

Decoding Digital Learning Outcomes Among Diverse Learners: A Study on the Effects of MOOCs

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ABSTRACT

The democratization of online platforms through technological advancements has helped in the growth of new tools for digital learning. The global pandemic in 2019 accelerated the shift to a digital environment for organisations worldwide. With a shift to online learning, there has been a sudden spike in enrolments for massive open online courses. The present study addresses this gap in the literature by analysing the impact of MOOC courses on the achievement of program outcomes of a formal education program. The authors attempt to understand if digital learning outcomes vary among diverse learner groups, if the adaption of MOOC courses enhances the achievement of program outcomes among diverse learner groups. The data for this study were collected using purposive sampling from students pursuing a management course at a B-school in India. The results of the study indicate that diversity has no impact on the achievement of program outcomes.

KEYWORDS

E-Learning, Learner Diversity, MOOC, Program Outcomes

INTRODUCTION

When the pandemic hit countries across the globe in 2020, all forms of economic activity had come to a halt. School and college going children and young adults were the worst hit as educational institutes had suspended all forms of in-person learning. A study by KPMG states that around 250 million students in India were affected due to the closure at the onset of lockdown announced as a result of the global outbreak of Covid-19. Results of the emergency report of the School Children's Online and Offline Learning (SCHOOL) survey clearly point out the learning disparities that existed across the rural and urban hamlets of India. The results from a simple reading test of the SCHOOL Survey showed alarming results that nearly half of all children were unable to read more than a few words (Pari, 2021). Even though technology was seen as a key enabler to ensure continuity of learning among

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young learners, macro factors such as the digital divide has slowed down learning progress among learners across age groups. One of the ways in which educators have been actively trying to bridge the digital divide and the learning gap is by recommending learners to take up various Massive Open Online Courses (MOOCs). Though we have plenty of literature discussing the advantages and the benefits of Massive Open Online Courses and its effectiveness, the authors identified a significant literature gap in the role of Massive Open Online Courses in helping learners achieve the learning outcomes of a formal education program. As universities and educational institutions encourage and recommend young learners to adopt to Massive Open Online Courses, it becomes consequential for scholars to investigate if they are effective in helping achieve the program outcomes of their existing formal education programs. Through our study, the authors aim to understand how the achievement of Program Outcomes of an existing formal learning program varies among diverse learner groups and analyse if Massive Open Online Courses play a role in the achievement of Program Outcomes of the formal learning program.

AIMS OF THE STUDY

The main objective of this paper is to understand how program outcomes vary among diverse learner groups & the moderating role of Massive Open Online Courses in helping achieve the program outcomes. The specific objectives of this study include:

- To understand the concept of Massive Open Online Courses & Program Outcomes.
- To examine how achievement of Program Outcomes of the formal learning program varies among diverse learners' groups.
- To analyse if Massive Open Online Courses play a role in the achievement of Program Outcomes of the formal learning program.
- To observe the moderating effect of Massive Open Online Courses in achieving Program Outcomes.

REVIEW OF LITERATURE

Learner Diversity

The propagation and promulgation of an inclusive education model across various countries has been driving greater attention to the concept of Learner Diversity in the past few decades. Global organisations and academia today recognise the fact that diverse identities and experiences of learners makes it imperative for educators to be sensitised and trained in order to meet the diverse learning requirements of learners (Jelas, 2010). Studies in the past have proven to us that paying attention to learning styles and learner diversity can improve student's academic achievement as well as their attitude towards the course, interest, and motivation (Nettles et. al., 1997).

In India, the cultural diversity within the country makes every learning community diverse within itself. This diversity is also attributed to the movement of learners within and to different parts of the country to meet their learning and career requirements. Data from the official census shows that diversity in the country greatly varies across several dimensions such as age, gender, disability, religion, ethnicity, native tongue, caste, and domicile state to name a few. The highly stratified nature of the Indian society in terms of caste, income, geographical location can play the role of important determinants of the learner's awareness, learner's access to any kind of E-Learning facilities.

Studies in the past have given scholars an insight into the affective outcomes of having a diverse learning community. However, through the current study, the authors attempt to investigate if the achievement of learning outcomes are affected by the learner's diversity.

E-Learning: Pre-COVID-19 and Post-COVID-19 Perspectives

The conventional system of education that originated and existed over the past decades required students to enrol in a brick-and-mortar institution and learn through continuous exchange of information in close physical proximity with their instructors. Such brick-and-mortar institutions were designed to bring together learners, instructors, administrators, and various other participants of the learning ecosystem in physically defined spaces to achieve the common purpose of learning and growth.

