TikTok Consumption and University Student Engagement in Virtual Classrooms in Egypt

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Abstract: In recent years, TikTok, a video-based application, has become immensely popular, especially among young social media users. During the COVID-19 pandemic, TikTok also proved to be useful in remote learning. The present study examines the use of TikTok videos among university students in Egypt, with a specific focus on how these videos enhance student online engagement in virtual classrooms. We also evaluate the moderating effect of gender, age, and academic major on the relationship between the adoption and educational use of TikTok and student online engagement. The results of a survey conducted among a total of 250 students at Cairo University from different age groups, gender, and majors revealed statistically significant and positive correlations between the adoption of TikTok (perceived usefulness, perceived ease of use, and social influence), educational use of TikTok (via facilitating access to information and sharing material), and online student engagement. The results also showed two significant moderations based on gender and age. First, we found that access to information via TikTok contributed more to the online engagement of male students as compared to their female counterparts. Second, with increasing age, sharing information and materials with the help of TikTok was found to have a greater effect on online student engagement. While it remains to be established whether these findings can be generalized to other universities and educational institutes in Egypt, the adoption and educational use of TikTok can be considered to be a promising way to facilitate online education.

Keywords: Cairo University, Egypt, Educational Use of TikTok, Online Student Engagement, Technology Acceptance Model (TAM), TikTok

Introduction

Along with performing socializing, communication, and entertainment functions, social media platforms have recently started to be increasingly used in pedagogical activities and practices (Manca and Ranieri 2016). Social media apps—particularly those with key features like short videos and music—have gained significant popularity due to their openness, interactivity, and sociability (Kumar and Nanda 2020; Shutsko 2020; Chugh and Ruhi 2018; Van Dijck and Poell 2017; Manca and Ranieri 2016). Among social media platforms, TikTok is considered to be the fastest-growing app, with users in over 150 countries (Khlaif and Salha 2021). TikTok generated an influx of users equaling 3 billion downloads since its launch in 2016 (McLachlan 2023). According to recent estimates, TikTok has over 800 million users globally, which reflects the reach and impact of this app on users (Khlaif and Salha 2021). With regard to the age of TikTok users, available statistics indicate that most users (over 61%) are between 10 to 19 or 20 to 29 years old (Wall Room Media 2023).

TikTok is a video-based application that allows the global circulation of engaging and creative short videos on social media. Typically used for creating fun and engagement (Lu, Lu, and Liu 2020; Savic 2021), TikTok originally stemmed from Generation Z's need for quick gratification.

COMMON GROUND

The app was designed to lure users into continued use and watching (Wynne, Wright, and Alvermann 2021; Zeng and Abidin 2021). However, in recent years, TikTok has also started to be used for educational purposes. During the COVID-19 pandemic, for instance, TikTok proved to be particularly helpful in facilitating the learning process (Solomon 2021). Students were enlivened by the tandem of education and social media, and there is evidence suggesting that learners considered TikTok to be both fun to use and helpful in writing and math lessons with music and dancing (Solomon 2021).

Some academic evidence has been accumulated to demonstrate that TikTok positively affects students' well-being and personal happiness during distance learning (online learning via virtual classrooms). For instance, in a study that empirically tested the impact of social media on collaborative learning, Amadu et al. (2018) concluded that social media platforms, including TikTok, can effectively engage students in an interactive environment. The microblogging feature of Twitter was found to have particularly advantageous potential for both language acquisition and pedagogy. As argued by Lomicka and Lord (2016), this unique feature provides avenues for engagement with individuals who are fluent in the language, promotes the identification and interchange of significance, and caters to a variety of assignments across various proficiency levels and environments. Likewise, Holmes et al. (2013) found that the control of interactions and activities by users, particularly on pertinent matters of interest, is a crucial element of Twitter. Overall, Amadu et al. (2018) argued that students' positive attitudes toward social media platforms, including TikTok, can be explained through the lens of the technology acceptance model (TAM), which conceptualizes the factors that determine the adoption and use of a new technology (Amadu et al. 2018).

Specifically, the TAM asserts that a user's perception of a technology's usefulness and simplicity of use affects its adoption. According to previous studies, the perceived usefulness, effectiveness, ease of use, and self-efficacy of technology have a positive impact on students' motivation to use it in online applications and virtual classrooms (Peng and Hwang 2021). Facebook has garnered the attention of educators and academics alike, owing to its potential for educational purposes. Consequently, several studies have been undertaken to examine the use of Facebook as an educational tool, particularly in the context of language teaching and learning; for instance, according to Tiryakioglu and Erzurum (2011), Facebook possesses attributes that enhance communication proficiencies among students as well as their engagement, cooperation, peer assistance, and participation in academic pursuits.

Therefore, it can be assumed that perceived ease of use and usefulness of a technology can influence students' decision to use TikTok, along with other digital platforms for entertainment and educational purposes. Another factor that can influence learners' decisions to use a technology is the concept of "social influence," defined as the extent to which a person or a group is acting under the impact of some others (person/group or event) (Milošević et al. 2015). The growing use of TikTok can be attributed to social influence, which, as a result, could lead to higher student engagement in online/virtual classes (Milošević et al. 2015).

