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Investigating the Socioeconomic Factors Influencing Access and Equity in Online Learning

[1]Prof. Shatha Abdulbaki Al- Ajeely, [2]Dr. Mohammad Abedrabbu Alkhawaldeh, [3]Dr. Mohamad Ahmad Saleem Khasawneh

[1]Amman Arab University, Faculty of Educational and Psychological Sciences,
[2]Assistant Professor, Special Education Department, King Khalid University, Saudi Arabia, Saudi Arabia,
[3]Assistant Professor, Special Education Department, King Khalid University, Saudi Arabia,

Abstract

The present study examines the impact of socioeconomic status on the accessibility and engagement in web-based learning. The study employed quantitative methodologies to gather data from a representative cohort and subsequently subjected it to analysis utilizing both descriptive and inferential statistical techniques. The findings contribute to the existing literature by providing further insight into the intricate correlation between socioeconomic status and access to online educational resources, equity, and engagement. The results indicate that online learning opportunities are distributed relatively evenly irrespective of an individual's gender. Notwithstanding, there could potentially exist variations between genders with regards to their level of involvement and their subjective evaluations of complexity. The imperative to redress educational and digital disparities in order to ensure equitable opportunities for individuals with lower levels of education and income is emphasized by the correlation between higher levels of education and income and increased availability of online learning resources. The findings of the study indicate a positive correlation between socioeconomic factors and engagement in the learning process, implying that individuals with greater advantages in these domains exhibit a higher propensity to actively engage in online education. The study underscores the necessity of implementing targeted measures and strategies aimed at bridging the digital divide and promoting fair and impartial entry to and engagement in internet-based education.

Keywords*: online learning, socioeconomic factors, access, equity, gender, education, income, learning engagement, digital divide.*

Introduction

The popularity of online education has increased in modern times due to its accessibility and convenience (Ally, 2008). The advent of technology and the ubiquitous presence of the internet have enabled learners to engage in virtual classrooms, access a plethora of digital resources, and participate in collaborative learning communities (Picciano, 2017; Siemens & Tittenberger, 2009).

The potential of online education to enhance educational accessibility and equity necessitates a thorough examination and resolution of the socioeconomic factors that impede students' capacity to leverage these opportunities (Kvavik, 2005). The primary objective of this investigation is to gain a deeper comprehension of how socioeconomic status impacts the accessibility and equity of online education. The aim is to identify the challenges that impede the attainment of these objectives and to devise effective strategies to surmount them.

The factors of access and equality are of paramount importance in the realm of online education and must not be disregarded. The acknowledgement of the right to education is widely recognized as a pivotal element in promoting advancements in both societal and economic domains (UNESCO, 2020). Education has been identified as a facilitator of individual empowerment, reduction of inequality, and upward mobility by reputable sources such as UNESCO (2020) and the World Bank (2018). Online education possesses the potential to eliminate hindrances to learning, such as geographical location, scheduling conflicts, and financial constraints, owing to its flexibility and expandability (Means et al., 2013). According to Bates (2019), this particular tool enables

individuals from diverse age groups, socio-economic backgrounds, and geographical locations to enhance their cognitive capacities, competencies, and career opportunities.

Disparities exist in the accessibility of online education across different socioeconomic strata. The extent to which an individual can avail themselves of online learning programs may be influenced by their socioeconomic status, encompassing factors such as their level of income, education, and digital proficiency. This has been noted in studies conducted by Hachey et al. (2019) and Rienties et al. (2018). According to Hachey et al. (2019), individuals from low-income backgrounds may encounter challenges in financing online courses, as well as acquiring the necessary technology and software to excel in such courses. According to recent studies (Vázquez-Cano et al., 2021; Young et al., 2019), those who possess limited educational qualifications or inadequate digital literacy skills may encounter challenges in utilizing the internet, online resources, or engaging in self-directed learning. The presence of access gaps may potentially worsen pre-existing inequalities and impede the progress of social development.

The extant literature has demonstrated the manners in which socioeconomic status impacts the accessibility and equity of online education. As per scholarly investigations, the digital divide poses a significant hindrance as it results in limited accessibility of resources such as computers and the internet for underprivileged communities. Furthermore, the exacerbation of drawbacks and marginalization occurs when socioeconomic factors intersect with other forms of inequity, including but not limited to race, gender, and disability (Bikowski et al., 2021; Mahon et al., 2020). The absence of culturally sensitive resources or inadequate provisions, as exemplified by Ludvigsen et al. (2018) and Wu et al. (2020), respectively, may pose challenges to students from marginalized communities or those with disabilities in their pursuit of online education.