The outbreak of the global pandemic in the year 2019 led to massive disruptions in the way these traditional systems functioned. Reports by UNESCO reveal to us that the learning progress of millions of students around the world was affected as a result of this shutdown (UNESCO, 2021). Childcare programs, schools, and universities were eventually forced to shift to remote models of working (Ayasrah et al., 2022). A research report by Kelly and Columbus state that The University of Washington and Stanford University were the first to move classes online (Kelly & Columbus, 2020).

Several authors and scholars in the past have defined various definitions and models to define the concept of E-Learning. There are a multitude of definitions and frameworks on E-Learning such that there has been constant confusions and contradictions on what E-Learning is and what E-Learning is not. Hoppe et. al. defines E-Learning as “The learning supported by digital tools and electronic media” (Hoppe et. al., 2003). In a conceptual analysis of E-Learning, M-Learning and D-Learning, Basak et. al. views E-Learning as a larger umbrella that covers the concepts of M-Learning and D-Learning (Basak et. al., 2018). Fischer defines E-Learning as “The technological or methodological e-learning forms that are perceived to be new and novel by potential users (Fischer, 2013). “E-Learning as the experienced dimension of E-Learning, includes factors such as engagement, curiosity, simulation, and practice” (Behera, 2013).

However, our data reveals to us that the concept of E-learning is not something novel. We have several pieces of evidence pointing out to us the early adoption & usage of E-learning from various countries. Countries around the world like Palestine, Syria, Afghanistan, and South Africa resorted to E-Learning as a means of education during times of crisis (Affouneh et al., 2020). Though E-Learning ensured that every learner had undisturbed access to learning and learning resources even through a crisis, research from various countries has shown contradictory results. Adnan and Anwar studied online learning outcomes from Pakistani higher education students during Covid-19. The findings of their study indicate that online learning outcomes do not meet valuable and desired results in a country like Pakistan because various students cannot get the right access to internet facilities. The lack of access to proper internet connectivity along with financial & technological obstacles further hampered their learning outcomes. (Adnan & Anwar, 2020). Lack of access to proper internet connectivity is a problem of concern even in developed countries. A study has estimated that about five million American adults are unable to access online higher education due to the lack of a broadband connection.

While many educational institutions relied on existing infrastructure to switch to E-Learning, many others had to first set up an online learning capacity. The shift is not planned when the switch from traditional learning methods to E-learning happens under unusual circumstances like the ongoing pandemic. Affouneh et. al. in their research work in fact clearly draw out the distinction between Emergency Remote Teaching (ERT) & E-Learning. Affouneh et. al. defines Emergency Remote Teaching as a sudden unplanned shift through a remote medium under unusual circumstances (Affouneh et al., 2020). Emergency Remote Teaching has proved to be much more stressful than E-Learning especially during the pandemic time as educators had to make the switch, learn, and adapt in a short period of time. The learners & educators often face several challenges and obstacles in accommodating and embracing E-Learning in case of Emergency Remote Teaching. The results of the Chronicle of Higher Education survey attest to the same. The results of the survey demonstrated that a strong majority of faculty and administrators believed that online classes were worse in quality than in-person sessions. The differential perception of the quality and effectiveness of online classes over face-to-face classes is not novel. We had sufficient historical data from the previous studies to

testify this. Data collected between 2002 and 2009 show us that, the annual compound growth rate of online classes was 19% as compared to 2% growth rate of face-to-face courses (Allen & Seaman, 2015). Despite the growing enrolments in online courses, majority of educational institutes continue to rate online courses and programs inferior to face-to-face courses. They believe that online learning lacks the kind of interaction, collaboration and learning outcomes that are necessary to support quality education (Redpath, 2012)

Despite studies showing us that E-Learning may not be as effective as in-person learning, A bibliometric analysis conducted by Chen et. al. states that the arrival of Covid-19 has made E-Learning an exciting, important, and promising field of research as this is the only way to reduce the spread of the virus without disrupting academic activities (Chen et al., 2021).

MASSIVE OPEN ONLINE COURSES: THE ORIGIN AND RISE

While the realms of E-Learning continue to expand amidst the pandemic, Massive Open Online Courses have been gaining a lot of traction these days (Tamjidyamcholo et al., 2020). Though Massive Open Online Courses has been growing popular recently, data from our review of literature tell us that MOOCs have been around since a long time. The term ‘Massive Open Online Course’ was first coined by Dave Cormier in 2008 (Sergio & Mora, n.d.) and the first Massive Open Online Course was launched by Sebastian Thrun and Peter Norvig from Stanford University on ‘Artificial Intelligence’. The massive success of the first ever Massive Open Online Course led to the duo eventually starting their own MOOC platform Udacity, offering short courses to students from various universities.