To date, extensive evidence has documented the growing use of online social media apps for businesses, information seeking, and educational purposes (e.g., Liu 2020; Capone et al. 2020). For instance, in a survey-based study with 384 Egyptian university students from different disciplines and grades, Bakkar (2020) found that, during the COVID-19 pandemic, the use of online applications considerably increased and greatly facilitated the learning process in virtual classrooms. Likewise, Hayes et al. (2020) found that science students particularly welcomed short videos (lasting from 15 seconds to 1 minute) created via social media apps, including TikTok. In another relevant study, Fiallos, Fiallos, and Figueroa (2021) established that TikTok-based health sciences videos were particularly popular among science students. Similarly, the expressive and connective power of music on TikTok helped to positively engage students in the learning process and facilitated the creation of fun, creative, and collaborative environment for online learning (Literat 2021). Overall, TikTok and other social media apps were reported to positively influence students' academic performance and increase their online engagement in online classrooms (Swathi and Devakumar 2020). In summary, previous literature has highlighted the educational use of TikTok, which facilitates learning and access to information and helps with sharing useful educational content (Milošević et al. 2015).

In the context of the growing use of TikTok among the young generation, universities have been urged to use this app to promote campus experiences and inspire learning via engaging content (Escamilla-Fajardo, Alguacil, and López-Carril 2021). Currently, there is already some evidence that, due to its creative and fun content, TikTok can effectively increase engagement of science students (Zeng, Schäfer, and Allgaier 2020). Similarly, Capili and Gaur (2021) observed that TikTok provides tutors with easiness and flexibility to make creative and short content on various concepts and reach wider audiences, thus making learner experiences more enjoyable in online settings.

An area in education where TikTok and other social media platforms were reported to be particularly effective is foreign language learning (Chawinga 2016, 2017). Here, social media platforms offer significant resources and learning opportunities for students, serving as effective tools for enhancing learning experiences. Instagram reels, for example, allow educators to create and share informative and engaging videos for students who can easily consume educational materials using relevant and proper hashtags. Similarly, Twitter was reported to be effectively used in foreign language educational settings to enhance student participation and promote active learning (Abney et al. 2018). In its turn, YouTube was argued to provide a variety of useful educational content for foreign language learners (Othman 2018), fostering a self-paced learning approach catering to various learning styles and empowering students to manage their own educational journey.

However, despite the growing evidence on the usefulness of the TikTok app in terms of increasing student online engagement, relevant research on the use of TikTok in Egypt educational settings remains scarce. To fill this gap in the literature, the present study explores the impact of TikTok videos on learners' engagement among students at Cairo University, one of Egypt's oldest higher education institutions, with a large number of faculties (over 25) and

students (around 230,000) (Times Higher Education, n.d.). Being the country's top university, during the COVID-19 pandemic, Cairo University partnered with Blackboard to provide virtual classroom solutions and enhance its digital teaching infrastructure (Daily News Egypt 2020). In the present study, we investigated students' online learning engagement with a particular focus on the role of the TikTok app. While several previous studies conducted in Egypt analyzed the perspective of online undergraduate students from well-known higher educational institutions (El-Sayad, Md Saad, and Thurasamy 2021), the role of TikTok or other social media applications or platforms on student engagement has not been explored yet.

The two research questions addressed in the present study are as follows: (1) Does the adoption of TikTok and its use for educational purposes increase online student engagement in virtual classrooms? (2) How do students' demographic characteristics (i.e., age, gender, and academic major) moderate the relationship between the adoption and educational use of TikTok and student online engagement? The conceptual model used in the present study is shown in Figure 1.
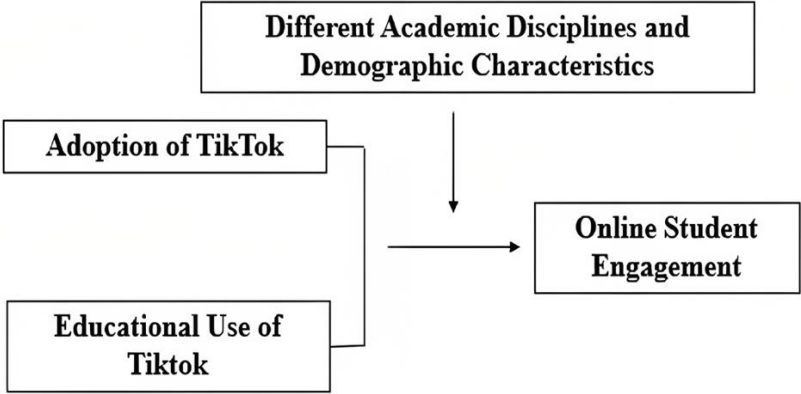

Figure 1: Research Conceptual Model

Methodology

Data Collection

The data were collected from students at Cairo University, Egypt's leading public university, via a self-administered survey with closed-ended questions on a five-point Likert scale (from 1 = "Strongly Disagree" to 5 = "Strongly Agree"). The survey was created on Google Forms and was made available online to collect data from a maximum number of students.