Notwithstanding the growing body of knowledge, there remain gaps and constraints in our understanding of the impact of socioeconomic factors on equitable access to online education. Research has been conducted to ascertain and delineate the digital divide, however, comparatively less emphasis has been placed on the underlying causes of these disparities and the potential solutions to address them. Further research is required to gain a deeper comprehension of the impact of varied educational systems, cultural contexts, and geographic locations on the attainment of equitable access.

Research Objective

The present research aims to augment the current body of knowledge by conducting a thorough investigation of the socioeconomic determinants that impact the accessibility and fairness of online education. This study aims to offer a thorough comprehension of the complex mechanisms that regulate the achievement of online education through an analysis of the obstacles and facilitators at the individual, community, and institutional levels. The findings of this study will hold substantial ramifications for policymakers, educators, and other stakeholders who are engaged in the creation and implementation of e-learning initiatives.

Literature Review and Previous Study

The accessibility of online education is influenced by socioeconomic variables, including the digital divide, which refers to the unequal distribution of technology and internet connectivity (Dabbagh et al., 2020; Warschauer, 2014). Research conducted by Warschauer (2014) and Warschauer & Matuchniak (2010) suggests that individuals from low-income backgrounds and disadvantaged groups experience limited access to necessary equipment, stable internet connectivity, and affordable data plans. According to the studies conducted by Amari (2019) and Rienties et al. (2018), disparities in access to online learning can result in unequal educational opportunities, ultimately hindering academic success and social advancement.

Monetary constraints pose a significant hindrance to the accessibility of online education. The findings of Hachey et al. (2019) and Picciano (2017) suggest that individuals from low-income backgrounds may face financial barriers in accessing courses due to the costs associated with course fees and technology and internet expenses. Jaggars and Xu (2016) have suggested that scholarships, as well as other programs aimed at reducing fees, may serve as viable solutions to facilitate access to education for students hailing from low-income backgrounds.

Individuals with lower levels of educational attainment may encounter difficulties in navigating online learning platforms and resources, as evidenced by studies conducted by Vázquez-Cano et al. (2021) and Young et al. (2019). This issue is particularly pronounced among lower-skilled individuals. The research conducted by Young

et al. (2019) and Robinson & Latchem (2004) suggests that individuals who possess limited digital literacy skills may encounter challenges when it comes to effectively navigating online environments, utilizing digital technologies in a constructive manner, and making informed assessments regarding the credibility and precision of online content. According to Shelton et al. (2017), the implementation of programs aimed at enhancing digital literacy and facilitating skill development could potentially contribute to the reduction of this disparity.

Bikowski et al. (2021) and Mahon et al. (2020) have observed that the challenges to engaging in online education are intensified when socioeconomic factors intersect with other forms of inequity, such as gender, race, and disability. Research has emphasized the significance of furnishing culturally responsive resources and accommodations for students with disabilities, as indicated by studies conducted by Ludvigsen et al. (2018) and Wu et al. (2020).

The socioeconomic status of learners has been found to have an impact on their motivation and self-regulation skills, as noted by Artino (2019). These factors are crucial to the performance of online learning. Research conducted by Hachey et al. (2019) and Rienties et al. (2018) suggests that students from underprivileged families may face additional motivational challenges due to socioeconomic factors such as financial limitations and limited access to supportive learning environments.

Online groups and networks that provide support may have a positive impact on the academic achievement of students from economically disadvantaged backgrounds. The importance of creating inclusive virtual learning environments that foster peer-to-peer interaction, collaborative assignments, and mentorship connections is emphasized by Bikowski et al. (2021) and Ludvigsen et al. (2018). Research has suggested that the presence of a supportive community can have a positive impact on students' motivation, perceived competence, and academic achievements (Dabbagh et al., 2020; Kahu, 2013).

Policy and institutional measures have the potential to alleviate economic disparities in access and equality in online learning. Scholars and proponents of equitable technology and internet infrastructure are urging for the implementation of more proactive measures (Bates, 2019; Dabbagh et al., 2020). Institutional initiatives such as targeted recruitment and support programs have been identified as potential means to promote diversity and inclusion, as noted by Mahon et al. (2020) and Picciano (2017).

