MOOCs by offering international standards courses at the national and international levels to deliver quality education for learners at their doorstep. MOOC is accessed and delivered by clearly outlining the goals and course objectives, engaging instructors who can effectively communicate complex concepts, and designing meaningful assessments and feedback that align with learning objectives which are considered essential predictors that contribute to the positive learning experience among the learners' achievements (Yousaf et al., 2022). The well-executed MOOC platforms such as Virtual University of Pakistan, Coursera, PakistanEDX, Open Access, and Khan Academy are being developed in collaboration with top-ranked public universities in Pakistan to deliver international standard online courses (HEC-OR, 2023; HEC, 2023; HEC-CO, 2023; Siddiquei & Khalid, 2022). MOOC platform details are illustrated in Table 1.

Table 1
Description of MOOC Platforms

MOOC Provider	Description
Virtual University	It was developed by the Government of Pakistan in 2002.
Coursera	HEC Pakistan launched DLSEI in 2018 in partnership with Coursera.
edX	HEC online learning service with partnerships with top-tier universities in 2019, including Harvard University, Princeton, University of Chicago, and more.
Open Access	In 2019, HEC provided learning platforms for learners to access some courses on this portal for free and others can be audited for free.
Khan Academy	Founded by Salman Khan in 2008, Khan Academy is an American not-for-profit educational organization

Literature Review

The foundation of literature in this study rests on three main pillars that shape its research framework. The principal determinants towards the quality and success of MOOCs are "effectiveness and usability of MOOC", "integrated significant predictors", and the "IT/IS model for technology acceptance and usage". Within this section, the study explores understanding the adaptability and usability of MOOCs from learners' perspectives and suggests the proposed research model with hypotheses relationships.

Effectiveness and Usability of MOOC

The effectiveness and usability of a MOOC involve considering various crucial factors related to instructors' teaching methods, course learning objectives, transparent assessment, user experience, and overall satisfaction (Dinh et al., 2023). Effectiveness related to MOOC delivers effectively its stated learning objectives that are aligned with the essential course curriculum (Albelbisi, 2020), evaluates the quality of overall assessments (quizzes and assignments) in gauging learners' understanding (Qi & Liu, 2021), and last but most importantly teachers' teaching methods remain influential in shaping the learning journey and facilitating meaningful learning experiences with integration of technological and pedagogical expertise enhances the overall quality and impact of MOOCs usability (Rodés et al., 2021).

Integral Significant Predictors

Course objectives

The course objectives of a course within the educational system significantly rely on the design of its updated content because high-quality course content and objectives ensure that learners receive information that is clear, relevant, and applicable to their needs. According to (Al-Mekhlafi et al., 2022), the effectiveness of a MOOC can be determined by the clarity, relevance, and future applicability of its course contents that ensure comprehension among learners and the course needs to have well-defined learning objectives that incorporate problem-solving and real-world applications by providing a clear sense of purpose (Pham et al., 2019). Based on prior research (Aparicio et al., 2019), it is evident that course objectives play a pivotal role in enhancing the relevance of concepts and skills, facilitating learners in achieving lifelong success and future goals. According to (Albelbisi et al., 2021), urged that course objectives contribute to the relevancy of concepts and skills taught by aligning the course content with the

skills and knowledge needed for future success helping learners to connect what they are learning to their long-term goals and enhancing the overall value of the course.

Teaching Methods

The instructors' teaching methods associated with (instructional delivery techniques) utilized in MOOCs play a crucial role in shaping learners' achievements by promoting accessibility, interactivity, collaboration, adaptability, and a variety of instructional approaches that involve a supportive learning environment and encouragement of learners (Khalil & Sultana, 2017). Consequently, the instructors significantly integrate digital skills and pedagogical principles to create effective teaching methods that align the teaching quality design of MOOC and enhance the active class participation of learners (Harahap et al., 2022). The Past literature (Chatwattana, 2021), urged that digital skills be utilized to integrate real-world applications into the course content, instructors may incorporate case studies, industry examples, or practical projects that demonstrate the practical relevance of the concepts being taught to bring learners with global knowledge and awareness. On the other hand, digital pedagogy is instrumental in maximizing the potential of MOOCs by providing flexible, interactive, and personalized learning experiences and empowering instructors to adapt technology to create engaging and effective educational environments for making quality education accessible to a diverse and global audience (Steele et al., 2019). MOOCs are supported by digital pedagogy to contribute the concept of lifelong learning success and stay relevant in a rapidly changing world of education.