Massive Open Online Courses, popularly known as MOOCs are defined as, “Web based online courses held for an unlimited number of participants held by professors or other experts”. We have identified certain characteristics common to MOOCs from models, definitions and frameworks derived from literature. Some of these include:

Massive Open Online Courses are characterised by a large number of participants. Since these courses take place online, they traverse boundaries of space and capacity otherwise imposed by brick-and-mortar institutions. Thereby, truly standing to the idea of being available to a massive crowd.

Massive Open Online Courses are truly open to all. Unlike the traditional/formal education systems, Massive Open Online Courses do not require any formal conditions for participation. Ideally, they should also be free of cost. However, recently some MOOC providers have started charging low fees to cover the basic operating costs.

Massive Open Online Courses as the name suggests always take place via an online platform. Therefore, participants irrespective of their location can participate from anywhere as long as they have access to the internet.

Today, Massive Open Online Courses are available on several platforms such as LinkedIn Learning, Coursera, Udacity to name a few. They offer courses across various domains to the learning community around the globe. Our study aims to understand the contribution of these courses in helping students in achieving the program outcomes of the formal college program.

The exponential growth of Massive Open Online Courses has been attributed to several reasons such as variety to choose a specific course/skillset as opposed to an entire formal education program offered by university, increased flexibility & affordability relative to formal education programs (Gevelber, 2020), opportunities to develop a specialised skillset, higher employability (De Novellis, 2019). The success of Massive Open Online Courses has been scientifically proved through previous studies that measured its efficiency through quantitative measures such as institutional costs, instructor popularity, number of students enrolled, and completion rates. A study conducted to understand the learning culture perspective identified six themes common to learners from across the globe all pointing to the concept of MOOCocracy – a social learning democracy (Loizzo & Ertmer, 2016). Loizzo and Ertmer believe that the open nature and large global scale of Massive Open Online Courses, the learning culture could potentially have a greater impact on the learner’s attitudes and beliefs.

Today, top universities worldwide recommend students to take up Massive Open Online Courses in addition to their existing college courses. Certain collegiate programs have modified their policies and have provisions in place that offer credits to students to take up MOOCs relevant to their area of study. Thereby, challenging traditional teaching methods and institutions.

OUTCOME-BASED EDUCATION AND PROGRAM OUTCOMES

Written examinations play a very important role in assessing the learning progress of students in the Indian education sector. Traditionally, written examinations spanning over a fixed period of time and a standard evaluation schema was considered the most effective and efficient method of evaluating the learning progress of students. Written examinations were considered superior to oral assessments as it helped instructors to test the learning progress of a large number of students in short span of time with the least number of resources. However, over the course of time with the regulations set by authorities in the field of education better methods have been developed to measure learning progress. In India, majority higher educational institutions offering technical learning courses are regulated by the AICTE.

The All-India Council for Technical Education (AICTE) recommends the Revised Bloom's Taxonomy as an important framework for organised learning and to aid educators in designing appropriate questions for assessments. The Bloom's Taxonomy when first published received very little recognition. However, it was later translated into 22 languages and is one of the most cited works in educational research. The model initially intended to serve a small group of university examiners today caters to instructors and educators around the world. The original model devised by Benjamin S. Bloom that categorised thinking behaviours into three domains namely the cognitive, the affective, and the psychomotor which consisted of six cognitive levels of complexity namely knowledge, comprehension, application, analysis, synthesis, and evaluation. The original model was later revised, and the six cognitive levels were renamed to remembering, understanding, applying, analysing, evaluating, and creating.

As per the regulations set by the All-India Council for Technical Education (AICTE), The implementation of Bloom's Taxonomy in the assessment systems should also be aligned with the program outcomes. The alignment of Program Outcomes with the Revised Bloom's Taxonomy is achieving with the establishment of a framework known as outcome-based education. Outcome-based education (OBE) follows a result-oriented approach where all teaching effort is directed towards the achievement of a specific outcome. In outcome-based education, the Program outcomes of various learning courses are to be clearly defined. Using a top-down design approach, from the Program outcomes the course outcomes are defined. Various courses together form the building blocks of a program. Therefore, it becomes very important for educators to align the assessments with the course outcomes and eventually with the program outcomes. As per the Outcome-based education framework as set by the All-India Council for Technical Education (AICTE), it is now mandatory for all technical education institutions in India to set Program Outcomes for individual programs & align the course outcomes and examination patterns to the overall program outcomes.

The present study is a three-fold attempt to understand how learning outcomes vary among diverse learner groups, understand if Massive Open Online Courses play a role in achieving Program Outcomes of the formal learning program, and to test the moderating impact of Massive Open Online Courses on the achievement of Program Outcomes among Diverse Learner Groups.

