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Assessing the Effectiveness of Massive Open Online Courses (MOOCs): A Study of Coursera Users in Pakistan

Asif Mehmood
Department of Management Sciences National University of Modern Languages (NUML). asifmehmoodpk87@gmail.com
Dr. Muhammad Haroon
Department of Management Sciences National University of Modern Languages (NUML). mharoon@numl.edu.pk

Abstract

This study evaluates the effectiveness of Massive Open Online Courses (MOOCs) in enhancing learners' knowledge and skills within the Pakistani context, with a focus on Coursera users. By facilitating accessible and flexible learning opportunities, MOOCs play a vital role in developing critical competencies that are essential for employment and economic advancement in Pakistan. Through a mixed analysis of survey data from 100 participants, the research explores how engagement with MOOCs contributes to improved digital literacy and skill acquisition, which are key drivers of employability and productivity. The study further examines the influence of course participation on learners' perceptions of their career prospects and economic potential. Grounded in the Adult Learning Theory and Expectancy-Value Theory, the findings demonstrate that increased MOOC engagement significantly enhances perceived course effectiveness—accounting for around 40% of the variance—ultimately fostering a more skilled workforce. Digital literacy and learner engagement also positively impact skill development, although their effects are somewhat mediated by overall MOOC participation. These insights emphasize that high-quality MOOCs, combined with targeted engagement strategies, can significantly boost skill levels, leading to greater employment opportunities and contributing to Pakistan's broader economic growth. The research underscores the importance of leveraging digital education platforms to build human capital, supporting policymakers, educators, and platform providers in their efforts to harness MOOCs as a catalyst for socioeconomic development in the country.

Key Words: MOOCs, HEC, DLSEI, DLS, Coursera, Learner Engagement, Digital Literacy

Introduction

Overview

The rise of online education platforms like Coursera has transformed the landscape of learning, providing flexible and accessible training options for learners worldwide. The purpose of this study is to assess how well Coursera's online training courses improve participants' knowledge, abilities, and job prospects. The goal of Massive Open Online Courses (MOOCs) is to provide learners worldwide with open access and limitless participation over the internet. Coursera is the world's foremost pioneer in MOOCs. Coursera is focused on providing the finest and most prestigious University certifications & Learning platform to the learners regardless of wherever they are in the world. More than 46 million students, the greatest number of university partners, and more than 6533 courses from the

world's top universities, institutions, and businesses including Yale University, the University of Michigan, the University of California, John Hopkins University, Google, Amazon, Facebook, and many more are available on Coursera. Higher Education Commission (HEC) has launched its Digital Learning and Skills Enrichment Initiative (DLSEI) in 2018 to equip Pakistani youth with the high-demand skills needed for jobs of the future. HEC has signed a contract with Coursera for online courses at a large discount price. In order to swiftly implement high-quality digital and human skills training at scale throughout the nation, HEC will support skill development opportunities for Pakistan's youth in the third phase of DLSEI in 2023 by providing free access to 5,300 online courses and 3,400 guided projects on Coursera across 11 domains. As a key partner, Coursera is speeding up efforts to build a talent pool that will meet the goal of a knowledge-based economy, where innovation and technology will fuel the industrial base instead of natural resources.

HEC-Coursera Partnership

In 2018, HEC established the DLSEI in collaboration with Coursera. Over the course of the program's first two stages, 12,000 students completed a total of 0.25 million hours of online skilling. Project management, data analytics, programming, social media marketing, and soft skills like public speaking, presenting, and negotiating are some of the most sought-after industry courses. The Higher Education Commission (HEC) launched the third phase of its collaboration with Coursera through the Digital Learning and Skills Enrichment Initiative (DLSEI) in December 2022 as part of its continuous commitment to give Pakistani youth the highly sought-after skills required for jobs of the future. In order to swiftly implement high-quality digital and human skills training at scale throughout the nation, HEC will support skill development opportunities for Pakistan's youth in the third phase of DLSEI in 2023 by providing free access to 5,300 online courses and 3,400 guided projects on Coursera across 11 domains.

Globally, it is widely recognized that the workforce, industry, and economy as a whole depend on the effective implementation of carefully crafted Technical Education and Vocational Training (TEVT) policies that can generate the highly qualified and informed workforce needed to meet the world's increasingly advanced technologies (Chamadia & Mubarik, 2021).

Online training programs are a useful tool for organizations looking to improve the skills and knowledge of their employees. Better communication, teamwork, and general

performance in remote work environments can result from integrating online training courses into staff development plans (*LdRlmjTdsIWAnaEeZsKip6eq5nxFxZM1Ce6FNDX2*, n.d.) . (Magdaluyo, J. G. et al., 2023)

As pointed out by Santiago et al., (2021), online training programs' accessibility and adaptability enable people to study at their own pace and convenience, which may be especially helpful for people with time restrictions or limited access to traditional educational resources.

Learner happiness may be explained in large part by the MOOC's schedule, workload, and completion status as well as the video, instructor, material, and assessment themes (Nguyen, 2022) .

Research Gap

The existing literature mostly talked about the participants' satisfaction about the MOOCs and mostly the qualitative data being collected and evaluated by the researchers. This data is being collected from the course participants at the end of the online course, which most of the time remains biased. Another flaw in earlier studies is that the majority of the data examined came from student reviews or comments submitted on Coursera at the conclusion of each online course (e.g., Haba and Dastane, 2019; Rääf et al., 2021; Du, 2022).

Problem Statement

Despite the increasing popularity of online education platforms such as Coursera, there remains a significant gap in empirical research assessing the effectiveness of these programs in fostering skill development and enhancing career opportunities, particularly in the context of Pakistan. While subjective evidence suggests that online courses can provide valuable knowledge and skills, there is limited understanding of how these programs translate into tangible benefits for learners, including their ability to apply new skills in the workplace, improve job prospects, and advance in their careers. This study seeks to fill the current research gap and provides insights that can guide the creation of more successful Massive Online Courses that are suited to Pakistani learners' requirements by methodically assessing the experiences and results of Coursera users. The consequences of online education must be fully understood by educators, policymakers, and students in order to maximize its potential in promoting skill development and economic progress in the region.

The Central Research Problem

In order to address the dearth of contextualized research and offer insights into the particular

opportunities and problems that this environment presents, this study attempts to evaluate the efficacy of MOOCs, primarily Coursera courses, in the context of Pakistani learners. The success of MOOCs may be impacted by elements including internet connectivity, digital literacy, cultural relevance, and the needs and priorities of local learners, even if they have the potential to democratize education and increase access to learning opportunities in Pakistan. By looking at these variables, the study aims to give a more comprehensive picture of how MOOCs affect Pakistani students and to pinpoint methods for enhancing their efficacy.

Recognizing the significance of these elements in forming the learning experience and affecting the impact of MOOCs on learners, it aims to comprehend how learner engagement and digital literacy moderate the relationship between MOOC participation and learning outcomes. Promoting deep learning and attaining successful learning outcomes depend on learner engagement, which includes elements like motivation, involvement, and communication with peers and teachers. Success in online learning environments also depends on digital literacy, which is the capacity to use digital technology efficiently. In order to offer insights into how MOOCs might be created and delivered to optimize their impact on learners, this study looks at how these characteristics influence the relationship between MOOC participation and learning outcomes.

In order to provide a thorough evaluation of the effects of MOOCs on students' lives and careers, the study will look into the variables impacting course completion and perceived advantages among Coursera users in Pakistan. Although course completion is frequently cited as the main measure of MOOC success, other elements should also be taken into account, such as perceived advantages, which could include enhanced knowledge and abilities, professional growth, and personal development. This study aims to give a more comprehensive picture of how MOOCs affect Pakistani students by looking at both course completion and perceived advantages.