Course Evaluation

The assessment of courses in Massive Open Online Courses (MOOCs) serves a comparable purpose to the evaluation methods employed in traditional educational settings. In both contexts, course evaluation aims to offer learners feedback and progress reports, enhancing the overall learning experience and assessment involves facilitators providing feedback to learners based on their class progress, highlighting areas for improvement, and acknowledging successful aspects (Firmansyah et al., 2021). According to researcher Tsimaras et al. (2022), recommend that course evaluation in MOOCs should observe principles of fairness in grading and transparency in the quality of feedback given for quizzes and assignments, in the following these recommendations ensure that the evaluation process is equitable and that learners receive clear insights into their performance. In the realm of MOOCs, course evaluation stands out as a unique opportunity to influence the quality of online educational platforms from learners' perspectives as emphasized by (Lundqvist et al. 2020),

General Diagram Of IT/IS Adoption Model

The IT/IS acceptance model refers to the degree of "willingness or interest" an individual exhibits in adopting newly introduced technology. Figure 1 illustrates the flow of the general diagram of the IT/IS adoption model cited and developed by (Source: Venkatesh, 2003). The UTAUT model was introduced in the research paper titled "Unified Theory of Acceptance and Technology", published in the journal "MIS Quarterly" in 2003. The authors of this influential model are Viswanath Venkatesh, Morris G. B. Davis, Fred D. Davis, and Gordon B. Davis.

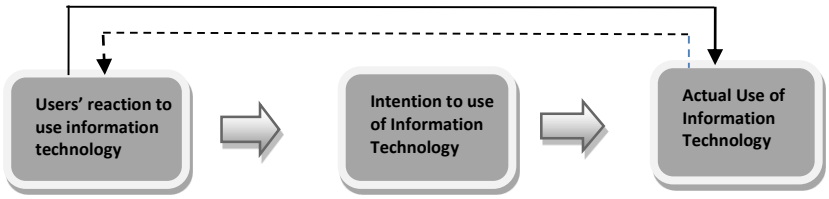

Figure. 1. General Diagram of IT/IS Model, Source (Venkatesh, 2003)

Unified Theory of Acceptance and Technology (UTAUT)

The UTAUT model holds significant recognition and it is extensively used in the realm of technology acceptance research (Venkatesh et al., 2003). It offers a comprehensive understanding of the factors influencing individuals' behavior intention and contributing to the successful adoption of newly introduced technology (Altalhi, 2021). As recommended by researchers (Haron et al., 2021; Altalhi, 2021) stated that the UTAUT model plays a pivotal role in studying widespread technology acceptance and usage to identify the users' perceptions and concerns about innovative technology platforms. Notably, the UTAUT acceptance model introduces more predictors that acknowledge the importance of actual predictors and moderators' effects (factors influencing the strength of relationships between predictors) and mediators (factors defining the process through which predictors influence behavioral intention) of actual usage of a particular technology (Wang et al., 2021). In this context, the UTAUT model is considered which is integrated with the external significant predictors, to assess the individuals' acceptance of MOOC usage in higher education. The subsequent explanations delve into each original predictor of the UTAUT model in Figure 2. UTAUT focuses on four original constructs (independent variables) which are (1) performance expectations (PE), (2) effort expectations (EE), (3) social influence (SI), and (4) facilitating conditions (FC). In addition, behavioral intentions (Intentions) will be identified whether they affect the use of technology usage Venkatesh et al. (2003).