METHODOLOGY

The study on "Decoding Digital Learning Program Outcomes among Diverse Learner Groups" analysed data from an ontological point of view. Through an ontological point of view, we tried to examine, "What is the reality of MOOC courses in contributing to the achievement of program

outcomes?”. We adopted the interpretivist philosophy and a deductive approach by deducing our findings from a broad array of data collected. A reputed B-School from South India, with well-defined program outcomes & a learning community with exposure to Massive Open Online Courses was identified. Primary data for the study was collected from students who were administered questionnaires, which collected quantitative data. The questionnaire was circulated to 360 students of which we received 99 responses, with a response rate of 27.5%. The questionnaire consisted of 28 items segregated into 7 variables. The conceptual framework for the study is given in Figure 1:

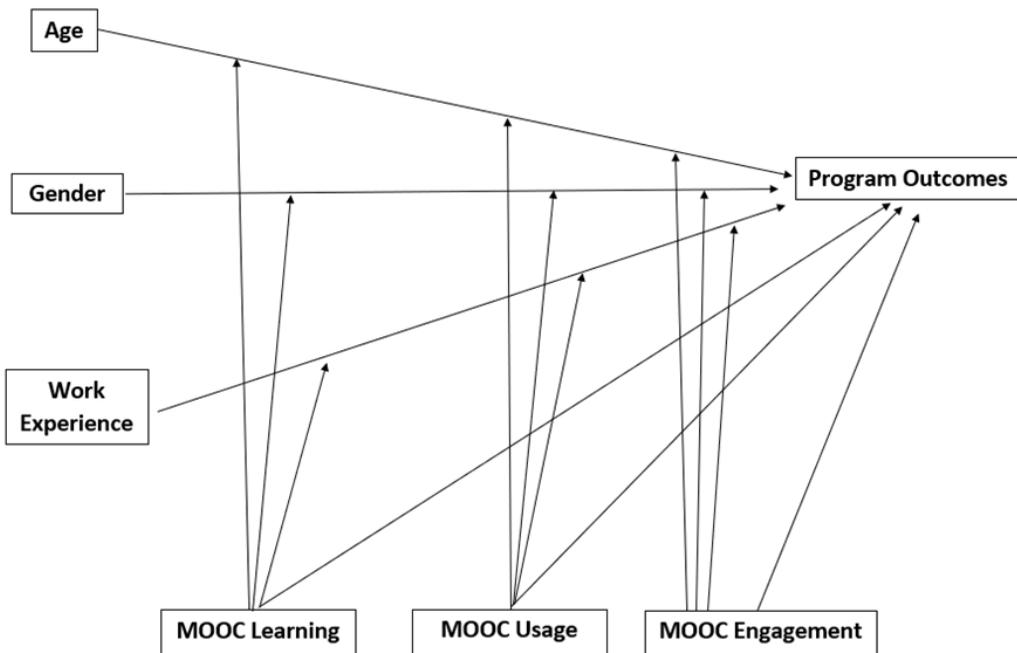
The independent variable for the study was learner diversity. The diversity of learner groups was narrowed down to three dimensions – Age, Gender & Work Experience. The primary dependant variable under study was Program Outcomes. The Program Outcomes are pre-defined set of outcomes set by the educators for a given course of study. The items to measure Program Outcomes were collected from the B-School under study. The Program Outcomes of the formal learning program consisted of 9 items covering the holistic outcomes of a management program. The moderating variables in the given study were adapted from the scales to measure MOOC Learning and MOOC Usage from previous literature ((Tamjidyamcholo, Gholipour, Kazemi, 2020). Through our pilot study, we were able to identify a third variable – MOOC Engagement which showed significant impact on Program Outcomes

RESULTS

Test For Reliability: Cronbach’s Alpha

The study collected data from 99 students from a reputed B-School was used to test the reliability of the instrument. Cronbach’s Alpha was adapted as an index to measure the reliability of the instrument. The Cronbach’s Alpha was computed using SPSS v. 22. The Cronbach’s Alpha was computed for 22 items on the scale to be 0.913, an indicator of a highly reliable instrument.

Figure 1. Conceptual framework developed for study



Descriptive Statistics

Descriptive statistics of the raw data on the learner profile was produced to understand the learner diversity of the sample collected. The raw data on various diversity attributes were collected and the descriptive statistics was computed with the help of SPSS v. 22 to visualise the underlying diversity that could potentially have an impact on the learning outcomes. The descriptive statistics of various dimensions of learner diversity gave us the following results:

The bar graphs depicted illustrate the diversity attributes of data of the various categorical variables collected such as Gender & Exposure to MOOC Courses. The bar graph depicting gender diversity (Figure 2) shows 55.6% representation from individuals identifying as male and 44.6% representation from individuals identifying as female. From the 99 responses received, 59.6% of the participants from the study claim have had some kind of exposure to MOOC Courses while 40.4% participants did not have any exposure to MOOC Courses (Figure 3).