Specific Issues in the Pakistani Context

In Pakistan, fair access to high-quality internet is still a major issue that could restrict the impact and accessibility of MOOCs and exacerbate already-existing disparities in educational opportunities. Despite MOOCs' potential to democratize education, the digital gap is still a major problem, especially in underdeveloped nations like Pakistan where internet connection is frequently spotty and restricted. Many students are unable to access MOOCs and other online learning materials because of factors like poverty, a lack of infrastructure, and

geographic remoteness. A multifaceted strategy is needed to address this issue, one that includes funding internet infrastructure, supplying reasonably priced devices, and creating digital literacy initiatives.

Limitations in digital literacy may limit participation in MOOCs, especially for students from underprivileged backgrounds who do not have the abilities needed to successfully access course materials and navigate online platforms. The ability to effectively use digital technology, particularly the capacity to obtain, assess, and apply information from online sources, is referred to as digital literacy. Digitally illiterate learners may find it difficult to contribute to MOOCs, which can cause dissatisfaction and disengagement. This is especially true for students from underprivileged backgrounds who might not have had much exposure with digital tools before. This obstacle can be addressed and learner involvement in MOOCs increased by offering training and assistance in digital literacy.

Given the particular difficulties low-SES students in Pakistan have accessing and using MOOCs and other online learning tools, it is imperative that inequalities be addressed and that they receive an equal and high-quality education. Students from lower socioeconomic backgrounds may encounter a number of obstacles that could make it more difficult for them to thrive in online learning settings. These challenges could include limited access to technology, a lack of digital skills, and a lack of support from family and the community. A comprehensive strategy that involves financial aid, training in digital literacy, and the establishment of encouraging learning environments is needed to address these inequities.

Addressing the Research Need

By concentrating on Pakistan and offering insights into the particular potential and constraints that this setting offers, this study will fill the knowledge vacuum regarding MOOC effectiveness in developing nation contexts. Although MOOCs have the potential to revolutionize education in Pakistan, a number of factors, such as internet availability, digital competence, cultural relevance, and the needs and priorities of local learners, may affect how effective they are. By looking at these variables, the study aims to give a more comprehensive picture of how MOOCs affect Pakistani students and to pinpoint methods for enhancing their efficacy.

It will shed light on the intricate dynamics that mold learners' experiences and affect their performance by revealing how attitudes, motivation, learning engagement, and

perceived outcomes interact in MOOCs. Designing successful MOOCs that support favorable learning outcomes requires an understanding of how these components interact. Learners' motivation and engagement can be influenced by their attitudes, which represent their views and sentiments regarding MOOCs. Learners' motivation, or the reasons for their participation in MOOCs, might shape their behavior and perseverance. Promoting deep learning requires learning engagement, which includes elements like participation, interaction, and self-regulation. Learners' subjective evaluations of the worth and influence of MOOCs are reflected in perceived outcomes, which might affect their satisfaction and likelihood to participate again.

The study will give stakeholders useful tactics to increase MOOC accessibility and boost student participation in Pakistan, along with practical suggestions for legislators, instructors, and MOOC providers. These tactics could involve making investments in internet infrastructure, offering instruction in digital literacy, customizing course materials for regional contexts, and establishing encouraging learning environments. By putting these tactics into practice, stakeholders can guarantee that MOOCs are useful and available to all students in Pakistan, irrespective of their geography or socioeconomic status.

Significance

By using a multifaceted, person-centered approach to examine learner engagement, this study advances the theoretical understanding of MOOCs. It goes beyond conventional unidimensional models and offers a more comprehensive view of the variables influencing learner behavior and outcomes. This study looks at the behavioral, cognitive, emotional, and social aspects of engagement in an effort to give a more comprehensive picture of how students engage with MOOCs and what influences their success. This approach recognizes that rather than being passive consumers of knowledge, students are active agents who guide their own learning.

Based on well-established engagement theories, it will offer a novel framework that is appropriate for comprehending MOOCs in developing country contexts. This framework will be tailored to the opportunities and challenges that these contexts present, making it a more applicable and relevant model for researchers and practitioners operating in these areas. The requirements and priorities of local learners, as well as elements like internet access, digital literacy, and cultural relevance, will all be considered in this framework. This study aims to offer a more precise and practical model for comprehending MOOC efficacy by tailoring

current theories to the unique circumstances of developing nations.

Using a modified model of expectancy-value theory, the study will provide a thorough explanation of individual differences in MOOC engagement, considering the various motivations of MOOC learners as well as the distinctive features of online learning settings. According to the expectation-value theory, learners' perceptions about their chances of success (expectancy), the importance they attach to the job (value), and the consequences of participating (cost) all affect how engaged they are. This study aims to give a more thorough knowledge of the elements that affect learner engagement by adapting this model to take into consideration the unique setting of MOOCs.

Practical Implications

The results will address a significant issue in MOOC education and enhance the overall efficacy of these platforms by offering helpful recommendations to MOOC designers, researchers, students, and instructors on how to reduce dropout rates and boost completion rates. These recommendations could include methods for boosting learner engagement, increasing course design, improving assistance, and encouraging self-regulation. Stakeholders can contribute to the development of MOOCs that are more interesting, useful, and available to learners worldwide by putting these principles into practice.

In order to build more relevant, interesting, and successful learning experiences that meet the many requirements and motivations of MOOC learners, curriculum designers and instructors will be better able to comprehend the reasons why people participate in and achieve better results from MOOCs. Understanding what drives students to take MOOCs allows teachers to create more successful, interesting, and relevant courses. This could entail adding components like social interaction, gamification, and practical applications. For students to feel appreciated and respected, a welcoming and inclusive learning environment must also be established.

To foster inclusivity and guarantee that every learner has the chance to thrive in MOOCs, the research will guide the creation of efficient educational interventions that best engage various learner types and offer assistance to those with poor engagement patterns. Personalized feedback, adaptive learning tools, and focused support services are a few examples of these approaches. Teachers can enhance engagement and foster positive learning outcomes by customizing interventions to meet the unique requirements of various students.

Research Objectives

- To evaluate the degree of knowledge that students have acquired after finishing a Coursera course.
- To evaluate the impact of Coursera training on participants' skill development.
- To analyze the career outcomes of learners who have completed Coursera courses.
- To identify factors that influence the effectiveness of online training programs on Coursera.

Research Questions

- How effective are Coursera programs in improving knowledge and skills among learners?
- What is the relationship between course completion and career advancement for participants?
- What learner characteristics (e.g., age, educational background, prior experience) influence the effectiveness of Coursera courses?
- What are the perceptions of learners regarding the quality and relevance of Coursera training programs?

Literature Review

Theoretical Framework

The research will be grounded in Adult Learning Theory (Andragogy) and the Kirkpatrick Model of Training Evaluation.

- Adult Learning Theory emphasizes the importance of self-directed learning and the need for practical applications of knowledge.
- The Kirkpatrick Model provides a structured approach to evaluating the effectiveness of training programs through four levels: Reaction, Learning, Behavior, and Results.

Massive Open Online Courses (MOOCs)

The term Massive Open Online Courses, or MOOCs, was coined by Stephen Downes and George Siemens in 2013 to refer to a learning platform in which students can participate from anywhere if they have a device with Internet access. Kim (2016) added the following to the MOOC's function: "MOOCs are new types of e-learning class, which consists of short video lectures, computer-graded tests, and online discussion forums." MOOCs were first introduced in 2008 and have since become a popular educational tool. MOOCs have played an integral part in education as they have provided students with a wide array of online courses (Johnson et al., 2016). The rich diversity of courses can provide learners with various skills and

knowledge in different fields, which might equip them with future skills such as focus and openness to novelty, value creation, and effective communication that are needed for their careers (Nguyen, 2022) .

Students most frequently report that their preference for online courses is highly connected with course flexibility in studies on Internet based courses to date (Harasim, 1990). Students can participate in Internet-based courses at any time and from any location because to the time and location freedom provided by Internet technology.The flexibility is especially appealing to the typical continuing education customer, who has had to balance a growing amount of employment, family, and business related travel during the 1990s (Clarke, 1999; Greco, 1999).

