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A comparative cross-platform study of global and local MOOC providers on educational access and equality

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Highlights

- This study advances MOOC research via offering a descriptive exploration of noteworthy facets across contexts and provides a comparative analysis of two MOOC providers, one global (MITx) and one local (BilgeİŞ), revealing differences in course subjects, levels, and learner backgrounds.
- Strategies should be developed to reduce gender disparities and improve accessibility for disadvantaged learner groups in MOOCs so that MOOCs impact on lifelong learning at scale can be maximized.
- There is a need for standardized MOOC metadata, data collection, and reporting across MOOC providers to enable accurate comparisons and informed decision-making.

Article Info: Research Article

Keywords: *Massive open online courses, MOOCs, online learning, lifelong learning, cross platform studies*

Abstract

Massive Open Online Courses (MOOCs) have become increasingly popular as a means of delivering education on a global scale. However, comparative analyses across different contexts remain limited. To enhance the effectiveness and inclusivity of MOOCs, it is essential to gain a deeper understanding of course characteristics and learner behaviors in varied educational and cultural settings. This descriptive study compares two distinct MOOC platforms: MITx, a large academic initiative from the United States, and BilgeİŞ, a smaller professional development platform from Turkey. The aim is to explore how MOOCs contribute to educational equity, access, and opportunity. The analysis draws on descriptive statistics from 122 MITx courses (with 2.8 million learners) and 100 BilgeİŞ courses (with 100,000 learners), focusing on course topics, difficulty levels, and learner demographics such as age, gender, and education level. Findings reveal persistent inequalities in learner participation, particularly by gender and educational background. As MOOCs mature, they appear to attract a broader range of learners, including individuals with lower levels of formal education and older age groups. This trend highlights the potential of MOOCs to serve as inclusive learning environments that support lifelong learning and workforce development. The study underscores the need for standardized metadata frameworks to enable more consistent cross-platform comparisons and recommends regular evaluations to help providers tailor course design and content distribution in ways that promote equitable educational access.

1. Introduction

Researchers have provided several different definitions of massive open online courses (MOOCs). Some define MOOCs as “university-affiliated courses offered to masses of online learners for little or no cost” (Selwyn et al., 2015, p. 175). On the other hand, the Commonwealth of Learning considers a MOOC “to be an online course that requires no prior qualifications for entry, can be accessed by anyone who has an

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Internet connection, and includes large or very large number of learners" (Porter & Beale, 2015, p. 6). Simply put, a MOOC is a vehicle to allow unlimited participation to an educational experience that is typically freely available via the Web (Bonk et al., 2018). While there is open access to course contents by an unlimited number of learners, MOOCs often contain discussion forums, streamed or pre-recorded video lectures, and an assortment of interactive exercises and content guides just as found in much smaller scale online courses. Some rely on traditional types of tests graded by computer technology or papers scored by their peers. These MOOCs rely less on social interaction and more on passing assessments and are called xMOOCs.

Over the past decade, MOOCs have received significant attention both in developed and developing countries (Bonk et al., 2015; Zhang et al., 2019). As a result, the number of MOOC providers and learners who register for MOOCs have increased sharply. There are several MOOC providers around the world such as FutureLearn from Open University-UK, SWAYAM from India, Miríadax from Spain, MéxicoX from Mexico, ThaiMOOC from Thailand, or Edraak from Jordan (Shah & Pickard, 2019). Coursera is the top MOOC provider with 45 million registered users followed by edX (24 million), Udacity (11.5 million), FutureLearn (10 million), and Swayam (10 million) (Shah, 2019). These numbers have sharply increased during ongoing COVID-19 pandemic because of the increased interest in online education (Shah, 2020). Another study investigated the background of 34,779 MOOC participants from 32 MOOCs provided by the University of Pennsylvania on the Coursera (Christensen et al., 2014). One year later, a group of researchers explored the characteristics of learner groups in two consecutive instantiations of a MOOC called FLMobiGame, the first University of Reading MOOC (Liyanagunawardena et al., 2015). More recently, researchers examined course characteristics, learner characteristics, and certification rates of MITx MOOCs in detail (Cagiltay et al., 2020). However, these studies do not allow proper comparisons across contexts. The media attention on MOOCs has mostly been focused on a few MOOC providers in the English-language (Ruipérez-Valiente et al., 2022). Furthermore, very few research studies have focused on the comparison of different MOOC providers (Ruipérez-Valiente et al., 2019; Ruipérez-Valiente et al., 2020; Ruipérez-Valiente et al., 2022) or institutional MOOC adoption strategies (Jansen et al., 2015).

Purpose of the Study

Making sense of MOOC participants' characteristics can help to adapt the courses to diverse learners' needs, and in this way, their impact in delivering lifelong learning on a large-scale can be maximized (Kahan et al., 2017). Research studies on regional MOOC providers need to be given more attention for their potential role in expanding access to higher education (Ruipérez-Valiente et al., 2019) as an unrepresentative large share in MOOC research come from developed countries (van de Oudeweetering & Agirdag, 2018). Similarly, for MOOC research to advance, Reich (2015) suggested that investigations should focus on comparisons across contexts rather than individual courses. Further thorough research is required on regional initiatives as the current available literature is limited, and additional investigations and dialogue among the diversity of MOOC providers are needed (Ruipérez-Valiente et al., 2022). Further discussions and studies that address the variety of MOOC providers would greatly benefit the entire online learning ecosystem (Ruipérez-Valiente et al., 2022). Specifically, while many studies focus on individual MOOC platforms, particularly those based in developed countries and in English-speaking contexts, there is limited comparative research that includes platforms from both developed and developing regions. Our study helps address this gap by analyzing and contrasting a global MOOC platform (MITx) with a regional/local one (BilgeİŞ), focusing on educational access, learner demographics, and course

characteristics. Furthermore, this research contributes to the broader discourse on digital inequality and the democratization of education by exploring whether MOOCs are truly inclusive of underrepresented groups. In response, the purpose of this study is to compare two different MOOC portals according to an array of variables. This research study contributes to the literature by comparing and contrasting the use patterns of these two MOOC portals from developing country and developed country perspectives. This study can be considered a starting point for further research comparing MOOC providers from various parts of the world. The nine research questions setting the groundwork for the research being undertaken are as follows:

RQ1: What are the course subjects and number of MOOCs in these portals?