The Descriptive Statistics of the continuous variables included age and any prior work experience. The average age of the participants of this study was 23.32, with ages ranging from 0-29. The average work experience of individuals (in years) was 1.34 years with a minimum of 1 year and maximum of 3 years (Table 1).

EXPLORATORY FACTOR ANALYSIS

An Exploratory Factor Analysis was performed using principal component analysis and varimax rotation. The minimum factor loading criteria was set to 0.50.

The results of Bartlett's Test of Sphericity were significant, $\chi^2(n = 99) = 1770.017$ ($p < 0.001$), which indicates its suitability for factor analysis (Table 2). The Bartlett's Test of Sphericity, a data

Figure 2. Gender diversity

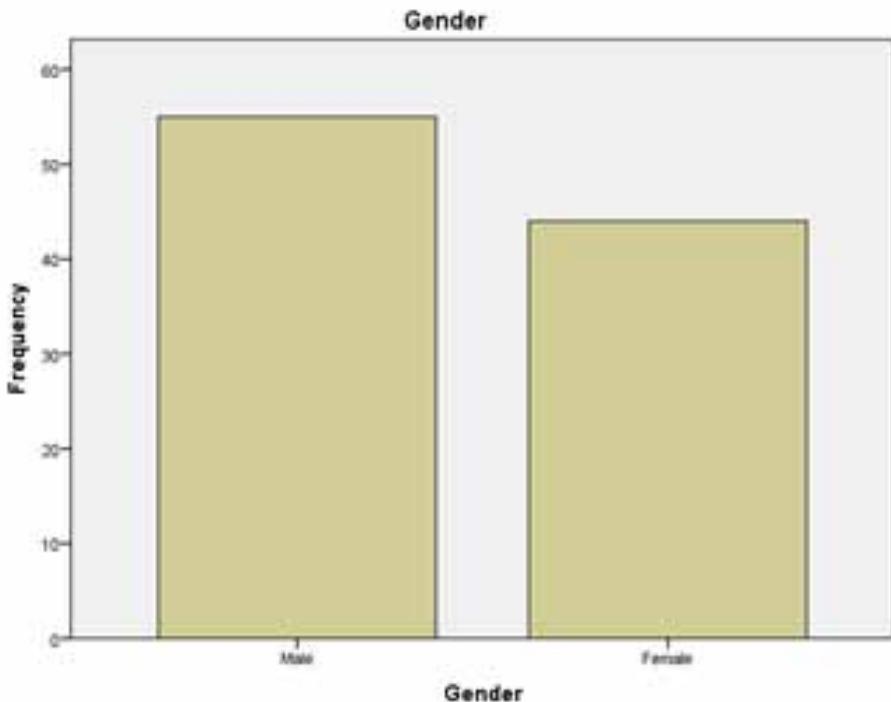


Figure 3. Exposure to MOOC courses

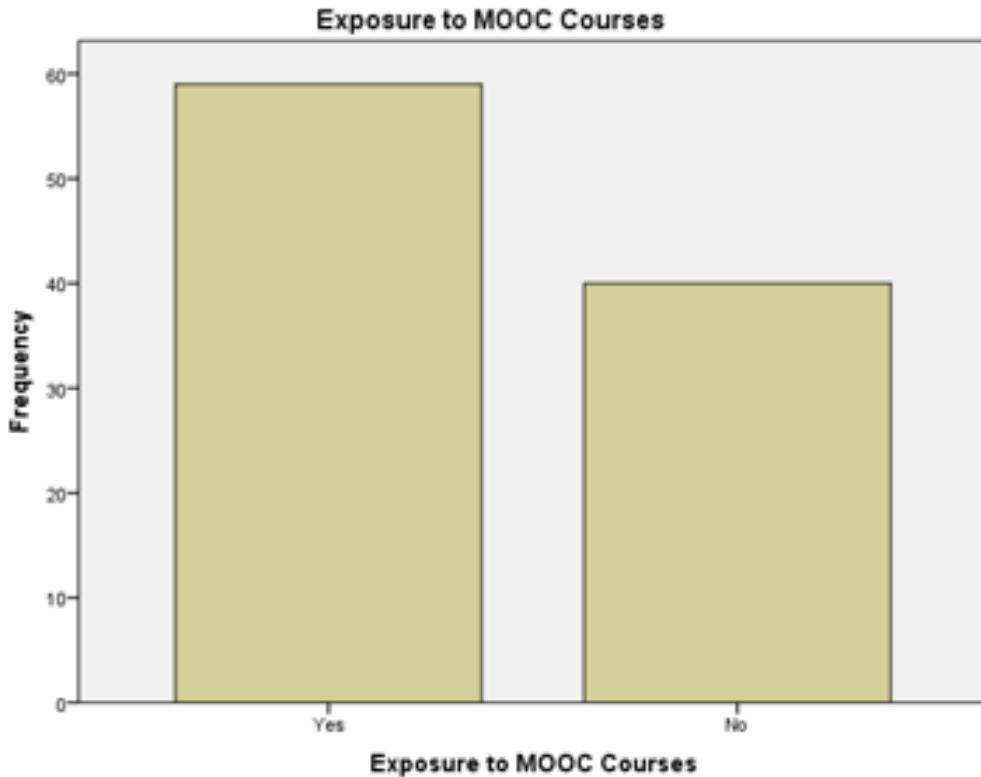


Table 1. Descriptive statistics

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Age	99	29	0	29	2309	23.32	3.774	14.241
Prior work experience	99	2	1	3	133	1.34	.538	.289
Valid N (listwise)	99							

Table 2. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.890
Bartlett's Test of Sphericity	Approx. Chi-Square	1770.017
	Df	231
	Sig.	.000

reduction technique is performed prior to the factor analysis to check if the factor analysis would be effective in compressing data in a meaningful way. The Kaiser–Meyer–Olkin measure of sampling adequacy (MSA), which indicates the appropriateness of the data for factor analysis, was 0.890. In this regard, data with MSA values above 0.800 are considered appropriate for factor analysis. The

Kaiser-Meyer-Olkin measure of Sampling adequacy is used to measure if data collected is suitable for factor analysis. Finally, the factor solution derived from this analysis yielded four factors for the scale, which accounted for 32.0% percent of the variation in the data indicating a good model fit.

The four dimensions explained a total of 72.230 percent of the variance among the items in the study. Bartlett’s Test of sphericity proved to be significant, and all communalities were over the required value of 0.500. The initial theoretical proposition in this research identified three factors. After factor analysis, four factors were identified as part of the model through EFA. Factor 1 includes items from ML1 to ML 6, referring to the variable MOOC Learning (ML). Factor 2 gathers items MU1, MU3 & MU7 which represent MOOC Engagement (ME). Factor 3 includes items MU2, MU4, MU5 & MU6 referring to MOOC Usage (MU). Finally, Factor 4 includes items from PO1 to PO9 representing the Program Outcomes of the Learning Program. Given below are the various items used to measure the variables Program Outcomes (PO), MOOC Learning (ML), MOOC Usage (MU), MOOC Engagement (ME) (Table – 3):