PE- Performance Expectancy a degree refers to which an individual believes that using a particular technology will help them in achieving gains (Altalhi, 2021). The learners are more likely to accept and use online educational platforms if they perceive that it will positively impact their learning outcomes and believe that participating in a MOOC will enhance their knowledge, skills, or overall academic performance. They are more likely to engage with the MOOC platform actively to accomplish their academic needs (Wan et al., 2020; Irianto, et al, 2023).

EE- Effort Expectancy is the perceived ease associated with the use of technology and reflects the degree to which individuals believe that using the technology will be free of effort (Srivastava & Bhati, 2022). The learners should find the MOOC platform user-friendly and easy to navigate. If learners perceive that engaging with the MOOC requires minimal effort and is convenient to use, they are more likely to embrace the technology (Altalhi, 2021; Li & Zhao, 2021).

SI- Social Influence a degree refers to which an individual perceives that others (such as friends, family, or colleagues) believe they should use a particular technology (Irianto, et al, 2023). The influence of peers, or social networks can significantly impact learners' decisions to accept and use online learning platforms like MOOCs (Wang et al., 2021; Srivastava & Bhati, 2022).

FC- Facilitating Conditions represent the degree to which individuals believe that there is support and infrastructure in place to assist them in using the technology effectively (Altalhi, 2021). The learners need to feel that the necessary support structures, resources, and technical infrastructure are available. This includes factors such as access to the required technology, technical support, and a reliable online learning environment (Wan et al., 2020; Li & Zhao, 2021).

BI- Behavioral Intention acts as a key link between users' perceptions and the actual use of technology which reflects users' expressed willingness to use and engage with the technology based on their attitudes and perceptions of its utility, ease of use, social influence, and the facilitating conditions provided (Altalhi, 2021; Li & Zhao, 2021; Alotaibi, 2023).

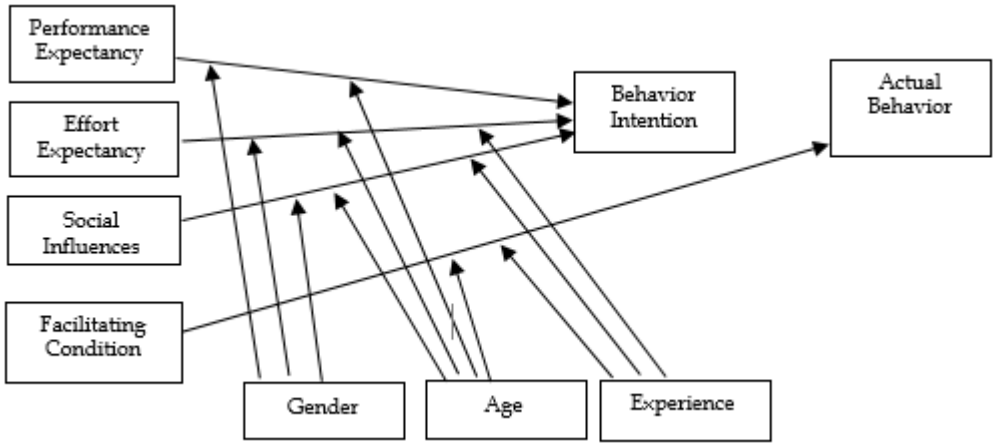

Figure. 1. UTAUT Model -------Source (Venkatesh et al., 2003)

In the recommendation by researchers Table. 2. As shown in the latest past MOOC literature, the UTAUT is the most adopted and widely used model for the acceptance and usage of e-learning-related platforms like MOOC. Under researchers contributed the amended UTAUT model adopted in their research investigations at the latest by understanding the individuals' perception and concern regarding newly innovative technology.