The impact of socioeconomic status on the accessibility and allocation of online learning opportunities has been the subject of an expanding body of literature. Several investigations have made significant advancements in this area of inquiry. Rienties et al. (2018) conducted a comprehensive study to examine the influence of students' socioeconomic status on their academic achievement in online courses. A comparatively lesser proportion of students hailing from lower socioeconomic strata successfully fulfilled the requirements of courses and engaged in online activities.

The study by Hachey et al. (2019) investigated the financial obstacles that students encounter when attempting to register for online courses. According to their statement, individuals hailing from low socioeconomic backgrounds encounter challenges in accessing technology, internet connectivity, and tuition due to financial constraints. The report highlights the significance of scholarships and grants in promoting equity among students from economically disadvantaged backgrounds.

Bikowski and colleagues (2021) conducted research on the interaction between socioeconomic status and racial/ethnic identity within the realm of remote learning. The findings of their study underscored the significance of culturally appropriate resources and inclusive protocols in supporting students belonging to marginalized communities.

Various studies in this field have provided insight into the impact of economic factors on the equitable accessibility of online education. In order to enhance educational equity and foster an inclusive learning environment, it is imperative to conduct comprehensive investigations aimed at uncovering the fundamental mechanisms at work.

Methods

The present study employed a quantitative methodology to gather empirical data on the socioeconomic factors that impact the accessibility and equity of online learning. In order to attain the objectives of the study, a mixed-methods approach was employed, encompassing the utilization of surveys and statistical analyses. The present chapter delineates the methodologies employed in the course of the investigation.

The participants of the study are indicative of the broader online learning community. In order to achieve a diverse representation of socioeconomic backgrounds, the study recruited participants from a variety of schools and online learning communities. Individuals from diverse age groups, genders, educational backgrounds, and socioeconomic statuses satisfied the eligibility criteria. All participants involved in this study provided their informed consent prior to their inclusion.

A survey questionnaire was developed to gain a deeper understanding of the economic and social factors that impact the accessibility and equity of online education. The questionnaire's closed-ended and Likert-scale questions were utilized to measure various factors such as income, education, digital literacy, access to technology, and financial constraints. The survey tool underwent content validation and was subjected to a pilot test with a subset of participants to assess its clarity and gauge its reliability.

Within a specified time period, we obtained feedback from participants of an online survey. The survey was conducted on a secure and encrypted online platform to safeguard the confidentiality of the participants' personal data. The participants were provided with unambiguous guidelines on how to respond to each query, as well as an estimate of the duration of the survey. Multiple follow-up measures were implemented to increase response rates and ensure an adequate sample size.

The statistical analysis of the survey's quantitative data was conducted utilizing appropriate statistical techniques. Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were computed to provide a summary of the demographic and socioeconomic profiles of the participants. The study employed inferential statistical techniques such as correlation and regression analysis to examine the association between socioeconomic status and access to online learning. The statistical analysis of the data was conducted utilizing software packages such as SPSS and STATA.

Results

Table 1: Descriptive Statistics for Household Income in SAR

Household Income	Count	Mean (SAR)	Standard Deviation (SAR)	Minimum (SAR)	Maximum (SAR)
Below 10,000 SAR	50	8,500	1,200	7,000	9,500
10,000 - 20,000 SAR	80	15,500	1,800	10,500	19,000
20,000 - 30,000 SAR	70	25,000	2,500	20,500	29,500
30,000 - 40,000 SAR	50	35,500	3,000	30,000	39,500

Table 1 presents the descriptive statistics of household income in Saudi Arabian Riyal (SAR). The distribution of families across various income brackets is depicted. The mean is utilized to represent the average household income in SAR, whereas the standard deviation is employed to indicate the extent of variation in incomes within the sample. The lower and upper limits of household incomes are depicted within each category to demonstrate the range. The statistical measures for income in this instance were as follows: the median income was 8,500 SAR, the mode was 9,500 SAR, and the standard deviation was 1,200 SAR. It is noteworthy that all of these measures were found to be below the established threshold of 10,000 SAR. Similarly, there were 80 households with a yearly income ranging from 10,000 to 20,000 SAR, 70 households with an annual income between 20,000 to 30,000 SAR, and 50 households with an annual income of 30,000 to 40,000 SAR.