RQ2: What are the course distributions according to the course levels in these portals?

RQ3: What are the learner backgrounds based on gender and education levels in these portals?

RQ4: What are the course subject distributions, number of enrolled learners, and their ages in these portals?

RQ5: What are the course level distributions and number of enrolled learners in these portals?

RQ6: What is the distribution of enrolled learners according to gender and course subjects in these portals?

RQ7: What is the distribution of the number of enrolled learners according to their gender and course levels in these portals?

RQ8: What is the number of enrolled learners and percentages according to education levels and course subjects in these portals?

RQ9: What is the distribution of the number of enrolled learners according to education levels and course levels in these portals?

This study offers original contributions by presenting a large-scale cross-platform comparison between a Western, academically focused MOOC platform (MITx) and a regional, professionally oriented platform (BilgeİŞ), a combination that is rarely explored in the current literature. It reveals persistent inequalities in MOOC participation related to gender and educational background across these two MOOC contexts. Additionally, the study underscores the critical need for standardized data collection and reporting practices in MOOC research to enable meaningful and reliable international comparisons, an issue that remains largely overlooked in empirical studies.

2. Literature

There are extremely limited MOOC comparison studies in the literature. Ruipérez-Valiente et al. (2019) used multi-platform learning analytics to compare regional and global MOOC learning in the Arab world based on their previous case study. As they note, most MOOC research studies in the past have focused on single higher education institutions, and the aggregation of data from a single MOOC provider. Their comprehensive data contained 565 MOOC iterations with 12.67 million course registrations for Edx, and 231 MOOC iterations with 3.77 million registrations for Edraak. The results showed that Edraak, which is the regional provider, reached younger learners, females, and learners whose educational attainment was lower than the global providers. Edraak attracted more local and Arab learners. Course completion rates in Edraak were higher than those found with the global provider. However, the percentage of learners who viewed the course in the Edx courses was higher than the ones in Edraak, which shows that a higher proportion of students in Edraak courses did not access the course content after signing up for the courses. Identity threat and limited English proficiency of learners were the self-reported top reasons for registering on Edraak.

Ruipérez-Valiente et al. (2022) analyzed the demographics, preferences, and perceptions of learners across global and regional MOOC providers on a large scale. For this, they conducted a research partnership among 15 different MOOC providers from nine countries to better understand the regional MOOC ecosystem. The data showed that individuals choose to take MOOCs from global or regional providers because these platforms best meet their needs. This also implies that learners have other priorities and preferences, such as educational and social factors, which vary depending on the provider's scope and may be perceived differently among subgroups. In addition, the findings suggested that students prefer to learn in a familiar environment, specifically when it comes to utilizing their native language and having instructors who share their culture. Findings also demonstrated the significant influence of location on the types of learners each provider attracts where the subpopulations in regional platforms tend to be more diverse, including learners who are underrepresented in global providers. The authors suggested that based on their data analysis, regional MOOC providers may have an advantage in increasing access to higher education within their regions compared to the more well-known global providers. In parallel to this, Ruipérez-Valiente (2022) examined the relationship between the socioeconomic status of MOOC students and their educational performance on a large scale based on the data from 12 MOOC providers including 8 million learners. It was found that language is a crucial factor in attracting learners from underrepresented groups in lower-Human Development Index (HDI) countries. The findings on completion rates also revealed similarities in the impact of context, as the correlation between completion rates and HDI was present in some platforms but not in others. With regards to certification, two providers exhibited a moderate correlation between certification and HDI. A recent study showed that learners tend to prioritize factors such as the offering institution, cost, subject matter, and language when selecting MOOCs, whereas aspects like course difficulty and required effort play a less significant role in their decision-making (Shi et al., 2024).

Some MOOC research has attempted to create common conditions to compare MOOCs. For instance, Kalz et al. (2015) set up a European cross-provider data collection on open online courses with the aim of building a database that can provide detailed information on the participants' profile, experiences, and behaviour in (European) open online courses through a cross-provider data-collection. Based on socio-economic profile, lifelong-learning profile, ICT-profile, MOOC profile, motivation and intentions, and drop-out phenomenon components, they developed a research model for MOOCs. To predict human social behaviour, Kalz et al. (2015) used two frameworks in their study: the reasoned action approach (Fishbein & Ajzen 2010) and self-determination theory (Ryan & Deci, 2000). Importantly, they included background factors that can influence different variables and exert a direct effect on the behavioural intention to take and complete a MOOC. Drachsler and Kalz (2016) discussed how learning analytics and MOOCs interact and presented a framework called the MOLAC (the MOOC and learning analytics innovation cycle) framework to understand current research in this area. The MOLAC framework is divided into three parts: the micro-level, which focuses on collecting and analyzing data on individual learners; the meso-level, which combines data from multiple MOOCs to gain insights into group behaviour and inform educational models; and the macro-level, which allows for the development and testing of learning and teaching interventions across multiple educational institutions.