Table 2
Authors' recommendations for the UTAUT model

Author, Year	Article title	Model	Constructs
Altalhi, M. 2021	Towards Understanding the Students' Acceptance of MOOCs: A Unified Theory of Acceptance and Use of Technology (UTAUT)	UTAUT	Self-efficacy, Attitude, PE, EE, SC, FC, Behavior Intention to Actual Usage
Irianto, et al, 2023	Use of H5P interactive learning content in a self-paced MOOC for learning activity preferences and acceptance in an Indonesian medical elective module	UTAUT	PE, Business expectations, SC, FC, Behavior Intention to Actual Usage
Srivastava, S., & Bhati, N. S. (2022, March).	Determinants for Adoption of MOOCs from the Perspective of UTAUT	UTAUT	PE, EE, SI, FC, Behavior Intention to Actual Usage

Alotaibi, S. J. (2023)	Towards a UTAUT Model for Acceptance of Massive Open Online Courses (MOOCs)	UTAUT	PE, EE, SI, FC, Behavior Intention to Actual Usage

Proposed Research Model

This research study proposed the amended UTAUT model for technology acceptance and usage by considering independent and dependent variables that directly impact the behaviour intention by acknowledging the individual perceptions and expectations towards the MOOC adoption and usage. The proposed research model combines additional variables for examining the level of integrated significant predictors that influence the learner's intention to effectively use MOOC in higher education in Pakistan. shown in Figure. 3. Explaining the researchers' proposed research model along with external predictors with the actual constructs to integrate the research model. The proposed research model identifies the individuals' intention towards MOOC usage (MU), which is the dependent variable, the other newly integrated significant predictors are Course Objectives (CO), Teaching Methods (TM), and Course Evaluation (CE) considered the strongest predictors to increase the overall effectiveness and usability of MOOC platform. The external significant predictors are connected with the original model for predicting and understanding the learners' concerns towards MOOC adoption in higher education. Below are considered the relationship of hypotheses that posit.

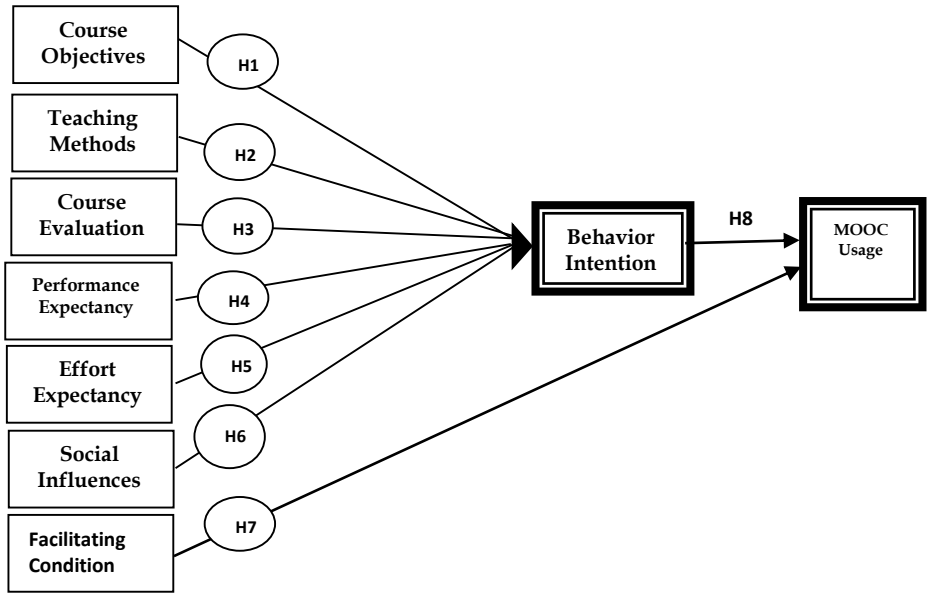

Figure. 3. Proposed Research Model

Hypotheses

H_1: Course objectives have a positive impact on behavior intention.
H_2: Teaching Methods have a positive impact on behavior intention.
H_3: Course evaluation has a positive impact on behavior intention.
H_4: Performance expectancy has a positive impact on behavior intention.
H_5: Effort expectancy has a positive impact on behavior intention.
H_6: Social influence has a positive impact on behavior intention.
H_7: Facilitating conditions have a positive impact on MOOC usage.
H_8: Behavior intention has a positive impact on MOOC usage.