The measures for these items were created by translating theoretical perspectives on these dimensions in videoconferencing formats (Thach & Murphy, 1995) to the Internet-based environment because there are not many accurate and reliable tools to evaluate students' attitudes toward flexibility.

In Pakistan, the adoption of MOOCs has been influenced by the increasing need for accessible and affordable education, coupled with advancements in technology and internet connectivity. The COVID-19 pandemic further accelerated the adoption of online learning platforms, including MOOCs, as educational institutions sought to ensure continuity of learning during lockdowns and social distancing measures (Chaveesuk et al., 2022) . This shift has highlighted both the potential and the challenges of integrating MOOCs into the Pakistani education system.

Definition and Evolution of MOOCs

Massive Open Online Courses (MOOCs) are defined as open-access, video-based instructional platforms designed for a high volume of participants (Baturay, 2015) . This accessibility is a defining characteristic, distinguishing MOOCs from traditional, closed-enrollment educational models. The "massive" aspect refers not only to the potential number of enrollees but also to the scale of resources and interactions facilitated through these platforms. MOOCs leverage technology to deliver educational content to learners across the globe, breaking down geographical barriers that traditionally limited access to higher education. The open nature of MOOCs typically means that anyone with an internet connection can enroll in a course, regardless of their prior educational background or institutional affiliation.

MOOCs have emerged as a prominent trend in higher education, offering flexibility in time and place (Baturay, 2015) . This flexibility is a key factor in their widespread adoption, as learners can access course materials and participate in activities at their own pace and from any location with an internet connection. This is particularly beneficial for individuals who may have work or family commitments that make it difficult to attend traditional on-campus courses. The asynchronous nature of many MOOC components, such as video lectures and discussion forums, allows learners to engage with the material at times that are most convenient for them.

The effectiveness of MOOCs has been widely debated since their emergence in 2012 (Ruby et al., n.d.). This debate often centers on completion rates, which tend to be lower than those of traditional courses. Critics argue that the lack of face-to-face interaction and the absence of a structured learning environment can lead to decreased motivation and engagement among learners. However, proponents of MOOCs emphasize the value of access and the opportunity for individuals to learn new skills and knowledge, regardless of whether they complete the entire course. The debate also encompasses the pedagogical approaches used in MOOCs, with some arguing for more interactive and personalized learning experiences to enhance effectiveness.

Global Impact and Accessibility

MOOCs challenge traditional education paradigms by offering accessible and flexible learning opportunities on a global scale (Moses Anson, 2024) . The way that education is provided and accessed will be significantly impacted by this upending of conventional methods, especially in areas with scarce educational resources. MOOCs enable people to pursue lifelong learning by democratizing access to education by eliminating obstacles to enrollment, such as exorbitant tuition costs and regional restrictions. As students from many nations and backgrounds gather to exchange ideas and expertise, MOOCs' worldwide reach also promotes cross-cultural cooperation and exchange.

Students may study more efficiently with ICT and e-learning resources, which can also help teachers in this technologically advanced age (Asad & Churri, 2021). However, measuring the success of training is difficult and is arguably one of the most overlooked parts of capacity development initiatives (Hayes et al., 2016).

Because MOOCs offer free or inexpensive education to anybody with an internet connection, they have the potential to close the gap in educational attainment. This is especially important

in developing nations, where infrastructure, poverty, and remoteness can all restrict access to high-quality education. MOOCs can aid in addressing these inequalities and fostering social mobility by providing reasonably priced learning options. But it is crucial to recognize that not everyone has access to the internet, and digital gaps can still make it difficult for people to take part in MOOCs.

Compared to traditional venues, MOOCs draw a varied range of learners with varying goals, levels of expertise, and skill sets. For educators and course designers, this diversity offers both benefits and difficulties. On the one hand, because students bring their distinct experiences and backgrounds to the classroom, it facilitates a lively exchange of ideas and viewpoints. However, in order to meet the diverse needs and skill levels of their pupils, teachers must modify their teaching methodologies and evaluation techniques. Understanding the characteristics and motivations of MOOC learners is essential for designing effective

MOOCs in Developing Countries like Pakistan

Pakistan's educational system has a number of difficulties, such as unequal educational chances for various socioeconomic classes and restricted access to high-quality education, especially in rural areas. Online learning platforms like MOOCs are an alluring alternative to traditional educational institutions, which frequently find it difficult to satisfy the rising demand for higher education (Ahmed et al., 2017a). The objective of democratizing education and encouraging lifelong learning is in line with MOOCs' capacity to reach a sizable student body, irrespective of their location or socioeconomic status.

Because MOOCs provide reasonably priced distance learning, they can enhance education in places like Indonesia. The traditional educational system in many emerging nations might not have enough resources or be able to satisfy the rising demand for higher education. MOOCs offer an affordable and scalable means of expanding access to high-quality learning resources and enhancing current educational offerings. MOOC providers can customize their courses to fit the unique requirements and preferences of students in these areas by collaborating with regional institutions and organizations.

Equal access to high-quality internet, however, is still a major issue in poorer nations. The ability of MOOCs to reach underserved communities may be limited by the digital divide, which is defined by differences in access to technology and internet connectivity. This gap can be exacerbated by elements including poverty, a lack of infrastructure, and remote location. A multifaceted strategy is needed to address these issues, one that includes funding

internet infrastructure, supplying reasonably priced devices, and creating digital literacy initiatives.

Digital platforms have been used by Asian and Pacific institutions to continue online education in times of crisis. The significance of online learning in maintaining educational continuity during disruptive times was brought to light by the COVID-19 pandemic. MOOCs and other digital platforms have been used by numerous schools and universities in the area to promote student learning and provide courses remotely. Online learning technologies have been adopted more quickly as a result of this experience, and their promise to improve educational access and flexibility has become more widely recognized.

MOOCs During and After the COVID-19 Pandemic

Shift to Online Learning

During the COVID-19 epidemic, higher education institutions maintained online learning with the use of digital technologies. Many universities were compelled by the COVID-19 outbreak to switch to online instruction in order to protect their employees and students. Higher education has adopted digital platforms and technologies more quickly as a result of the shift to online learning, and their potential to improve educational access and flexibility has become more widely recognized.

During the epidemic, MOOCs were an essential remedy for the difficulties associated with distant learning. During the pandemic, MOOCs offered a scalable and easily accessible way to give online education. They made it possible for educational institutions to swiftly switch to online instruction and give students access to top-notch course materials and learning exercises. During the epidemic, MOOCs were also a great tool for students looking to further their education or learn new skills. Since the outbreak, MOOCs offered online have proliferated. Online MOOCs have become much more accessible and well-liked as a result of the epidemic. Numerous schools and institutions have teamed up with MOOC providers to supply their students with online courses. Because of this, MOOCs are now more widely available and reasonably priced than before.

Impact on Student Experience and Achievement

Family and personal background were among the many interconnected factors that affected student accomplishment. The significance of elements like family and personal history in affecting student achievement has been brought to light by the pandemic. Due to their limited access to technology, lack of digital literacy, and insufficient family and community support,

students from underprivileged backgrounds would have had a harder time adjusting to online learning. A comprehensive strategy that involves financial aid, training in digital literacy, and the establishment of encouraging learning environments is needed to address these inequities. Improvements in knowledge and skills acquired throughout the pandemic were found to positively correlate with satisfaction. Knowledge and skill gains were more likely to be reported by students who were happy with their online education. This implies that encouraging student accomplishment requires establishing a supportive and stimulating online learning environment. The caliber of the course contents, the degree of instructor support, and the opportunity for peer engagement are some of the elements that may influence student happiness.

Distance learning presented difficulties for vulnerable pupils, impacting both their social and academic lives. During the pandemic, vulnerable students—such as those from low-income families, students with disabilities, and English language learners—may have had difficulty adjusting to distant learning. These difficulties can have included social isolation, a lack of digital skills, restricted access to technology, and trouble finding support resources. A focused strategy that incorporates resources, accommodations, and tailored support is needed to address these issues.