In another MOOC study, Joksimović et al. (2018) researched how learning at scale can be modelled using a systematic review of the research on MOOCs. These researchers reviewed approaches to model learning in MOOCs based on learning related constructs that are used for predicting and measuring student engagement and learning outcomes. The researchers suggested that engagement in learning at scale including MOOCs should be considered a multidimensional construct which contains academic, behavioural, cognitive, and affective engagement. In this way, more comprehensive data on the factors affecting learning with MOOCs can be obtained with this generally accepted conceptualization of engagement. In addition, insights into how these factors could work across different platforms or be compared with diverse context can be obtained.

In summary, there are limited studies on MOOC comparison in the literature although the number of studies focusing on multi-platform learning analytics to compare regional and global MOOC learning are on the rise. Various MOOC research studies have tried to create common grounds to compare MOOCs using different frameworks. MOOC studies have also attempted to model learning in MOOCs through multidimensional constructs to gain a more comprehensive understanding of factors that affect learning with MOOCs and obtain insights into how these factors work across different platforms or in diverse contexts. The current study attempts to fill these gaps and enrich the relevant literature by providing in-depth comparisons from two MOOC providers. Because local MOOC providers operate in various languages with regional university or corporate partners, are dispersed throughout the globe, and have fewer staff dedicated to maintaining research data, this ecosystem is more difficult to evaluate than the major players (Ruipérez-Valiente et al., 2022). More effort must be put into ensuring that there are equitable learning opportunities as online education in general- and MOOCs in particular- continue to increase gradually over time (Ruipérez-Valiente, 2022). Therefore, it is essential to reveal and compare how different platforms may reach different learner populations and the distributions of various features related to courses and learners, including course subjects and levels, as well as learner characteristics such as age, gender, and education level. The current study indicates the ability of large-scale studies to distinguish universal trends from those that are dependent on specific educational contexts (Ruipérez-Valiente, 2022). Specifically, this paper provides a significant contribution to the literature through going into the cross-platform comparison and analyzing data from not only from one of the most popular MOOC providers, but also a smaller one from a developing country. Overall, this study contributes to the research and practice of online education.

3. Methodology

This present quantitative study employs a descriptive research method by examining the details of a particular situation or setting by utilizing the log data from two MOOC portals, MITx and BilgeİŞ based on the MOOC and learning analytics innovation cycle (MOLAC) (Drachsler & Kalz, 2016). Descriptive research aims to portray the current state of a phenomenon by using numerical data to summarize the characteristics of individuals or groups, without attempting to explain causes or predict outcomes. Its primary purpose is to depict conditions as they exist (McMillan & Schumacher, 2014). In order to set the groundwork for the research being undertaken, the perspectives that can be compared on the common grounds from the two MOOC providers were considered based on the available data. MITx offers MOOCs from Massachusetts Institute of Technology. Many of the MITx courses include the learning materials developed for MIT residential courses and focus on academic subjects. MITx courses can be audited free of charge, and learners can obtain a verified certificate for a fee. BilgeİŞ MOOC Portal was developed within the scope of BilgeİŞ Project ("Capacity Development of Employees and Employers via Information and Communication Technologies") which was supported by the European Union and Turkish government. The portal offers 100 MOOCs on technical and soft skills. Although having been developed for small and medium enterprise employers and employees to promote professional development, BilgeİŞ courses are provided for anyone free of charge including a statement of accomplishment upon completion.

The data of MITx courses were obtained from MIT MOOCs (MITx) on edX portal. The data of BilgeİŞ courses were obtained from BilgeİŞ portal. Particularly, for the MITx data, we obtained aggregated, anonymized, raw datasets through an outbound data use agreement with MIT. For BilgeİŞ, the project coordinator is one of the researchers of this paper, and he obtained the raw course data of BilgeİŞ. In total, the data gathered included 122 MITx courses (offered between 2012 and 2016) and of 100 BilgeİŞ courses (offered between 2017 and 2020) were analysed in this study. MITx courses were offered in 2012 (1 course,

0.82%), 2013 (7 courses, 5.74%), 2014 (24 courses, 19.67%), 2015 (51 courses, 41.80%), and 2016 (39 courses, 31.97%). All the courses on BilgeİŞ have been offered since 2017. The data included 2,896,539 learners from MITx and 96,903 learners from BilgeİŞ. The raw data were extracted and made suitable for the analyses. The data were analyzed through descriptive statistics.

This study is limited to the data from one global and one local MOOC provider with the variables of interest abovementioned in the research questions. This study offers a descriptive exploration of noteworthy facets within the realm of MOOCs, and it was not possible to provide findings based on inferential statistics due to the natüre of the data obtained from both MOOC providers. Although other variables would further enhance the contextualization of the findings, the data from both MOOC providers did not allow merging with respect to variables such as engagement with the MOOCs, the completion and certificate numbers, duration of the MOOCs or learners' detailed profiles. This study also shed light on this issue as well.

4. Results

The results are provided for MITx and BilgeİŞ portals based on the research questions.

Course Subjects and Number of MOOCs

In MITx, 22% (n=27) of the courses were offered under computer science, followed by engineering (16%, n=19) and the business and management (15%, n=18) subject areas. In BilgeİŞ, 15% (n=15) of the courses were offered under business development, followed by soft skills and personal development (11%, n=11), graphics (8%, n=8), and office applications for different purposes (8%, n=8).

Course Distributions According to the Course Levels

The classification of the course levels as introductory, intermediate, and advanced levels was done by the MOOC providers. As seen from Table 1, most of the courses (45%, n=55) in MITx are at the introductory level, followed by intermediate (31%, n=38), and advance level (24%, n=29) courses. In BilgeİŞ, most of the courses (86%, n=86) are at the introductory level as well, while 10% (n=10) of the courses are at the intermediate level, and only 4% (n=4) are at advanced levels. Table 1 shows the number of courses according to course levels.