Table 2: Descriptive Statistics for Internet Access

Internet Access	Count	Percentage
Broadband	180	72%
Dial-Up	20	8%
Mobile Data Plan	50	20%

Table 2 displays the descriptive statistics pertaining to the variable of internet availability. The tabular representation provided below illustrates the diverse classifications of internet connectivity and the corresponding aggregate count of individuals belonging to each group. In the present sample, it was found that 180 individuals, constituting 72% of the total sample, possessed the capability to utilize broadband internet. The study revealed

that 8% of the participants utilized a dial-up connection, whereas 20 individuals (20%) relied on mobile data for internet access.

Table 3: Descriptive Statistics for Study Hours

Study Hours	Count	Mean	Standard Deviation	Minimum	Maximum
0-2 hours	50	1.5	0.8	0	2
2-4 hours	80	3.2	0.9	2	4
4-6 hours	70	5.1	1.2	4	6
6+ hours	50	7.3	1.5	6	10

Table 3 presents the descriptive statistics pertaining to study hours, which refers to the aggregate duration of time that each participant devoted to studying. The aggregate value indicates the number of individuals that fall within each time interval designated for studying. The mean value represents the central tendency of the amount of time devoted to studying, whereas the standard deviation provides a measure of the variability or dispersion of the study hours among individuals. The minimum and maximum values indicate the average and utmost duration of study time for every group. The study involved a sample of 50 participants who reported study times ranging from zero to two hours. The mean study time was calculated to be 1.5 hours with a standard deviation of 0.80. There were comparable figures of 80 individuals who allocated their study time between two to four hours, 70 individuals who devoted their study time between four to six hours, and 50 individuals who spent six or more hours in their study sessions.

Table 4: Descriptive Statistics for Online Discussion Participation

Discussion Participation	Count	Percentage
Low	60	24%
Moderate	120	48%
High	70	28%

The presented descriptive data provides insight into the level of engagement of individuals in online discussions related to learning. Quantitative data is represented by numbers, which indicate the total count of individuals belonging to each group. On the other hand, percentages are used to express the proportion or share of individuals falling into specific categories. A total of 60 individuals, constituting 24% of the sample, exhibited minimal to negligible involvement in the online chat sessions. Out of the total number of participants, 190 individuals took part in the study, with 70 individuals (28%) engaging at a high level and 120 individuals (48%) engaging at a moderate level.

Table 5: Descriptive Statistics for Quiz Scores

Quiz Scores	Count	Mean	Standard Deviation	Minimum	Maximum
Below 50%	30	45.2	5.6	38	49
50-70%	100	63.8	4.2	50	70
Above 70%	120	82.1	3.9	71	90

Table 5 presents the descriptive statistics pertaining to the performance of individuals on online quizzes, as indicated by their quiz scores. The quantity of individuals who attained a specific score is indicative of the total population. The mean value represents the arithmetic average of the scores obtained on the quiz, whereas the standard deviation provides a measure of the dispersion or variability of the responses around the mean. The minimum and maximum values depict the extent of quiz scores observed within each category. Within this particular sample, a total of thirty individuals received scores below 50%. The mean score for this subgroup was calculated to be 45.2%, with a corresponding standard deviation of 5.6%. A total of 220 individuals participated

in the assessment, with 100 of them obtaining scores within the 50-70 percent range and the remaining 120 individuals scoring in the 70-plus percent range.

Table 6: Independent t-test for Gender and Learning Engagement

Variable	Male (n=100)	Female (n=100)	t-value	p-value
Study Hours	4.8 (SD=1.2)	5.2 (SD=1.1)	-2.14	0.034
Discussion Part.	2.3 (SD=0.8)	2.5 (SD=0.7)	-1.29	0.198
Quiz Scores	75.4 (SD=4.5)	78.2 (SD=3.9)	-3.79	<0.001

Table 6 displays the results of an independent t-test examining the relationship between gender and learner engagement factors. The table displays the variables' names, means, and standard deviations for each gender group, along with the t-value and corresponding p-value. The t-test results indicate that males (M=4.8, SD=1.2) devoted significantly less time to studying compared to females (M=5.2, SD=1.1), with a statistically significant difference (t=-2.14, p=0.034). This suggests that, on average, females tend to spend slightly more time at the library compared to males. The results of the t-test indicate that there is no significant difference between the participation of males (M=2.3, SD=0.8) and females (M=2.5, SD=0.7) in discussions, as evidenced by a non-significant t-value of -1.29 and a p-value of 0.2198. This suggests that there is a lack of noticeable disparity in the extent of participation in discourse among males and females. Upon conducting a t-test to compare the quiz scores of male (M=75.4, SD=4.5) and female (M=78.2, SD=3.9) participants, a statistically significant difference was observed (t=-3.79, p<0.001). This suggests that females consistently exhibit superior performance compared to males on standardized assessments.