Future of Online Education

Online learning is likely to remain a part of the educational experience post-pandemic. The pandemic has demonstrated the potential of online# Literature Review Outline: MOOCs, Learner Engagement, Digital Literacy, and Course Effectiveness

Digital Literacy

In the technology acceptance model (TAM), beliefs that technology is useful and easy to use influence the users' attitudes toward the technology and thereby their decision to adopt the technology. This model is grounded in the information technology literature and has been found to be a valid predictor of the use of computer software (Bagozzi, Davis, & Warshaw, 1992) and the World Wide Web (Atkinson & Kydd, 1997). In the context of Internet-based courses, this suggests that perceived usefulness and the ease of use of the delivery medium may affect students' attitudes toward their course experience and, consequently, affect their decision to take other Internet-based courses in the future. There are eight proposed items to measure perceived usefulness and perceived ease of use of a technology (each of the two variables in the TAM); these have been used extensively in prior studies (Atkinson & Kydd,

1997; Davis, 1989; Davis, Bagozzi, & Warshaw, 1989).

Defining Digital Literacy

To navigate and engage in the digital world, one must be digitally literate. It includes a variety of skills, such as the capacity to communicate and work together online, as well as the ability to obtain, assess, and apply digital information efficiently. For MOOC participants to successfully interact with the course material, take part in online conversations, and finish assignments, digital literacy is essential.

Pakistani students' levels of digital literacy vary greatly, with notable differences across urban and rural regions, as well as between age groups and socioeconomic backgrounds. Many students might not have the digital abilities needed to get the most out of MOOCs, especially those from underprivileged backgrounds. This digital divide has the potential to worsen already-existing disparities in educational access and reduce MOOCs' potential as a democratizing instrument.

In order to overcome this obstacle, MOOC programs must incorporate instruction in digital literacy and give students continual assistance and tools to advance their digital literacy. This could entail setting up help desks or support forums where students can ask problems and get answers, giving them access to online tutorials and resources, and teaching beginning modules on fundamental computer skills.

To successfully navigate and use digital technologies, one must be digitally literate. Digital technologies are used in every part of life in the modern world, from communication and entertainment to education and employment. Possessing the abilities and information required to use these technologies sensibly and successfully is known as digital literacy. This entails comprehending the wider ramifications of digital technology for society and culture in addition to being able to operate certain software or gadgets.

Understanding technology, utilizing them effectively and safely, and assessing digital tools are all components of digital literacy. This includes a broad range of abilities, such as the capacity to locate and assess information on the internet, communicate successfully through digital media, produce and distribute digital content, and defend oneself against online threats like fraud and cyberbullying. It also entails being aware of the moral and legal concerns surrounding digital technology, including those pertaining to copyright, privacy, and intellectual property.

Employees who possess digital literacy are better able to comprehend technology and how

they are used. As businesses embrace new technology to increase productivity and efficiency, digital literacy is becoming more and more crucial for workers across all industries. To carry out their duties and support the organization's success, employees must be proficient in using these technologies. Software for data analysis, communication, project management, and customer support may be used in this situation.

Impact on Online Learning

Using digital technologies effectively is essential for success in online learning settings. Digital tools including online materials, video conferencing software, and learning management systems are essential to online learning. In order to access course materials, engage in activities, and interact with peers and instructors, learners must be proficient in using these technologies. Students may find it difficult to keep up with the course and may grow irritated or disheartened if they lack the necessary digital abilities.

Inadequate digital skills in adult learners can lead to anxiety, reduced interest, and cognitive overload. When students are overwhelmed by the volume of material or the difficulty of the tasks they are required to complete, cognitive overload occurs. Because they feel unprepared for the demands of the course, students may become less engaged and more anxious as a result. These difficulties can be lessened and learner success can be encouraged by offering assistance and instruction in digital skills.

Student success rates are greater at schools that provide digital interventions like help desk services and orientation seminars. By ensuring that all students have the abilities and information necessary to thrive in online learning environments, these interventions can aid in closing the digital divide. While help desk services can offer technical support and troubleshooting assistance, orientation events can give students an overview of the digital tools and resources they will be using in the course.

Digital Literacy in the Context of Pakistani Learners

Support for smartphone users, such as free or inexpensive data plans, is necessary to improve digital literacy. Smartphones are the main way that people in many developing nations access the internet, especially those with modest incomes. Increasing access to online learning resources and encouraging digital literacy among smartphone users can be achieved by offering reasonably priced data plans. This can be accomplished by offering free Wi-Fi in public areas, forming alliances with cellular providers, or providing government subsidies.

For low-SES kids, addressing inequalities and guaranteeing an equal quality education are

crucial. Students from lower socioeconomic backgrounds may encounter a number of obstacles that could make it more difficult for them to thrive in online learning settings. These difficulties could include a lack of digital skills, restricted access to technology, and insufficient community and family assistance. A comprehensive strategy that involves financial aid, training in digital literacy, and the establishment of encouraging learning environments is needed to address these inequities.

To support students from diverse backgrounds, faculty training and digital literacy assessments are required. Tests of digital literacy can assist in identifying students who might want more assistance in honing their digital skills. Faculty training can give teachers the information and abilities they need to educate students from a variety of backgrounds and successfully use digital technologies into their lessons. This could entail offering instruction on how to utilize particular programs or equipment in addition to tactics for advancing digital inclusion and equity.

Learner Engagement

Defining Learner Engagement

Maintaining student engagement is crucial for MOOCs to have a broad educational impact. Without active and sustained engagement, learners are more likely to drop out of courses and fail to achieve their learning goals. Engagement is not simply about passively consuming content; it involves actively participating in learning activities, interacting with peers and instructors, and reflecting on one's own learning process. Creating a sense of community and fostering a supportive learning environment are key to promoting engagement in MOOCs. Learner engagement includes online, offline, and integrated activities. Online engagement refers to activities such as watching video lectures, participating in discussion forums, completing quizzes and assignments, and interacting with online resources. Offline engagement may involve activities such as reading textbooks, working on projects, and collaborating with peers in person. Integrated activities combine online and offline elements, such as using online tools to support face-to-face discussions or completing online assignments based on real-world experiences. A holistic approach to engagement recognizes the importance of both online and offline activities in supporting student learning.

There are behavioral, cognitive, emotional, and social aspects to MOOC participation. The term "behavioural engagement" describes the visible acts and behaviours of students, such as their completion of assignments and involvement in online activities. The mental

work and techniques that students employ to comprehend information and resolve issues are referred to as cognitive engagement. Learners' sentiments and attitudes toward the course, the teacher, and their peers are all included in emotional engagement. The contacts and bonds that students form with one another in the classroom are referred to as social engagement. All four aspects must be taken into account for a thorough understanding of engagement.

Factors Influencing Engagement

Learner characteristics like motivation and involvement have an impact on engagement. Motivation is a key component in determining engagement since intrinsically motivated learners are more likely to actively participate in learning activities and persevere through challenges. Interaction with the course materials and other students can enhance engagement by creating a more vibrant and captivating learning environment. Understanding the characteristics of learners that promote engagement is essential to creating successful MOOCs.

Intrinsic motivation is primarily responsible for sustaining student engagement throughout MOOC participation. When students are intrinsically motivated, they engage in learning activities because they enjoy them or find them fascinating rather than because they want other people's approval or rewards. Promoting intrinsic motivation requires creating courses that are relevant to students' interests, providing opportunities for autonomy and self-direction, and offering them challenging but manageable assignments.

External events and causes also have a big influence on MOOC participation. These components can include the design of the course, the quality of the instructional materials, the availability of support and feedback, and the social climate of the classroom. Establishing a well-organized and supportive learning environment can boost student engagement and reduce the negative impacts of external factors.

Strategies for Enhancing Engagement

Increased learner engagement and persistence are highly correlated with personalized learning and interactive material. Customizing the learning process to each learner's unique requirements and preferences is known as personalized learning. This could entail letting students select from a range of learning materials, offering adaptive feedback, and creating personalized learning pathways. Games, simulations, and interactive movies are examples of interactive material that can improve engagement by enlivening and invigorating the learning process.