Material and Methods

Procedure

This study used the quantitative approach to validate the research model along with suggested hypotheses to achieve research outcomes (Rahman, 2020). This measurement instrument consists of 47 items overall in gathering data from the targeted respondents. The first part is related to the demographic questions for collecting respondents' personal information such as gender, age, qualification, department, designation, and MOOC experience. The second part comprises the survey questions that acknowledge the learners' understanding and perceptions regarding MOOC adoption and usage. The key indicators addressed the importance of the independent constructs likewise Course objectives (CO, having six items), Teaching methods (TM, having six items), Course evaluation (CE, having six items), Performance Expectancy (PE, having four items), Effort Expectancy (EE, having four items), Social influence (SI, having four items), and Facilitating condition (FC, having four items) are driven by the influential factors. Whereas Behavioral intention (BI, having four items), and MOOC usage (MU, having three items) are the dependent variables. The research has opted for a cross-sectional survey methodology to gather data and examine the relations among independent and dependent variables. A survey instrument scale has been developed to incorporate a five-point Likert scale ranging from strongly disagree to strongly agree to gather opinions or insights from the target population (Chen et al., 2023). The survey questionnaire form was designed on Google form and shared with all participants through email and WhatsApp. The reliability test of each independent and dependent construct was assessed using SPSS software to ensure the consistency and stability of measurements in the survey questionnaire thereby establishing their trustworthiness.

Population

A total of 51 targeted responses had been recorded from learners especially those who are registered and engaged in using MOOCs from well-reputed public institutions located in big and highly populated cities such as Karachi, Lahore, Peshawar, and Quetta in Pakistan. The gathered responses were used to determine the initial findings (reliability-test analysis) for the data instruments validity.

Ethical Considerations

The ethical consideration in the article is essential to the address by providing the ethical conduct of the research and its objectives in ensuring the integrity, credibility, and responsible conduct of the research. This helps build trust with targeted audiences by confirming the study aligns with ethical guidelines.

Results and Discussion

Descriptive Statistics Analysis

The demographics are to provide the profile information of the targeted participants. Based on our findings indicate the majority of the participants were male (58.5%), and the participants were aged between 31 to 40 years (56.5%) using MOOC. The majority of academicians and students experienced less than a year and 1-2 years which is significantly impactful. The demographic information is illustrated in Table 3.

Table 3
Descriptive Statistics

Demographic Information	Frequency	Percentage of frequency (%)
Gender		
Male	31	58.5
Female	20	37.7
Age		
22-30	09	17.0
31-40	30	56.5
41-50	09	17.0
More than 50	03	5.7
Qualification		
Bachelor	--	--
Master	39	73.6
Ph.D.	12	22.6
Department		
Computer Science	21	20.8
Business Administration	11	39.6
Education	11	20.8
Mathematics	--	--
Engineering	--	--
Others	8	15.1
MOOC learning experience		
Less than 1Year	26	49.8
1-2	13	25.2
2-3	6	12.4
More than three years	6	12.4

Reliability Test (Pilot Study)

The pilot study of measurement instruments is important in research because it helps assess feasibility, test validity, and reliability to determine the significance of construct items before conducting a final study. The outcomes confirmed a total of 41 construct items including MU (α = 0.938), BI (α = 0.929), CO (α = 0.918), TM (α = 0.897), CE (α = 0.878**)**, PE (α = 0.919), EE (α = 0.922), SI (α = 0.913), FC (α = 0.932). According to (Hair et al., 2013), the considerable Cronbach's Alpha coefficient is set higher or equal to **0.7**. Since all the constructs' significance values are higher than 0.7 considered reliable acceptable. The Cronbach Alpha's significance of all construct outcomes ranging between **0.878–0.938**, as represented in Table 4.