Table 1.

Number of courses according to course levels

	MITx		**BilgeİŞ**	
Course Level	**n**	**%**	**n**	**%**
Introductory	55	45.08	86	86.00
Intermediate	38	31.15	10	10.00
Advanced	29	23.77	4	4.00
Total	122	100	100	100

Considering the MITx and BilgeİŞ courses, the number of introductory level courses is higher than that of intermediate and advanced level courses in both portals. However, it should also be noted that in the BilgeİŞ platform, the number of introductory level courses is higher compared to the courses at other levels.

Learner Backgrounds

As seen from Table 2, from 2012 to 2016, in total 2,896,536 learners enrolled in 122 courses in MITx. Among these nearly three million MOOC learners, 66.71% were male and 21.26% were female, while 11.65% of learners did not define their gender, and .38% defined their gender as other. The total number of registered users on BilgeİŞ MOOC portal was 102,069 by January 25, 2019. However, data of 5,166 participants were lost due to system problems, and another 1,068 of the users did not give their background information. Among the BilgeİŞ users, 56.69% were male and 42.21% were female. As such, the percentages of male and female learners in BilgeİŞ courses can be considered more balanced compared to MITx courses.

Table 2.

Number of enrolled learners and their gender

	MITx		BilgeİŞ	
Gender	**n**	**%**	**n**	**%**
Male	1,932,345	66.71	54,930	56.69
Female	615,815	21.26	40,905	42.21
Not Defined	337,517	11.65	1,068	1.10
Other	10,862	0.38	-	-
Total	2,896,539	100	96,903	100

In order to report the learners' education levels in both MOOCs, the sum of doctorate and master's degrees on MITx is reported as graduate level. Additionally, the sum of associate degree and bachelor's degree is reported as bachelor's and associate degree in Table 3. As shown in Table 3, most of the courses in MITx were taken by learners with bachelor's and associate degrees (n=1,015,691, 35.07%).

Table 3.

Number of enrolled learners and their education levels in MITx and BilgeİŞ

	MITx		BilgeİŞ	
Education Level	**n**	**%**	**n**	**%**
Graduate	739,615	25.53	12,118	12.51
Bachelor's and associate degree	1,015,691	35.07	66,157	68.27
High school	614,193	21.20	13,904	14.35
Middle school	70,576	2.44	2,954	3.05
Primary school	10,217	0.35	342	0.35
No formal education	10,130	0.35	360	0.37
Other and not defined	436,117	25.53	1,068	1.10
Total	2,896,539	100	96,903	100

The situation is similar for BilgeİŞ courses with 68.27% (n=66,157) of the MOOC learners with bachelor's and associate degrees. However, it should be noted that the percentage of this group of learners in the BilgeİŞ courses (68.27%) is much higher compared to the MITx group (35.07%). An incredibly low number of learners with no formal education enrolled in both MITx (n=10,130, 0.35%) and BilgeİŞ (n=360, 0.37%) courses. Similarly, an extremely low number of learners having a primary school education level had enrolled in MITx (n=10,217, 0.35%) and BilgeİŞ (n=342, 0.35%) courses. The situation is similar also for the learners having a middle school education level (MITx 2.44% and BilgeİŞ 3.05%) (see Figure 1).

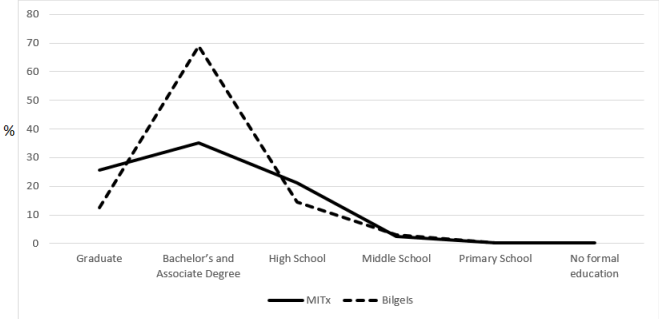

Fig. 1. Percentages of education levels of learners

Course Subject Distributions, Number of Learners, and Their Ages

The average size of MOOCs has attracted much attention from the media as well as from the institutions and organizations offering them. The average number of learners in the MITx courses we explored was 23,715. In detail, the average number of learners was the highest for Communication courses (53,347 learners), followed by Computer Science (41,028 learners), Data Analysis and Statistics (40,063 learners), Humanities (39,886 learners) and Math (30,334 learners). The average number of learners is lowest in Chemistry (7,808 learners), Art and Culture (8,718 learners), and Physics (8,993 learners) subjects. Most of the MITx MOOC learners had taken Computer Science courses (38.24%) followed by Business and Management courses (12.36%).

Given the vast claims about the equity and democratization can be brought about by MOOCs, the age of MOOC learner has also been of interest. As seen from the Table 5, the average age of learners in MITx courses is 30.29, where the youngest learners are in Engineering and Chemistry courses (average age is 27.67 and 28.27, respectively), followed by Computer Science and Math courses (average age is 29.34 and 29.00, respectively). In Education and Teacher Training, Business and Management, and History courses, the average age is the highest (average age is around 32). The average number of learners in BilgeİŞ courses is 2,703. The average number of learners in those courses is the highest in the Soft Skills and Personal Development course subject and is the lowest in Audio and Video course subject. The average age of learners in BilgeİŞ courses is 26.89. The youngest learners are in Programming courses. Not too surprisingly, the average age is the highest in Photography and Soft Skills & Personal Development courses.