In MOOCs, formative assessment and feedback techniques can greatly increase student participation. Giving students feedback on their progress during the course, as opposed to only at the conclusion, is known as formative assessment. This comments can encourage students to keep learning and help them pinpoint areas in which they need to improve. Timely, precise, and actionable, effective feedback emphasizes the learning process over the final product.

Comprehending the motivations behind people's engagement might be beneficial for educators and curriculum designers. Instructors can create more relevant and interesting courses by knowing what drives students to take MOOCs. This could entail adding components like social interaction, gamification, and practical applications. In order for students to feel appreciated and respected, a welcoming and inclusive learning environment must also be established.

Challenges and Barriers in MOOCs

Completion Rates and Attrition

In MOOCs, high dropout rates—typically around 90%—present a serious problem. This indicates that very few students who sign up for a MOOC go on to finish the course. A number of variables, such as student characteristics, course design, and the learning environment, might affect dropout rates. A multifaceted strategy is needed to address this issue, one that includes enhancing student participation, offering sufficient assistance, and establishing a more inclusive and friendly learning environment.

One of the main issues MOOCs encounter is low completion rates. Because of this issue, some detractors have questioned whether MOOCs are a good way to teach. It is crucial to remember that MOOC performance is measured in ways other than completion rates. Many students may sign up for a MOOC in order to learn a particular skill or to investigate a new subject; they may not be interested in finishing the course in its entirety.

Although completion rates vary, the median is approximately 12.6%. This indicates that the completion rates of half of all MOOCs are less than 12.6%, while the completion rates of the other half are higher. The target audience, the length of the course, the subject matter, and the assessment techniques can all affect completion rates. Designing successful MOOCs requires an understanding of the factors that affect completion rates.

Issues of Engagement and Interaction

One of the main obstacles to participation is a lack of interaction with teachers. The teacher in many MOOCs is largely in charge of giving lectures and producing the course materials, with little opportunity for one-on-one engagement with students. Learner engagement may suffer as a result of feeling alone and not receiving individualized help. Enhancing engagement can be achieved by looking for methods to improve communication between teachers and students, such as through discussion boards, online office hours, and tailored feedback.

Response delays and social isolation might have a detrimental effect on learners' intentions to stick with MOOCs. For students who do not actively participate in online communities or do not have a strong social network, MOOCs might be a lonely learning experience. Delays in responses from peers or teachers can sometimes be upsetting and disappointing, especially when students are asking for assistance with a difficult work. These difficulties can be lessened by providing chances for social contact and making sure that prompt responses are given.

It can be challenging to maintain single effort, which suggests that motivated students are needed. Because there is frequently minimal outside pressure to finish the course, MOOCs need students to be self-directed and motivated. Lack of intrinsic motivation can make it difficult for learners to stay on course and ultimately lead to dropout. Students' motivation can be maintained and their chances of success increased by giving them clear objectives, frequent feedback, and social engagement opportunities.

Technical and Logistical Challenges

Participation in online learning may be hampered by problems with internet connectivity. Participating in MOOCs can be challenging for students in many regions of the world due to restricted or inconsistent internet connectivity. This is especially true for students in rural or poor nations. Investments in internet infrastructure and the availability of reasonably priced internet access are necessary to meet this problem.

Limitations in digital literacy may hinder participation. It is possible that many students lack the digital literacy needed to engage with MOOCs. This could involve fundamental abilities like computer use, internet navigation, and the production and distribution of digital content. Training in digital literacy can assist students in overcoming this obstacle and enhancing their participation in online courses.

MOOC participants frequently struggle with time management. Students enrolled in MOOCs

must manage their own time and juggle their study with obligations to their families and jobs. For students who are unfamiliar with online learning or who have little time management skills, this might be especially difficult. Giving students time management advice and resources can help them get past this obstacle and excel in MOOCs.

Effectiveness of Coursera Courses

Metrics for Measuring Effectiveness

Perceived learning outcomes, learner engagement, and completion rates are indicators of effectiveness. A quantifiable indicator of how many students successfully complete a course is provided by completion rates. Numerous measures, including participation in discussion forums, assignment submission, and interaction with course materials, can be used to evaluate learner engagement. Learners' subjective evaluations of the attitudes, abilities, and information they have acquired from the course are reflected in perceived learning outcomes. All three of these criteria should be taken into account in a thorough efficacy review.

MOOCs, which promote learning through information sharing, have the potential to impact academic performance. MOOCs give students access to a wealth of knowledge and materials that can improve their academic achievement. A more successful learning process might also result from the capacity to cooperate and exchange information with peers. It is crucial to remember, nevertheless, that the effect of MOOCs on academic achievement might differ based on the student, the course design, and the delivery environment.

Learners' notions can be used to define success, taking into account their agency to investigate and interact with restricted implications. Success in MOOCs is not exclusively based on grades or completion rates. Students may enroll in a course for a variety of reasons, and they may have various definitions of success. While some students may be pursuing formal certification or job development, others may just like to learn a new skill or explore a new topic. Assessing the success of MOOCs requires an understanding of each learner's unique objectives and viewpoints.

Since one of the most common ways to improve individual performance, organization al productivity, and regional growth is via training, assessing the efficacy of training is a cruci al organizational component for any future remedial measures (Galvao, Marques, Ferreira, & Braga, 2020, Sitzmann and Weinhardt, 2018; Paul, Tripathi, Burman, et al., 2016; McNamara et al., 2012).

Factors Influencing Course Completion

Completion rates are impacted by course length; longer courses have lower rates. This could be the result of lengthier courses being more difficult to finish and requiring a larger time commitment. Over time, learners may also become less motivated, especially if the course is uninteresting or unrelated to their hobbies. Enhancing completion rates can be achieved by creating courses that are succinct, targeted, and interesting.

Types of assessments that affect completion rates include auto-grading. Courses that use a range of assessment techniques, including peer evaluation, projects, and essays, may have higher completion rates than those that only use auto-graded tests. Auto-graded tests might not effectively evaluate higher-order thinking skills and might not give students enough feedback on their progress. A more thorough and significant learning experience can be offered to students by incorporating a range of evaluation techniques.

In order to achieve student involvement, early engagement within the first few weeks is essential. Students are more likely to stick with and finish the course if they are actively participating in it throughout the first few weeks. This could be as a result of their routine, relationships with other students, and growing dedication to the subject. A friendly and educational introduction to the course, chances for students to introduce themselves, and the assignment of interesting and pertinent tasks over the first few weeks are some strategies for encouraging early involvement.

Perceived Benefits and Outcomes

MOOCs provide flexible learning, a wide range of subjects and resources, and excellent academic assistance. Because of its versatility and adaptability, MOOCs are a desirable choice for students looking to increase their knowledge and proficiency. More effective learning might also result from the availability of top-notch course materials and academic support. But it is crucial to remember that MOOC quality can vary greatly, so students should thoroughly consider courses before signing up.

Benefits including gaining credentials, expanding their knowledge, and strengthening their personal growth are mentioned by learners. Obtaining a certification can give students a document that shows prospective employers their expertise and abilities. Gaining more knowledge and developing oneself can boost one's self-esteem, confidence, and general well-being. Those looking to further their careers or pursue lifetime learning objectives may find these advantages very beneficial. Positive results include participants' improved capacity for

self-management. Goal-setting, time management, and self-control are examples of self-management abilities that are critical for success in both academic and professional contexts. Because MOOCs require students to take charge of their own education and growth, they can give them the chance to hone these abilities. It is crucial to remember that not all students will gain the same amount from MOOCs, and others might need more help honing their self-management techniques.