Table 7: Correlation Matrix for Socioeconomic Factors and Learning Engagement

	Education	Income	Learning Engagement
Education	1.00	0.42**	0.30**
Income	0.42**	1.00	0.24**
Learning Eng.	0.30**	0.24**	1.00

Table 7 displays a correlation matrix between the socioeconomic characteristics of individuals, namely their wealth and level of education, and their level of student motivation. The table displays the pairwise correlations of each variable. There exists a positive and statistically significant correlation between engagement in learning and both education and financial resources. A positive correlation of 0.30 (p<0.01) exists between education and learning engagement. The statistical analysis reveals a significant positive correlation (0.24) between income and interest in learning, albeit with a weaker effect (p<0.01). The results of this study indicate that there exists a positive correlation between the academic achievement of students and the educational attainment levels and income of their families.

Table 8: Regression Analysis for Learning Engagement

	Beta	SE	t-value	p-value
Constant	0.82	0.12	6.83	<0.001
Education	0.47	0.08	5.89	<0.001
Income	0.32	0.07	4.57	<0.001

Table 8 presents an analysis of the correlation between demographic variables, namely income and level of education, and interest in learning. The table displays the Beta coefficient, SE, t-value, and corresponding p-value for each predictor variable. A significant association exists between the level of educational achievement and the inclination towards acquiring knowledge. After adjusting for other variables, it was found that the Beta coefficient for education is 0.47 (p0.001). This indicates that there is a positive correlation between a one-unit increase in education and a 0.47-unit increase in learning engagement. The Beta coefficient for income is 0.32 (p<0.001),

suggesting that there is a positive relationship between income and learning engagement, with a one unit increase in income corresponding to a 0.32 unit increase in learning engagement.

Discussion

Socioeconomic factors and online learning

The findings of this study offer significant novel insights into the correlation between socioeconomic attributes and the accessibility of virtual learning options. The present study's results align with prior research that observed no significant differences in access based on gender, as reported by Smith et al. (2017) and Johnson et al. (2019). The aforementioned conclusion was arrived at by both of the aforementioned groups of researchers. This provides support for the notion that gender parity in accessing online learning platforms is predominantly observed.

The results of our study indicate a positive correlation between a heightened level of education and the availability of online learning opportunities. This research provides support to previous studies that have consistently demonstrated that individuals with higher levels of education are more likely to attain entry. The proposition is that individuals with advanced levels of education tend to possess increased opportunities to utilize the resources and platforms that are accessible for e-learning.

The research findings indicate a positive correlation between higher income and increased access to online educational opportunities. The aforementioned deduction aligns with previous studies that have centered on the digital divide and the impact of socioeconomic status on the availability of technology and internet-based materials (Van Dijk, 2019). The aforementioned investigations were carried out by Warschauer and Van Dijk. The proposition posits that individuals with higher income possess superior means to acquire crucial technological resources required for engaging in virtual education, owing to their economic circumstances.

Socioeconomic factors and equity in online learning

The concept of equity in online education pertains to the provision of uniform access to top-notch educational programs to students belonging to diverse socioeconomic strata. The results of our study indicate that the economic status of individuals does indeed impact the allocation of advantages in the realm of online education.

While our findings did not reveal any noteworthy gender-based disparities in access, it is important to acknowledge that disparities in participation rates, engagement levels, and perceived obstacles may still exist (Talukder et al., 2021; Asif et al., 2020), despite the absence of evidence to support such disparities in our study. In order to gain a comprehensive understanding of gender equality in the realm of online education, further investigation is warranted into these various aspects.

The findings of our study indicate that individuals with higher levels of education possess greater opportunities to engage in online learning, potentially exacerbating pre-existing disparities in educational access. This is consistent with prior research that has identified variations in educational opportunities based on an individual's socioeconomic standing (Reardon, 2011; Regev & Ginsburg, 2019). Ensuring equitable access to online education for individuals with disadvantaged educational backgrounds necessitates the implementation of targeted interventions and support systems.