Course Level Distributions and Number of Learners

Most of the MOOC learners in MITx and BilgeİŞ have taken introductory level courses (60.35% and 92.56%, respectively), followed by intermediate level courses (23.48% and 6.00%, respectively) and advanced level courses (16.17% and 1.44%, respectively). Table 4 shows the number of enrolled MOOC learners in these two platforms according to course levels.

Table 4.

Number of enrolled learners according to course levels

	MITx				BilgeİŞ			
Course Level	**Number of Learners**	**%**	**Average Number of Learners**	**Average Age**	**Number of Learners**	**%**	**Average Number of Learners**	**Average Age**
Introductory	1,748,008	60.35	36,851	30.08	250,264	92.56	2,910	26.92
Intermediate	680,112	23.48	17,898	30.18	16,217	6.00	1,621	26.51
Advanced	468,419	16.17	16,152	29.84	3,890	1.44	972	26.57

As indicated in Table 4, the percentages of learners in the introductory level courses are substantially higher in BilgeİŞ courses compared to MITx courses. This difference might be because of the higher number of introductory level courses in BilgeİŞ compared to MITx and higher number of intermediate and advanced level courses in MITx compared to BilgeİŞ. This data is also reflective of the differences in the target group of these two MOOC portals. In addition, the average age of learner groups is higher in MITx courses compared to BilgeİŞ for all course levels. BilgeİŞ learners can be considered younger compared to the MITx learners.

Number of Learners According to Gender and Course Subjects

Next, we turn to gender differences. As seen from the Table 5, on MITx, Computer Science courses (n= 792,018, 40.99%), Business and Management courses (n= 235,618, 12.19%), and Engineering courses (n= 228,295, 11.81%) were the most preferred courses by male learners. Computer Science courses (n=178,868, 29.05%), Business and Management courses (n= 87,279, 14.17%), and Biology and Life Sciences (n=63,006, 10.23%) were the most preferred courses by female learners. Art & Culture courses (n=4,181, 0.22%), Chemistry courses (n=15,002, 0.78%), and History courses (n= 19,440, 1.01%) were the least preferred MITx courses by male learners. Art & Culture courses (n= 3,246, 0.53%), Chemistry courses (n= 5,592, 0.91%), and Philosophy & Ethics courses (n= 11,017, 1.79%) were the least preferred MITx courses by female learners. In most of MITx courses, the number of male learners is higher; however, the gap is quite substantial between the number of male and female students in courses like Data Analysis and Statistics, Engineering, Math, and Computer Science. In general, as shown in Table 5, technical courses from MITx are more preferred by male learners, whereas social courses are more preferred by female learners.

Table 5.

Number of enrolled learners according to their gender and course subjects in MITx

	Male		Female		Total	
Course Subject	**n**	**%**	**n**	**%**	**n**	**%**
Biology & Life Sciences	89,514	4.63	63,006	10.23	152,520	5.99
Education & Teacher Training	79,607	4.12	35,803	5.81	115,410	4.53
Business & Management	235,618	12.19	87,279	14.17	322,897	12.67
Physics	54,172	2.80	16,016	2.60	70,188	2.75
Social Sciences	47,348	2.45	45,620	7.41	92,968	3.65
Data Analysis & Statistics	138,386	7.16	34,452	5.59	172,838	6.78
Engineering	228,295	11.81	38,127	6.19	266,422	10.46
Math	63,335	3.28	15,061	2.45	78,396	3.08
Computer Science	792,018	40.99	178,868	29.05	970,886	38.10
Communication	72,062	3.73	22,622	3.67	94,684	3.72
Humanities	67,254	3.48	40,531	6.58	107,785	4.23
Philosophy & Ethics	26,113	1.35	11,017	1.79	37,130	1.46
Chemistry	15,002	0.78	5,592	0.91	20,594	0.81
History	19,440	1.01	18,575	3.02	38,015	1.49
Art & Culture	4,181	0.22	3,246	0.53	7,427	0.29
Total	1,932,345	75.83	615,815	24.17	2,548,160	100

On the BilgeİŞ portal, Soft Skills & Personal Development courses (n=30,601, 19.40%) and Programming courses (n=22,015, 13.96%) were the most preferred courses by male learners. Soft Skills & Personal

Development courses (n= 29,799, 27.04%) and Business Development courses (n= 12,759, 11.58%) were the most preferred courses by female learners. Audio and Video courses (n=3,678, 2.33%), Cloud Technologies courses (n=4,936, 3.13%), and 3D Design and Modelling (n=6,534, 4.14%) were the least preferred courses in the BilgeİŞ platform by male learners. New Technologies courses (n=2,292, 2.08%), Audio and Video courses (n=2,309, 2.10%), and 3D Design and Modelling courses (n=3,054, 2.77%) were the least preferred courses by female learners. There was a substantial gap between the percentages of male and female learners in courses like Programming or Web Design and Development. In most of the courses, the percentages of male learners are higher; however, the percentages of male and female learners in courses like Soft Skills & Personal Development are almost equal. Table 6 shows the number of enrolled learners according to gender and course subjects.

Table 6.