Table 3. Scales and items used in the study

Sl. No.	Variable	Item
1.	PO1	My B-School helped me gain domain knowledge for understanding business issues and make effective decisions
2.	PO2	My B-School helped me apply theories, appropriate techniques and strategic tools for planning, analysis and execution
3.	PO3	My B-School helped me enhance verbal and written presentation skills in students
4.	PO4	My B-School helped me develop leadership skills by working effectively in teams
5.	PO5	My B-School helped me seek information, identify risks, innovate and foster entrepreneurial orientation
6.	PO6	My B-School helped me develop abilities to understand international business environment and assess issues of global significance
7.	PO7	My B-School helped me apply ethical principles and nurture commitment to personal and professional ethics in all aspects of business practice
8.	PO8	My B-School helped me understand the impact of business practices on society and environment
9.	PO9	My B-School helped me create an interest to engage in continuous learning independently to improve knowledge and develop competencies
10.	ML1	I experience no difficulties learning from the massive materials/ resources in a MOOC.
11.	ML2	I experience no difficulties learning in an online learning environment in MOOC.
12.	ML3	I experience no difficulties learning with many new learners/peers in online learning environment.
13.	ML4	I experience no difficulties exploring learning materials in a MOOC (without any limitation)
14.	ML5	I experience no difficulties accessing learning materials in a MOOC at all time.
15.	ML6	I experience no difficulties managing the diverse materials/ resources from other MOOC learners
16.	MU1	It’s easy for me to engage in forum/ comment/ discussion in a MOOC
17.	MU2	It’s easy for me to understand MOOC content in a variety of forms
18.	MU3	It’s easy for me to master the learning content in a MOOC.
19.	MU4	It’s easy for me to capture the basic concepts taught in a MOOC.
20.	ME1	It’s easy for me to understand the learning tasks in a MOOC.
21.	ME2	It’s easy for me to make self-evaluations through the learning process in a MOOC
22.	ME3	It’s easy for me to upload learning material/ assignments in a MOOC.