According to Sitzmann and Weinhardt (2018), effectiveness is the degree to which a training program or course yields the desired outcomes. However, the outcomes differ according to the training programs' goals. In the twenty-first century, online learning has become more popular, especially after the COVID-19 pandemic. Massive Open Online Courses (MOOCs), which are being provided by more and more colleges worldwide, are a popular trend in this field. Students in these courses mostly study on their own and interact with the resources that are supplied. To improve their learning experiences and results, it is therefore essential to ascertain how satisfied they are with these courses (Nguyen, 2022).

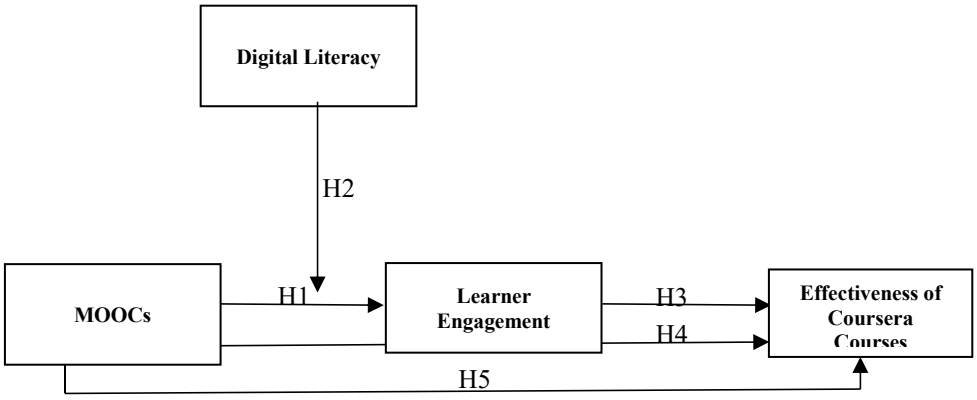
For a variety of reasons, even those who live in developed parts of the world cannot afford to attend universities, especially prestigious ones (Tobin, 2015). Some educators came up with the brilliant idea of massive open online courses, or MOOCs, to provide free, valuable education to everyone on the planet. The term MOOC was first coined in 2008 by Dave Cormier of the University of Prince Edward Island (Miguel et al., 2013). MOOCs are increasingly being viewed as an opportunity by millions of people who want free or inexpensive access to higher education (Ahmed et al., 2017b).

Adopting the Massive Open Online Courses (MOOC) platform is another method of online learning that should be viewed as an addition to virtual classrooms rather than as a substitute for them. Students enrolled in these courses receive educational packages that include pre-made quizzes, pre-recorded films, and pre-made materials and questions. Stated differently, individuals can access the classes virtually at any time and finish them at their own pace. Over the past ten years, a rising amount of research has been conducted on MOOCs (e.g., Al-Rahmi et al., 2019; Luo and Ye, 2021; Chong et al., 2022; Ding and Shen, 2022). One of the most well-known MOOCs is Coursera, a platform with over 107 million users globally that offers thousands of courses in a variety of subjects, including business, technology, linguistics, psychology, research, and health, created by over 275 top universities (About Coursera, 2022).

Hypotheses

- **H1:** The use of Coursera MOOCs positively influences Learner Engagement among Pakistani users.
- **H2:** Digital literacy moderates the relationship between MOOCs participation and learner engagement, such that the relationship is stronger for learners with higher digital literacy.
- **H3:** Learner Engagement positively impacts the Effectiveness of Coursera online courses in Pakistan.
- **H4:** The overall effect of Coursera MOOCs on the Effectiveness of online courses in Pakistan is significantly mediated by learner engagement levels.
- **H5:** Learner Engagement mediates the relationship between Coursera MOOCs and the Effectiveness of online courses in Pakistan.

Research Model



Research Design

Unit of Analysis

The Unit of Analysis for this research study was individuals who have completed Coursera online courses.

Measures

Measuring scale for the different variables is adopted from the different sources. 27 Items scale developed by (Albelbisi, 2020) adopted to measure the MOOCs. 12 Items scale developed by (Ruiqi Deng, 2020) adopted to measure the Learner Engagement in MOOCs. 20 Items scale developed by (Avinç & Doğan, 2024) adopted to measure the Digital Literacy of the participants.

Data Collection Method

Data for this study was collected through the administration of a research questionnaire to the selected sample of participants who have completed online course of Coursera. The surveys include Likert-scale questions and open-ended responses.

Population

All the Participants who have completed online courses from Coursera through the Higher Education Commission's Digital Learning and Skills Enrichment Initiative (DLSEI).

Data Analysis

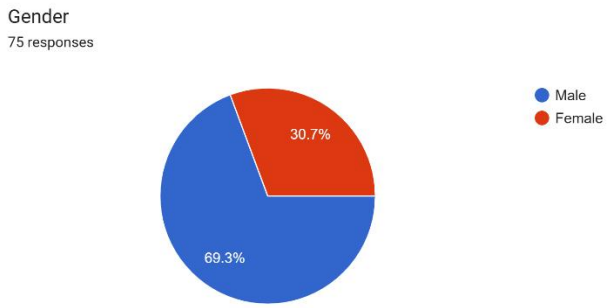
Analysis 1: Frequencies of Demographic variables

Statistics

		Gender of the Respondent	Qualification
N	Valid	74	74
	Missing	0	0

Gender of the Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	52	70.3	70.3	70.3
	Female	22	29.7	29.7	100.0
	Total	74	100.0	100.0	



Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12 Years Education	9	12.2	12.2	12.2
	14 Years Education	11	14.9	14.9	27.0
	16 Years Education	31	41.9	41.9	68.9
	18 Years Education	20	27.0	27.0	95.9
	20 Years Education	3	4.1	4.1	100.0
	Total	74	100.0	100.0	

Analysis 3: Reliability Analysis

Reliability Statistics

Cronbach's Alpha	N of Items
.946	68

The reliability of the measurement instrument was assessed using Cronbach's alpha to ensure consistency across the items. The analysis yielded a high alpha coefficient of **0.946**, indicating excellent internal consistency among the survey items. This suggests that the items reliably measure the constructs of MOOCs, learner engagement, digital literacy, and course effectiveness. The strong reliability score enhances confidence in the stability and dependability of the data collected from the 74 respondents, thereby supporting the validity of subsequent analyses within this study.

Analysis 4: Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
MOOCs	74	2.04	4.93	4.0262	.48875	-1.037	.279	3.440	.552
DLS	74	3.06	5.56	4.4688	.46875	.079	.279	.476	.552
LES	74	2.83	5.00	3.9403	.48855	.418	.279	.006	.552
EOCCs	74	2.00	5.00	4.1441	.47167	-1.152	.279	4.538	.552
Valid N (listwise)	74								

Description

To gain an initial understanding of the data collected from 74 Coursera users in Pakistan, descriptive statistics were computed for all four key variables: MOOCs usage, Digital Literacy Skills (DLS), Learner Engagement Scores (LES), and Effectiveness of Online Courses (EOCCs).

Central Tendency and Dispersion

MOOCs Usage had a mean score of 4.03 (SD = 0.49), with responses ranging from 2.04 to 4.93. This relatively high mean suggests that participants generally reported a high level of engagement with MOOCs.

Digital Literacy Skills (DLS) yielded the highest mean of 4.47 (SD = 0.47), indicating that most respondents considered themselves digitally proficient.

Learner Engagement Scores (LES) had a slightly lower mean of 3.94 (SD = 0.49), reflecting moderate levels of cognitive and behavioral engagement among participants.

Effectiveness of Online Courses (EOCCs) also scored relatively high, with a mean of 4.14 (SD = 0.47), suggesting that respondents generally perceive MOOCs to be effective in delivering learning outcomes.

Distribution Analysis

The skewness values for MOOCs (-1.037) and EOCCs (-1.152) indicate moderate negative skewness, meaning responses were slightly concentrated toward the higher end of the scale (positive perceptions). In contrast, DLS (0.079) and LES (0.418) were slightly positively skewed, indicating more evenly distributed or modestly lower scores in engagement and literacy.