Number and percentage of enrolled learners according to gender and course subjects in BilgeİŞ

	Male		Female		Total	
Course Subjects	**n**	**%**	**n**	**%**	**n**	**%**
Audio and Video	3,678	2.33	2,309	2.10	5,987	2.23
Business Development	15,896	10.08	12,759	11.58	28,655	10.70
Cloud Technologies	4,936	3.13	3,786	3.44	8,722	3.26
Graphics	7,580	4.81	6,391	5.80	13,971	5.21
Healthy and Safe Workplace	9,294	5.89	8,770	7.96	18,064	6.74
Microcontrollers	9,703	6.15	3,101	2.81	12,804	4.78
New Technologies	7,017	4.45	2,292	2.08	9,309	3.47
Office Applications for Different Purposes	8,604	5.46	7,501	6.81	16,105	6.01
Photography	6,708	4.25	5,685	5.16	12,393	4.63
Productivity	15,103	9.58	10,419	9.45	25,522	9.53
Programming	22,015	13.96	9,045	8.21	31,060	11.59
Soft Skills & Personal Development	30,601	19.40	29,799	27.04	60,400	22.54
3D Design and Modeling	6,534	4.14	3,054	2.77	9,588	3.58
Web Design and Development	10,050	6.37	5,295	4.80	15,345	5.73
Total	157,719	58.87	110,206	41.13	267,925	100

Number of Learners According to Their Gender and Course Levels

As seen from Table 7, 59.55% (n=1,150,652) of the male learners and 63.70% (n=392,267) of the female learners enrolled in the introductory level MITx courses. In BilgeİŞ courses, these percentages are higher where the majority of males (n=144,006, 91.31%) and females (n=103,872, 94.25%) learners preferred introductory level courses. The number of registrations for the advanced level courses is the lowest when compared to intermediate and introductory level courses. Overall, 92.52% of the learners selected introductory level courses in BilgeİŞ whereas it was 60.55% for MITx. Among all learners in the introductory courses, 75.83% of them were male and 24.17% of them were female in MITx courses. In contrast, in BilgeİŞ, male MOOC learners represented 58.87% of the users and 41.13% were female learners. Interestingly, the female/male ratio is higher in BilgeİŞ courses (0.70) than MITx courses (0.32).

Table 7.
Number of enrolled learners according to their gender and course levels

		Introductory		Intermediate		Advanced		Total	
Gender		**MITx**	**BilgeİŞ**	**MITx**	**BilgeİŞ**	**MITx**	**BilgeİŞ**	**MITx**	**BilgeİŞ**
Male	n	1,150,652	144,006	464,251	10,885	317,442	2,828	1,932,345	157,719
	%	59.55	91.31	24.03	6.90	16.43	1.79	75.83	58.87
Female	n	392,267	103,872	131,063	5,288	92,485	1,046	615,815	110,206
	%	63.70	94.25	21.28	4.80	15.02	0.95	24.17	41.13
Total	n	1,542,919	247,878	595,314	16,173	409,927	3,874	2,548,160	267,925
	%	60.55	92.52	23.36	6.04	16.09	1.45		

Number of Learners According to Their Education Degrees and Course Subjects

As seen from Table 8, the majority of the learners with no formal education (49.75%) enrolled in the Computer Science courses of MITx. In fact, Computer Science courses are preferred by the majority of learners whether they have primary school educational levels (46.26%), or middle school (39.24%), high school (42.30%), bachelor (38.60%), or graduate (32.85%) educational levels. The second highest ratio preferred courses for MITx MOOC learners according to educational level was Engineering courses. Engineering courses were the second most preferred course subject representing 13.73% of the learners holding a high school degree, 12.98% of the learners holding a middle school degree, 11.04% of the learners holding a primary school degree, and 11.92% of the learners with no formal education.

The situation was different for BilgeİŞ learners holding bachelor's and graduate degrees whose second most preferred courses (14.53% and 14.43%, respectively) were under Business and Management course subjects. The situation was similar for the learners with no formal education (19.90%) and middle school (19.11%) degree who mostly preferred the Programming courses offered within the BilgeİŞ platform. The primary school (18.74%), bachelor's (19.14%), and graduate (23.02 %) degree groups' most preferred courses were the ones under Soft Skills and Personal Development. On the other hand, bachelor's (10.98%) and graduate (11.92 %) degree groups' second most preferred courses were the ones listed under Business Development subjects, such as Basics of Project Management and International Trade.

Number of Learners According to Education Degrees and Course Levels

All levels of (i.e., introductory, intermediate, and advanced) courses are mostly preferred by learners with bachelor's and associate degree in both MITx (n= 1,015,691, 41.28%) and BilgeİŞ (n=195,182, 74.42%) courses (see Table 8). However, preference among higher education degree holders is much higher for MOOC courses offered in the BilgeİŞ platform (75%) than that of MITx courses (41%). On the other hand, the percentage of MOOC learners having graduate degrees is higher in MITx courses (28%) than that of BilgeİŞ courses (11%).

Table 8.
Number of enrolled learners according to their education degree and course levels in MITx and BilgeİŞ

Level of Education		Introductory		Intermediate		Advanced		Total	
		MITx	BilgeİŞ	MITx	BilgeİŞ	MITx	BilgeİŞ	MITx	BilgeİŞ
Graduate	n	413,259	27,075	194,713	1,701	131,643	381	739,615	29,157
	%	27.81	11.16	33.70	10.74	33.17	10.07	30.06	11.12
Bachelor's and associate degree	n	606,974	180,800	239,895	11,492	168,822	2,890	1,015,691	195,182
	%	40.85	74.51	41.52	72.55	42.54	76.37	41.28	74.42
High school	n	401,699	29,621	126,987	2,251	85,507	434	614,193	32,306
	%	27.04	12.21	21.98	14.21	21.55	11.47	24.96	12.32
Middle school	n	49,624	3,876	12,513	297	8,439	61	70,576	4,234
	%	3.34	1.60	2.17	1.88	2.13	1.61	2.87	1.61
Primary school	n	7,267	523	1,761	27	1,189	5	10,217	555
	%	0.49	0.22	0.30	0.17	0.30	0.13	0.42	0.21
No formal education	n	6,965	744	1,943	72	1,222	13	10,130	829
	%	0.47	0.31	0.34	0.45	0.31	0.34	0.41	0.32
Total	n	1,485,788	242,639	577,812	15,840	396,822	3,784	2,460,422	262,263
	%	60.39	92.52	23.48	6.04	16.13	1.44		

Table 8 also reveals a substantial gap between the number of learners enrolled in MITx and BilgeİŞ MOOCs portals regarding education levels. As displayed in Table 8, learners without any formal education as well as those who are limited to a primary school or middle school education are in the minority in all course levels. In effect, the percentage of MOOC learners with limited or no formal education is extremely low; this finding is quite troublesome for a form of education that is intended to democratize the world.