Factor Loadings are presented in table 4.

LINEAR REGRESSION ANALYSIS

Several hypotheses were developed to study statistically significant relationships between the independent variables and dependant variables under study. Six linear regression analyses were conducted to study the relationship between the variables, a summary of which is given below:

Hypotheses

H1 – Age has a statistically significant relationship with Program Outcomes.

Table 4. EFA table

Items	1	2	3	4
Program Outcomes				
PO1	.772			
PO2	.746			
PO3	.817			
PO4	.696			
PO5	.747			
PO6	.785			
PO7	.780			
PO8	.780			
PO9	.823			
MOOC Learning				
ML1		.778		
ML2		.774		
ML3		.647		
ML4		.791		
ML5		.679		
ML6		.783		
MOOC Usage				
MU1			.519	
MU2			.691	
MU3			.759	
MU4			.749	
MOOC Engagement				
ME1				.748
ME2				.577
ME3				.658

The hypothesis tests if Age has a significant relationship on the achievement of Program Outcomes. The results of the regression analysis show that Age does not have a significant impact on the achievement of Program Outcomes $F(1,99) = 1.276, p > 0.001$ (Refer Table 3). Therefore, we accept the null hypothesis.

H2 – There is a statistically significant relationship between Genders and Program Outcomes.

The hypothesis tests if Gender has a significant relationship on the achievement of Program Outcomes. The results of the regression analysis show that Gender does not have a significant impact on the achievement of Program Outcomes $F(1, 99) = 0.077, p > 0.001$ (Refer Table 3). Therefore, we accept the null hypothesis.

H3 – There is a statistically significant relationship between Work Experience and Program Outcomes.

The hypothesis tests if Work Experience has a significant relationship on the achievement of Program Outcomes. The results of the regression analysis show that Work Experience does not have a significant impact on the achievement of Program Outcomes $F(1, 99) = 0.000, p > 0.001$ (Refer Table 3). Therefore, we accept the null hypothesis.

H4 – There is a statistically significant relationship between MOOC Learning and Program Outcomes.

The hypothesis tests if MOOC Learning has a significant relationship on the achievement of Program Outcomes. The results of the regression analysis show that MOOC Learning has a significant impact on the achievement of Program Outcomes $F(1, 99) = 32.169, p < 0.001$ (Refer Table 3). Therefore, we accept the hypothesis.

There is a statistically significant relationship between MOOC Learning and Program Outcomes

H5 – There is a statistically significant relationship between MOOC Usage and Program Outcomes.

The hypothesis tests if MOOC Usage has a significant relationship on the achievement of Program Outcomes. The results of the regression analysis show that MOOC Learning has a significant impact on the achievement of Program Outcomes $F(1, 99) = 42.132, p < 0.001$ (Refer Table 3). Therefore, we accept the hypothesis.

There is a statistically significant relationship between MOOC Usage and Program Outcomes

H6 – There is a statistically significant relationship between MOOC Engagement and Program Outcomes.

The hypothesis tests if MOOC Engagement has a significant relationship on the achievement of Program Outcomes. The results of the regression analysis show that MOOC Engagement has a significant impact on the achievement of Program Outcomes $F(1, 99) = 42.132, p < 0.001$ (Refer Table 3). Therefore, we accept the hypothesis.

There is a statistically significant relationship between MOOC Engagement and Program Outcomes

Hayes Process Macro Analysis

The following hypotheses were tested to analyse the moderating effect of MOOC Courses on the achievement of Program Outcomes among Diverse Learner Groups.

Table 5. Linear regression results

Hypothesis	Regression Weights	Beta Coefficient	R ²	F	p-Value	Results
H1	Age → PO	0.23	0.13	1.276	0.261	Reject H1
H2	Gender → PO	0.43	0.001	0.077	0.782	Reject H1
H3	Work Exp → PO	-0.003	0.000	0.000	0.983	Reject H1
H4	MOOC Learning → PO	0.430	0.249	32.169	0.000	Accept H4
H5	MOOC Usage → PO	0.480	0.303	42.132	0.000	Accept H5
H6	MOOC Engagement → PO	0.477	0.264	34.721	0.000	Accept H6

H7 – MOOC Learning moderates the relationship between Age and Program Outcomes.

The study assessed the moderating role of MOOC Learning (ML) on the relationship between Age and Program Outcomes (PO). The results revealed that MOOC Learning does not moderate the relationship between Age and Program Outcomes ($b = -0.0211$, $t = -1.2402$, $p = .2180$), rejecting H7.

H8 – MOOC Learning moderates the relationship between Gender and Program Outcomes.