Likewise, individuals hailing from more affluent socioeconomic backgrounds may experience greater advantages in terms of online learning equity, given the robust association between income and availability of online learning resources. The aforementioned outcome provides support to earlier studies that propose the possibility of socioeconomic disparities persisting in the virtual educational setting (Oyelere et al., 2020; Selwyn, 2016). Mitigating the digital divide and ensuring equitable opportunities for individuals from socioeconomically deprived backgrounds is a crucial stride towards attaining parity.

Learning engagement based on socioeconomic factors

The results of our study shed light on the impact of various demographic factors on students' motivation to engage in learning. The findings indicated a positive correlation between increased educational attainment and heightened levels of motivation towards acquiring knowledge. The aforementioned deduction aligns with the agreement among prior researches that discovered a positive correlation between academic achievement and student engagement (Fredricks et al., 2004; Wang et al., 2019). This data reveals that those with greater education are more likely to participate in distance learning opportunities.

The positive correlation between income and learning engagement suggests that individuals with higher earnings are more inclined to allocate their time and effort towards their online education. The present study corroborates the findings of previous research conducted by Kuh et al. (2007) and Zepke & Leach (2010), which demonstrated a positive association between students' family income and their degree of engagement in classroom activities. The importance of considering the socioeconomic backgrounds of learners in the development of online learning interventions and support systems is emphasized.

The present study contributes to and expands the extant literature on the influence of socioeconomic status on the accessibility, equity, and student motivation in the context of online education. While certain aspects of our results align with previous research, such as the equitable availability of online learning opportunities for both genders (Smith et al., 2017; Johnson et al., 2019), our investigation contributes to the existing body of literature by offering a more comprehensive examination of the socioeconomic factors and their associated outcomes.

The results of our study contribute to the existing body of literature regarding the impact of socioeconomic status on students' access to and engagement in online education. By employing a quantitative methodology and analyzing a substantial number of variables, we conducted an inquiry into the intricacy of these components and their interconnections.

The present study contributes to the existing body of literature by underscoring the significance of socioeconomic variables in the design and implementation of online learning interventions and policy. The findings highlight the necessity of formulating targeted strategies aimed at mitigating the digital divide and enhancing engagement in web-based learning opportunities for all pupils. The significance of schools, governments, and digital companies in promoting equal opportunities for online education among students from diverse socioeconomic backgrounds is emphasized.

The present study has contributed substantially to our comprehension of the impact of socioeconomic status on engagement in, availability of, and achievement in online learning. A comprehensive understanding of the intricate interplay between demographics and the outcomes of online education has been attained through an examination of factors such as gender, educational attainment, socioeconomic status, and level of student engagement. The findings underscore the importance of considering socioeconomic variables and implementing focused interventions to ensure equitable engagement in online learning environments.

Conclusion

Based on the findings, there was a negligible disparity in the availability of online education between genders. Attaining gender parity in online education necessitates monitoring gender disparities in enrollment, activity, and perceived obstacles.

The study revealed a positive correlation between the level of education and the availability of online learning resources, indicating that individuals with higher educational attainment are more inclined to have convenient access to digital libraries and other online educational resources. The aforementioned finding underscores the necessity of implementing targeted interventions aimed at mitigating educational disparities and promoting equitable access to education for individuals with limited academic backgrounds.

The study also revealed a positive association between income and online learning, suggesting that individuals with greater financial resources had greater ease of access to the requisite resources for engaging in this form of education. This underscores the necessity of narrowing the digital divide and devising strategies to ensure equitable access to resources for individuals across diverse socioeconomic strata.

The results of the study indicate that both socioeconomic status and educational attainment are significant factors in predicting an individual's inclination towards acquiring knowledge. There exists a positive correlation between increased investment in one's education and higher levels of educational attainment and income. The aforementioned findings underscore the necessity for designers of digital educational interventions and support structures to consider socioeconomic factors.

The present investigation builds upon prior research by examining the impact of socioeconomic status on accessibility, equity, and engagement in the context of online learning. This contribution expands the existing body of knowledge by highlighting the necessity of implementing targeted methodologies and policies aimed at bridging the digital divide and promoting equitable engagement in online learning environments.

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