5. Discussion

The purpose of this study was to compare and contrast the data of 122 MITx courses (containing some 2.8 million learners) and of 100 BilgeİŞ courses (containing around 100,000 learners) by delving into the distributions of course subjects, course levels, and learner backgrounds. As seen, many of the results are in parallel with the literature; in particular, several insights about the inequality gap among MOOC learners are provided. Considering the MOOC learner profiles, average age of the learners, gender, and their education levels, the parallel findings with the earlier studies can be summarized as below.

Age and MOOC Preferences

In MITx courses, the average age of learners ranges between 28 and 32 in different courses where the average age is about 30. In BilgeİŞ courses, the age of MOOC participants ranges between 25 and 28 and the average age is approximately 27 years old. Hence, BilgeİŞ learners are slightly younger compared to MITx learners. It is worth noting that earlier studies have reported different distributions of the age groups for MOOC learners. Deng et al. (2019) have reported that MOOC students' age distribution is mainly between 25 and 65 years old. In another study, Rayyan et al. (2014) reported that in the Physics course of MITx, the overall average age of the 43,000 students was 27.5. In the current study, among the 80,940 students enrolled in the MITx Physics courses, the average was 30, which is slightly higher than that of Rayyan et al.'s (2014) study.

Additionally, as indicated, the learners from middle school, primary school, and no formal education groups are the minority in both MITx (2.44%, 0.35% and 0.35%, respectively) and BilgeİŞ (3.08%, 0.36% and

0.38%, respectively) courses. This finding indicates that both MOOCs fail to attract younger and less educated people.

Gender and MOOC Preferences

The female ratio in both MITx (21%) and BilgeİŞ (42%) courses is lower than the male population. (Rayyan et al. 2014) also reported the female percentage in MOOCs as 16%, which parallels this finding of our study. However, earlier studies have reported different preferences in terms of gender groups. According to Deng et al. (2019), the male percentage (83%) is substantially higher in Computer Science courses, whereas they report closer male/female ratios for business, innovation, and disaster preparedness courses and higher ratios for females in learning design, anatomy, and physical actor training courses. This current study also indicates the different course preferences by gender.

Overall, these findings indicate that despite the dominance of male registrations in the MOOCs, the gender groups' preferences on registering for different MOOC subjects show variation. Hence, even though the number of female MOOC learners is lower than that of males, their ratio sometimes becomes higher than the male learners in different courses. On the other hand, the percentages of female learners in BilgeİŞ courses are higher than the ones in MITx courses. As BilgeİŞ courses include more soft skills compared to MITx courses, which are more academically oriented, this could be the main reason for the higher ratio of female students in BilgeİŞ courses. In short, gender differences in different course subjects can be the common characteristics of both MITx and BilgeİŞ. Necessary steps should be taken to remove this gender disadvantage in different course subjects to provide equal access to MOOCs.

Education Level and MOOC Preferences

In this study, learners' percentage with graduate level degrees are reported as 26% in the MITx and 13% in BilgeİŞ courses. According to Deng et al. (2019), the percentage of doctoral degree students is reported as 3-4%. In contrast, the percentages of master's degree students vary between 14% and 78% in different studies. Liyanagunawardena et al. (2015) reported around 20-24% of master's and doctorate degree learners in the FutureLearn Platform. Accordingly, MITx learner groups can be considered as parallel to Liyanagunawardena et al. (2015) considering the graduate level of learners where the ratio of this group can be considered as slightly lower in BilgeİŞ courses and higher in MITx courses. The percentages of learners with bachelor's and associate degrees are found to be 35% for MITx and 68% for BilgeİŞ courses. Schulze (2014) reported this group of learners as 34%. In Deng et al.'s (2019) summary, the percentage of MOOC participants with bachelor's degrees was reported in the range of 14% to 88% for different platforms. In that concern, MITx is parallel with the one reported by Schulze (2014) and Robinson et al. (2015) while BilgeİŞ has a higher ratio of bachelor's and associate degree learner groups.

In this study, the percentage of learners having a high school level education is 21% for MITx courses and 14% for BilgeİŞ courses. High school education has been reported in the range of 6-29% by different researchers as summarized by Deng et al.'s (2019) study. Similarly, Rohs and Ganz (2015) also reported that more than 80% of MOOC learners have a university degree. As the definitions of different educational levels are not defined the same in different MOOC platforms, it is difficult to compare MOOC learners' education levels in different systems. However, as revealed in this study, more than one-third of MITx (35%) and the majority of BilgeİŞ (68%) learners have bachelor's and associate degrees. Besides, most of the learners hold a graduate, bachelor's, associate, or high school degree in both MITx (82%) and BilgeİŞ (95%) courses. Rayyan et al. (2014) also reported that most MOOC learners hold master's, bachelor's, and high school degrees in the MITx Physics course. The reported number of students with no education degree

was very low in that course. Since MITx MOOCs are academic-focused, and BilgeİŞ MOOCs are professional development-focused, this can lead to an overall difference in the characteristics of their target audience.