The study assessed the moderating role of MOOC Learning (ML) on the relationship between Gender and Program Outcomes (PO). The results revealed that MOOC Learning does not moderate the relationship between Gender and Program Outcomes ($b = -0.1608$, $t = -1.0533$, $p = .2949$), rejecting H8.

H9 – MOOC Learning moderates the relationship between Work Experience and Program Outcomes.

The study assessed the moderating role of MOOC Learning (ML) on the relationship between Work Experience and Program Outcomes (PO). The results revealed that MOOC Learning does not moderate the relationship between Work Experience and Program Outcomes ($b = -0.0363$, $t = -0.2471$, $p = .8053$), rejecting H9.

H10 – MOOC Usage moderates the relationship between Age and Program Outcomes.

The study assessed the moderating role of MOOC Usage (MU) on the relationship between Age and Program Outcomes (PO). The results revealed that MOOC Usage does not moderate the relationship between Age and Program Outcomes ($b = -0.0257$, $t = -1.4198$, $p = .1589$), rejecting H10.

H11 – MOOC Usage moderates the relationship between Gender and Program Outcomes.

The study assessed the moderating role of MOOC Usage (MU) on the relationship between Gender and Program Outcomes (PO). The results revealed that MOOC Usage does not moderate the relationship between Gender and Program Outcomes ($b = -0.1136$, $t = -0.7624$, $p = .4477$), rejecting H11.

H12 – MOOC Usage moderates the relationship between Work experience and Program Outcomes.

The study assessed the moderating role of MOOC Usage (MU) on the relationship between Work Experience and Program Outcomes (PO). The results revealed that MOOC Usage does not moderate the relationship between Work Experience and Program Outcomes ($b = -0.1721$, $t = -1.1740$, $p = .2433$), rejecting H12.

H13 – MOOC Engagement moderates the relationship between Age and Program Outcomes.

The study assessed the moderating role of MOOC Engagement (ME) on the relationship between Age and Program Outcomes (PO). The results revealed that MOOC Engagement does not moderate the relationship between Age and Program Outcomes ($b = -0.0304$, $t = -1.5903$, $p = .1151$), rejecting H13.

H14 – MOOC Engagement moderates the relationship between Gender and Program Outcomes.

The study assessed the moderating role of MOOC Engagement (ME) on the relationship between Gender and Program Outcomes (PO). The results revealed that MOOC Engagement does not moderate the relationship between Gender and Program Outcomes ($b = -0.1121$, $t = -0.6744$, $p = .5017$), rejecting H14.

H15 – MOOC Engagement moderates the relationship between Work Experience and Program Outcomes.

The study assessed the moderating role of MOOC Engagement (ME) on the relationship between Work Experience and Program Outcomes (PO). The results revealed that MOOC Engagement does not moderate the relationship between Work Experience and Program Outcomes ($b = -0.1751$, $t = -0.9845$, $p = .3273$), rejecting H15.

CONCLUSION

The outbreak of the global pandemic accelerated the shift to digital learning in India at an exponential rate. Shift to a remote learning environment pushed both educators and learners alike to explore alternate learning platforms and adopt to the latest technologies available to foster learning. Universities and higher education institutions have now started recommending and encouraging learners to take up various online courses such as MOOCs in addition to the courses they have already enrolled for in a university. The results of this study show that MOOC Courses play a significant role in enhancing the learning outcomes of an existing formal education program. The results of the study have testified that learner diversity has no significant impact on the achievement of Program Outcomes. These results prove to break through many conventional assumptions and stereotypes about gender & age differences when it comes to learning. However, the analysis of the impact of MOOC courses show that they contribute in a significant way to achieving the program outcomes of the formalised collegiate education. The originality of this study lies in the unique perspective of viewing Massive Open Online Courses as a source of learning that is supplementary and vital to existing formal education programs. The results of this study highlights how taking up courses beyond the conventional learning programs can help students achieve their learning outcomes in a better way than just sticking to the traditional coursework at universities. Therefore, the study provides sufficient evidence to educators, colleges, and universities in encouraging better participation in MOOCs for an effective achievement of the Program Outcomes. While such courses do not show a moderating impact on Program Outcomes, they do have a direct impact on improving achieving Program Outcomes. Though the outcomes of the present study are very encouraging to learners & educators alike, the study itself comes with several limitations. The sample of this

study was restricted to a small number. Perhaps, a larger student sample with diverse demographics can give us a much deeper understanding of how Massive Open Online Courses and its impact on formal college education programs. Collecting samples from students from a different discipline where Massive Open Online Courses are not easily accessible could also have varying results. As the scope and choice of Massive Open Online Courses become more widespread, we could possibly perform a trend analysis to understand how the impact of Massive Open Online Courses can vary with time and developments in learning technology.

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