Table 4
Cronbach's Alpha (Reliability Test Results)

Onstructs	No. of Items	Alpha (α ≥ 0.7)
MOOC Usage (MU)	03	0.938
Behavior Intention (BI)	04	0.929
Course Objectives (CO)	06	0.918
Teaching Methods (TM)	06	0.897
Course Evaluation (CE)	06	0.878
Performance Expectancy (PE)	04	0.919
Effort Expectancy (EE)	04	0.922
Social Influences (SI)	04	0.913
Facilitating Conditions (FC)	04	0.932

Conclusion

MOOC platform is a new entrant to the foundation of online learning platforms that offers a wide range of international standard courses across various disciplines and overlaps traditional education in quality-based online learning platforms in the future. In the past MOOC literature revealed that researchers who investigated and contributed to MOOCs may experience a decline in quality and success due to disconnected robust and considerable integration of significant predictors that impact the efficiency and usability of MOOCs in public universities in Pakistan. Therefore, this research provides a comprehensive examination of MOOCs within the context of assessing the impact of integrated significant predictors that are influencing the individuals' perceptions and expectations to adopt and use the MOOC platform successfully. Moreover, this research contributes to the strong status and potentially reshapes the future landscape of MOOC and e-learning-related platforms in higher universities in Pakistan. In this context, the researcher proposed an amended UTAUT model to validate the preliminary analysis reliability test. This research used the quantitative approach methodology to design the data collection instrument for obtaining insights from targeted participants from top universities in Pakistan. There were fifty-one participants given the initial responses for conducting the reliability and validity analysis. The reliability test outcomes of dependent constructs (MU three items **α =0.938**) and (BI four items **α =0.929**), other independent variables (CO six items **α =0.918**), (TM six items **α =0.897**), (CE six items **α =0.878**), (PE four items **α =0.919**), (EE four items **α =0.922**), (SI four items **α =0.913**), (FC four items **α =0.932**). Our results revealed, that the data collection instrument and data quality are consistent and sufficient that ensure the researchers proceed with confidence for future research conduct.

The integral significant predictors are Course objectives (CO), Teaching methods (TM), Course evaluation (CE), Performance Expectancy (PE), Effort Expectancy (EE), Social influence (SI), and Facilitating condition (FC) are driven by the influential factors. The researchers will provide empirical evidence regarding the usability challenges, user preferences, and effectiveness of MOOC platforms. The study will strongly support educators and institutions to set international standard learning outcomes, adopt effective teaching principles, and adequate evaluation assessment mechanisms to create enriching learning experiences that cater to the diverse needs and aspirations of learners in the digital world.

Theoretical Implications

This research will contribute to the conceptual theory and MOOC adoption literature in this aspect. The authors will empirically evaluate the relationship between integrated significant predictors using the UTAUT model behavioral intentions concerning MOOC adoption and usage in higher education institutions from learners' perspectives. Therefore, this study will contribute to the literature by providing empirical evidence that "course quality", "teaching methods", and "course evaluation" are the significant predictors affecting individual behavioral intention for the successful implementation of MOOC platforms in higher education institutions.

Practical Implications

MOOCs provide learners with access to high-quality educational content from top-ranked public universities and institutions in Pakistan. Our research will provide practical implications for MOOC administrators and higher education. Firstly, top universities in collaboration with MOOC providers, allow individuals, regardless of their

geographical location or financial constraints, to access courses and learning materials. MOOC platforms host a wide variety of courses on diverse subjects allowing learners to explore and acquire knowledge in areas beyond their formal education or professional expertise. Secondly, higher institutions and MOOC providers rethink and redesign with thoughtful approaches that employ various strategies to make their online learning services effective by designing strategies that encompass aspects like course design and learning outcomes, effective teaching methods and techniques, and adequate learning assessment methods to enhance the learning experience and learners' engagement.

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