Bridging the Gap of Inequalities for MOOC Learners

As reported in earlier studies, MOOCs may potentially provide learning opportunities for less educated populations of learners. However, this study indicated that inequalities still exist in both MOOC platforms investigated in this study in terms of learners with different education levels. Most learners utilizing MITx and BilgeİŞ hold bachelor's and associate degrees followed by high school and graduate levels. Learners with a middle school or primary school level education or no formal education background at all are a minority in these environments. However, it should be noted that the target group of MITx courses are mostly academic, whereas BilgeİŞ courses are primarily designed for professional development. In terms of those with limited education levels, the percentage of learners holding a high school level of education in MITx (21.20%) is higher compared to that of the BilgeİŞ learners (14.25%). At the same time, the average age (i.e., approximately 30 years old) of MITx learners is also higher than that of the BilgeİŞ learners (i.e., 27). Somewhat troubling is the fact that this study reveals that inequality is a continuing problem in both MOOC platforms. Nevertheless, as these MOOC platforms are maturing and becoming more familiar to learners, the level of inequalities is potentially decreasing (see Table 3). Such findings increase hope that greater opportunities will be provided for the disadvantaged groups in the future.

6. Conclusion and Suggestions

This study compared and contrasted the data of 122 MITx courses with enrolments of 2.8M learners to 100 BilgeİŞ courses with enrolments of 100K learners. The study was aligned with the call for investigations to focus on comparisons across contexts rather than individual courses and addressed the lack of research comparing MOOC providers across different contexts and regions. The research also helped in identifying inequalities among MOOC learners in terms of gender and education level.

The results show several parallel findings with earlier studies. However, the results also reveal that, while MOOCs are still quite limited in reaching disadvantaged groups of learners, as the various MOOC platforms are becoming increasingly accepted, familiar, and robust, they will potentially reach a higher level of disadvantaged learner groups. Even some strategies such as gamification (Ortega-Arranz et al., 2019) can be implemented to gain attention of some specific groups, still there is a need to develop some design strategies to provide the MOOCs for everybody as lifelong learning is crucial for both personal growth and staying updated on current occupational trends and practices (Kaplan, 2016). Additionally, the comparison revealed that the data collected by MOOC portals are not exactly parallel to each other, thereby creating challenges to compare different MOOC portals. This study once more emphasized and verified indirectly the need for common grounds to make cross platform comparisons. The following suggestions are offered for MOOC providers to overcome issues associated with comparisons of different platforms:

- Zhang et al. (2017) have reported some different learner behaviours in local and worldwide MOOCs. For instance, according to their study, in local MOOCs (native platforms), perceived usefulness affected adoption intention more compared to the foreign platforms where perceived ease of use affected intention more when using foreign platforms compared to the native platforms (Zhang et al. 2017). Additionally, it is reported that different learner groups which are clustered as average regulators, help seekers, self-regulators, and weak regulators, behave differently in MOOCs (Jansen et al., 2022). Besides these different learner behaviours, in this study, we have found that,

whether MOOCs are local or worldwide, they fail to substantially attract younger learners. MOOC designers and developers should make attempts in the design and delivery of MOOCs to address the needs, experiences, and cultural expectations of younger learners.

- Whether it is an academic-focused MOOC or a professional development-focused MOOC, the limited enrolments by those with lower levels of education poses a serious challenge. More specifically, the common feature of the two MOOC portals in this study is that very few learners with educational levels below a bachelor's degree enroll in MOOCs. MOOCs should be designed to attract such learners so that MOOCs can better serve a larger range of learners, resulting in enhanced opportunities to democratize education.
- Since MOOCs from MITx and BilgeİŞ mainly provide learning opportunities for men and more educated learners, MOOC providers should consider including some non-technical and more introductory courses to attract women and less educated people.
- MOOC providers should create common data saving formats. They should also decide what the minimum requirement should be for cross portal comparison and which data need to be made open by MOOC providers. These formats and practices can facilitate better understanding of learner behaviours in different platforms, which are difficult to access and compare in the current design of MOOC-related portals.
- In order to make thorough comparisons, MOOC providers should allow the access to their data by researchers following ethical rules and guidelines. As Emmons et al. (2017) also reported, there is a need for the standardization of MOOC data to better serve the analytical and visualization needs of different stakeholders. In this way, the promises of MOOCs and their educational value as well as their potentials can be explored better.
- Moreover, as classified by Emmons et al. (2017), some standards on demographic data, performance data, activity data and feedback data collected by MOOCs are also necessary. Specifically, education levels of MOOC learners, MOOC subject categorization, or MOOC level categorization variables need standard definitions to allow accurate comparisons.

Based on the findings of this current study, there are several applicability possibilities synthesized for the field of education. Firstly, MOOCs can be leveraged by educational institutions to foster inclusive learning environments that attract a diverse range of learners, including those from underrepresented gender groups and individuals with lower formal education levels. Additionally, the increasing participation of older learners suggests that MOOCs can effectively support lifelong learning initiatives, making them valuable tools for adult education and continuing professional development programs. By reaching learners from varied educational backgrounds, MOOCs can help reduce disparities in access to quality education, especially in underserved communities or regions lacking traditional educational infrastructure. Additionally, the need for standardized metadata and regular evaluations points to an opportunity for educators to use learner analytics and feedback to refine curriculum content, improve engagement, and ensure course relevance across different learner demographics. Given their accessibility and appeal to non-traditional learners, MOOCs can be integrated into vocational and workforce development strategies, equipping learners with relevant skills for evolving job markets. The call for standardized metadata frameworks opens up possibilities for institutions to collaborate more effectively, share resources, and conduct comparative studies that drive evidence-based improvements in online education delivery. Finally, Insights into persistent participation inequalities can help educators and policymakers develop targeted outreach and support mechanisms, such as mentorship programs or adaptive learning pathways, to engage underrepresented groups more effectively.

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Ethics approval

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