The kurtosis values for MOOCs (3.44) and EOCCs (4.538) are above the normal range (close to 0), suggesting a leptokurtic distribution—responses were more peaked, indicating high agreement among respondents. DLS (0.476) and LES (0.006) showed near-normal kurtosis, suggesting a more typical distribution shape.

Interpretation

Overall, the descriptive statistics demonstrate that the study sample consists of participants who:

- Are digitally literate,
- Are moderately to highly engaged in MOOCs,

And largely perceive MOOCs as effective educational tools.

These trends provide a solid foundation for the regression and correlation analyses conducted later in the study. The distribution metrics also suggest the data is sufficiently normal for parametric testing, supporting the use of Pearson correlations and linear regression.

Analysis 5: Correlations

Correlations

		MOOCs	DLS	LES	EOCCs
MOOCs	Pearson Correlation	1	.598**	.318**	.635**
	Sig. (2-tailed)		.000	.006	.000
	N	74	74	74	74
DLS	Pearson Correlation	.598**	1	.413**	.396**
	Sig. (2-tailed)	.000		.000	.000
	N	74	74	74	74
LES	Pearson Correlation	.318**	.413**	1	.330**
	Sig. (2-tailed)	.006	.000		.004
	N	74	74	74	74
EOCCs	Pearson Correlation	.635**	.396**	.330**	1
	Sig. (2-tailed)	.000	.000	.004	
	N	74	74	74	74

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

The Pearson correlation analysis revealed several notable relationships among the variables. Firstly, a moderate positive correlation was found between MOOCs and the Effectiveness of Courses (EOCC), with a coefficient of 0.635, indicating that increased engagement with MOOCs is associated with higher perceptions of course effectiveness among respondents. Additionally, MOOCs demonstrated a strong positive correlation with Digital Literacy (r = 0.598), suggesting that users who participate in MOOCs tend to possess higher levels of digital literacy. The correlation between MOOCs and Learner Engagement was moderate (r = 0.318), implying a positive association, though less pronounced, between MOOC participation and active learner engagement. Lastly, Learner Engagement showed a modest positive correlation with EOCC (r = 0.330), indicating that greater engagement may contribute to perceptions of course effectiveness. These correlations underscore the interconnectedness of these variables.

Discussion

To further explore the relationships among the variables in this study — MOOCs participation, Digital Literacy Skills (DLS), Learner Engagement Scores (LES), and Effectiveness of Online Courses (EOCCs) — Pearson correlation coefficients were computed using data from 74 respondents.

The results reveal several significant relationships, all at the 0.01 level (2-tailed):

MOOCs and EOCCs

A strong positive correlation ($r = 0.635$, $p < 0.01$) was found between MOOCs participation

and the perceived effectiveness of online courses. This suggests that greater engagement with MOOCs is significantly associated with higher perceived effectiveness, supporting the central hypothesis of this study.

MOOCs and Digital Literacy (DLS)

MOOCs also showed a moderately strong positive correlation with digital literacy ($r = 0.598$, $p < 0.01$), indicating that individuals more involved in MOOCs tend to report higher levels of digital literacy. This relationship provides a foundation for considering DLS as a moderating variable, potentially influencing how MOOCs affect learning outcomes.

MOOCs and Learner Engagement (LES)

A weaker but still statistically significant correlation was observed between MOOCs and learner engagement ($r = 0.318$, $p = 0.006$). This suggests that increased MOOCs usage is modestly related to higher levels of engagement, lending initial support for the role of LES as a mediating variable.

Digital Literacy and EOCCs

A moderate positive correlation was found between digital literacy and course effectiveness ($r = 0.396$, $p < 0.01$), indicating that individuals with higher digital skills perceive MOOCs to be more effective. This supports the theorized role of digital literacy as a moderator in this study.

Learner Engagement and EOCCs

Learner engagement also correlated positively with perceived course effectiveness ($r = 0.330$, $p = 0.004$). This confirms that more engaged learners tend to evaluate MOOCs more favorably, supporting engagement as a potential mediating factor.

DLS and LES

A moderate correlation ($r = 0.413$, $p < 0.01$) between digital literacy and engagement suggests that digital proficiency may enhance learner participation and motivation.

Interpretation

These findings provide empirical support for the conceptual model underpinning this study. The positive and significant associations among MOOCs, digital literacy, learner engagement, and course effectiveness affirm the relevance of these constructs in understanding online learning experiences in the Pakistani context. These results justify further testing through moderation and mediation analyses, as digital literacy and engagement appear to play meaningful roles in shaping the effectiveness of MOOCs.

Analysis 6: Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.635[a]	.403	.395	.36686

a. Predictors: (Constant), MOOCs

As indicated in the Model Summary, we can see that the R Square Value is **0.403**, which means that our independent variable i.e. MOOCs causes **40.3%** change in the dependent variable i.e. Effectiveness of Coursera Online courses.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.550	1	6.550	48.667	.000[b]
	Residual	9.690	72	.135		
	Total	16.240	73			

a. Dependent Variable: EOCCs

b. Predictors: (Constant), MOOCs

Anova table results show that **p-value** is **0.000** which is less than **0.05**, hence we can say that there is a significant relationship between the independent variable MOOCs and the Dependent Variable Effectiveness of Coursera Courses.

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	1.677	.356		4.706	.000	.966	2.387
	MOOCs	.613	.088	.635	6.976	.000	.438	.788

a. Dependent Variable: EOCCs

As indicated, the beta value is **0.635**, which means that the change in Independent Variable (MOOCs) by one unit will bring about the change in the Dependent Variable (Effectiveness of Coursera Courses) by 0.635 units, holding all other factors constant.

Furthermore, as the beta value is positive 0.635, which indicates that Positive relationship between MOOCs and the Effectiveness of the Coursera Courses is positive.

Coefficient Correlations[a]

Model			MOOCs
1	Correlations	MOOCs	1.000
	Covariances	MOOCs	.008

a. Dependent Variable: EOCCs

Discussion

To examine the impact of Massive Open Online Courses (MOOCs) on the perceived effectiveness of online courses among Coursera users in Pakistan, a simple linear regression analysis was conducted.

The regression model yielded a moderately strong positive correlation, as evidenced by an R value of 0.635, indicating that MOOCs participation explains a substantial portion of the variance in course effectiveness. The R Square value of 0.403 reveals that approximately 40.3% of the variance in perceived course effectiveness can be explained by the respondents' involvement in MOOCs. The Adjusted R Square value of 0.395 confirms the model's robustness after adjusting for the number of predictors and sample size.

The ANOVA table ($F(1, 72) = 48.667$, $p < 0.001$) demonstrates that the regression model is statistically significant, indicating that the predictor (MOOCs participation) significantly explains the variation in course effectiveness ratings among participants.

Examining the regression coefficients, the unstandardized coefficient ($B = 0.613$, $p < 0.001$) for MOOCs indicates that for every one-unit increase in MOOCs engagement, there is a corresponding 0.613 unit increase in perceived course effectiveness. The confidence interval for this coefficient ranges from 0.438 to 0.788, which does not include zero, reinforcing the statistical significance of the relationship. The standardized beta coefficient ($\beta = 0.635$) further confirms a strong positive relationship between MOOCs participation and perceived effectiveness.

In summary, the results strongly suggest that MOOCs significantly contribute to learners' perceptions of course effectiveness. These findings support the growing body of literature that emphasizes the role of MOOCs in enhancing learners' educational experiences, particularly in developing countries like Pakistan where access to quality education can be limited.

DLS & EOCC

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.396[a]	.157	.145	.43603

a. Predictors: (Constant), DLS

As indicated in the Model Summary, we can see that the R Square Value is **0.157**, which

means that our moderating variable i.e. digital literacy causes **15.7%** change in the dependent variable i.e. Effectiveness of Coursera Online courses.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.551	1	2.551	13.419	.000[b]
	Residual	13.689	72	.190		
	Total	16.240	73			

a. Dependent Variable: EOCCs

b. Predictors: (Constant), DLS

Anova table results show that **p-value** is **0.000** which is less than **0.05**, hence we can say that there is a significant relationship between the Moderating Variable Digital literacy and the Dependent Variable Effectiveness of Coursera Courses.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.362	.489		4.828	.000	1.387	3.337
	DLS	.399	.109	.396	3.663	.000	.182	.616

a. Dependent Variable: EOCCs

Coefficient Correlations[a]

Model			DLS
1	Correlations	DLS	1.000
	Covariances	DLS	.012

a. Dependent Variable: EOCCs

As indicated, the beta value is **0.396**, which means that the change in Moderating Variable (DLS) by one unit will bring about the change in the Dependent Variable (Effectiveness of Coursera Courses) by 0.396 units, holding all other factors constant.

Furthermore, as the beta value is positive 0.396, which indicates that Positive relationship between DLS and the Effectiveness of the Coursera Courses is positive.

Discussion

To examine the potential influence of **Digital Literacy Skills (DLS)** on the **Effectiveness of Online Courses (EOCCs)**, a simple linear regression analysis was conducted. The results demonstrate a **statistically significant and positive relationship** between DLS and EOCCs.

The regression coefficient for DLS was **B = 0.399**, with a **standard error of 0.109**. This indicates that for every one-unit increase in digital literacy, the perceived effectiveness of MOOCs increases by approximately 0.399 units, holding all other factors constant. The **t-value was 3.663**, and the **p-value was .000**, which is highly significant at the 0.01 level. This confirms that the relationship is not due to random chance.

The **95% confidence interval** for the unstandardized coefficient ranges from **0.182 to 0.616**, further supporting the reliability of the positive effect of digital literacy on perceived course effectiveness. The standardized beta value (**β = 0.396**) suggests a moderate effect size.

These findings imply that **digital literacy significantly contributes to how learners evaluate the success and effectiveness of MOOCs**. Participants with higher digital skills are more likely to benefit from and appreciate the content delivery, navigation, and learning experience provided by online courses like those on Coursera.

In the broader context of this study, which explores multiple influencing factors, this result underlines the importance of **digital readiness as a moderating factor**. It suggests that any educational interventions or course design improvements aimed at enhancing the effectiveness of MOOCs in Pakistan should prioritize the digital competence of learners.

Learner Engagement & EOCC

Coefficient Correlations[a]

Model			DLS
1	Correlations	DLS	1.000
	Covariances	DLS	.012

a. Dependent Variable: EOCCs

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.770	1	1.770	8.807	.004[b]
	Residual	14.470	72	.201		
	Total	16.240	73			

a. Dependent Variable: EOCCs

b. Predictors: (Constant), LES

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	2.888	.426		6.774	.000	2.038	3.738
	LES	.319	.107	.330	2.968	.004	.105	.533

a. Dependent Variable: EOCCs

Coefficient Correlations[a]

Model			LES
1	Correlations	LES	1.000
	Covariances	LES	.012

a. Dependent Variable: EOCCs

Discussion

To explore the role of Learner Engagement (LES) as a potential mediator in the relationship between MOOCs and course outcomes, a linear regression analysis was performed using LES as the predictor and EOCCs (Effectiveness of Online Courses) as the outcome variable.

The model summary indicates a moderate positive relationship between LES and EOCCs, with a **correlation coefficient (R) of .330** and **R^2 = .109**, meaning that approximately 10.9% of the variance in course effectiveness can be explained by learner engagement alone. Although this represents a modest proportion, the relationship is statistically significant.

The ANOVA table supports the overall significance of the regression model, with an F-value of 8.807 and a **p-value of .004**, which is below the 0.01 threshold. This confirms that learner engagement contributes significantly to the prediction of course effectiveness.

In the coefficients table, the unstandardized regression coefficient for LES is **B = 0.319** (Std. Error = 0.107), and the standardized beta coefficient is $\beta = 0.330$. This indicates that for every one-unit increase in learner engagement, the perceived effectiveness of the course increases by **0.319 units**. The t-value of 2.968 and p-value of .004 further confirm the statistical significance of this effect. The 95% confidence interval (0.105 to 0.533) suggests a reliable and positive impact.

These findings suggest that learner engagement is a significant predictor of how effective learners perceive MOOCs to be. This aligns with previous literature that highlights the critical role of engagement in determining the learning outcomes of online courses. Engaged learners are more likely to interact meaningfully with course content, leading to a higher evaluation of the course's effectiveness.

This evidence reinforces the argument that MOOCs should not only deliver high-quality content but also adopt strategies to increase learner engagement—such as interactive

activities, timely feedback, and gamified elements—to enhance their overall effectiveness, particularly in the context of Pakistani learners using Coursera.

IV/MOD/MED on DV

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.650[a]	.422	.397	.36620

a. Predictors: (Constant), LES, MOOCs, DLS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.853	3	2.284	17.035	.000[b]
	Residual	9.387	70	.134		
	Total	16.240	73			

a. Dependent Variable: EOCCs

b. Predictors: (Constant), LES, MOOCs, DLS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.349	.469		2.875	.005	.413	2.286
	MOOCs	.582	.110	.603	5.294	.000	.363	.801
	DLS	-.026	.119	-.026	-.215	.830	-.264	.212
	LES	.144	.097	.149	1.486	.142	-.049	.337

a. Dependent Variable: EOCCs

Discussion

To examine the combined influence of **MOOCs (IV)**, **Learner Engagement (LES, mediator)**, and **Digital Literacy Skills (DLS, moderator)** on the **Effectiveness of Online Courses (EOCCs)**, a multiple linear regression analysis was conducted.

Model Fit and Explained Variance

The regression model demonstrates a **moderately strong association**, with a multiple correlation coefficient (**R = 0.650**) and a **coefficient of determination (R^2) = 0.422**. This indicates that approximately **42.2% of the variance** in the perceived effectiveness of online courses can be collectively explained by MOOCs, learner engagement, and digital literacy. The **adjusted R^2 value of 0.397** further confirms the model's generalizability, accounting for the number of predictors.

Model Significance

The **ANOVA table** confirms the **statistical significance** of the regression model, with an **F-**

value of 17.035 and a **p-value < .001**. This suggests that the combination of independent, mediating, and moderating variables significantly predicts course effectiveness among Coursera users in Pakistan.

Individual Predictors

The **coefficients table** reveals the individual contribution of each predictor to the model:

- **MOOCs**: The unstandardized coefficient for MOOCs is **B = 0.582**, with a **standardized beta (β) = 0.603**, **t = 5.294**, and **p < .001**. This clearly indicates that MOOCs have a **strong and significant positive impact** on course effectiveness. With each unit increase in perceived quality or utilization of MOOCs, effectiveness scores increase by approximately 0.582 units.
- **Digital Literacy Skills (DLS)**: The DLS coefficient (**B = -0.026**) was **not statistically significant (p = .830)**. This indicates that digital literacy, while conceptually important, does **not independently predict** perceived course effectiveness in this model. It is possible that digital literacy may function better as a **moderator in interaction terms** rather than a direct predictor.
- **Learner Engagement (LES)**: The effect of learner engagement was also found to be **statistically non-significant** (**B = 0.144**, **p = .142**), despite showing a weak positive trend. This suggests that when MOOCs are already accounted for in the model, **learner engagement may not add significant unique predictive power** in explaining course effectiveness—possibly due to mediation or shared variance with MOOCs.

Interpretation and Implications

The findings underscore the **dominant role of MOOCs** themselves in determining how effective learners perceive their online educational experiences to be. While **learner engagement and digital literacy** are theoretically important, their **independent effects diminish** when MOOCs are included in the regression model—indicating that the **design, content, and delivery quality of MOOCs** may directly drive perceived outcomes, possibly absorbing the influence of secondary factors.

This result is particularly insightful for education policymakers and platform designers in Pakistan. It suggests that **investments in improving MOOC content and structure** are likely to yield more significant gains in perceived effectiveness than efforts solely focused on increasing digital literacy or engagement techniques in isolation.

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