The variables measured using the questionnaire items included the (1) adoption of TikTok (perceived usefulness, perceived ease of using, and reasons for using TikTok); (2) educational use of TikTok (facilitating access to information, sharing materials and information); and (3) online student engagement. The questionnaire items related to the adoption of TikTok were based on the TAM Model (Alenazy, Al-Rahmi, and Khan 2019).

Online student engagement was measured using the adapted Online Student Engagement (OSE) scale originally proposed and validated by Dixson (2015).

To determine the appropriate sample size, we used the Cochran's sample size formula, which calculates the optimal number of respondents based on the following variables:

1. Preferred confidence level (i.e., 95% or 99%)
2. The expected percentage of the given characteristics present in the population
3. The preferred level of precision (Bartlett, Kotrlik, and Higgins 2001)

Cochran's sample size formula determines the ideal sample size (N) as shown in equation (1):

$$N = (Z2 \text{ x } p \text{ x } q)/ d2 \tag{1}$$

where z is the z-score based on the desired confidence level; p is the estimated percentage of the given characteristic; q is the remainder from the estimated percentage of the given characteristics (1-p), and d is the desired level of precision.

In the present study, we assumed a 95 percent level of confidence; the z-score was taken as 1.96, while p and q were taken as 0.5, assuming that only 50 percent of the population had the same characteristics under question. Furthermore, it was assumed that the margin of error was 10 percent. Accordingly, using equation (1), the estimated appropriate sample size amounted to 96.

During the initial stage of the data collection process, a total of 300 students were reached with the online survey form by sending the link to establish a sampling frame. To give each member of the target population an equal chance to participate in the study, a simple random sampling strategy under probability sampling was used. To this end, we randomly selected a subset of participants among the students of different majors studying at Cairo University. A total of 253 students filled the survey. However, after eliminating incomplete responses, missing values, and/or outliers, the final sample amounted to 250 students. This number by far exceeded the recommended sample size computed using Cochran's sample size formula.

We also ensured all ethical considerations, including free consent, the anonymity of students' identities, and privacy and confidentiality of the survey data. The respondents were given the right to withdraw from the survey at any time during the data collection process.

Data Analysis

First, the reliability of the data collection instrument was determined using data quality checks tests such as Cronbach's alpha. Reliability tests were performed using SPSS. The internal consistency reliability scores of each observed item group were higher than the acceptable alpha score of 0.7.

The data were analyzed using SPSS. Along with descriptive statistics of the sample, the average ratings of each item were computed. To test the research model, we also computed Pearson correlations. Finally, a general linear model (GLM) was run to explore the moderating effect of demographic variables in the relationship between independent variables (adoption of TikTok and educational use of TikTok) and the dependent variable (online student engagement).

Results

The results of the demographic analysis using frequency statistics to determine the proportion of three demographic characteristics—namely, age, gender, and academic major—are summarized in Table 1. As can be seen in Table 1, the sample consisted of more male students (56.4%) than females (43.6%). Most respondents were 18 to 22 years old (39.2%), followed by those between 23 to 27 years old (28.8%). Only 5.2 percent of the study participants were younger than 18 years old. Regarding the participants' majors, the sample included students from several departments at Cairo University. Most students were from the Faculty of Computers and Artificial Intelligence (14.4%), followed by those from the Faculty of Medicine (12.8%).

Table 1: Demographic Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Age	<18 years	13	5.2	5.2	5.2
	18 to 22 years	98	39.2	39.2	44.4
	23 to 27 years	72	28.8	28.8	73.2
	28 to 32 years	48	19.2	19.2	92.4
	≥33 years	19	7.6	7.6	100
	Total	250	100	100	
Gender	Male	141	56.4	56.4	56.4
	Female	109	43.6	43.6	100
	Total	250	100	100	
Academic Major	Faculty of Agriculture	19	7.6	7.6	7.6
	Faculty of Archaeology	17	6.8	6.8	14.4
	Faculty of Arts	22	8.8	8.8	23.2
	Faculty of Commerce	17	6.8	6.8	30.0
	Faculty of Computers and Artificial Intelligence	36	14.4	14.4	44.4
	Faculty of Economics and Political Science	19	7.6	7.6	52.0
	Faculty of Education for Early Childhood	16	6.4	6.4	58.4
	Faculty of Engineering	15	6.0	6.0	64.4
	Faculty of Law	20	8.0	8.0	72.4
	Faculty of Mass Communication	17	6.8	6.8	79.2
	Faculty of Medicine	32	12.8	12.8	92.0
	Faculty of Science	20	8.0	8.0	100.0
	Total	250	100.0	100.0	

In terms of the participants' daily and weekly use of TikTok, most students reported using the app 2 to 3 hours per day (29.2%), followed by those who used it 1 to 2 hours a day (24.4%). In contrast, only 11.6 percent of the students reported using TikTok for less than 30 minutes per day (see Table 2). Overall, as shown by the results in Table 2, TikTok kept most of the respondents engaged for at least more than an hour. Furthermore, the results revealed that over half of the study participants visited TikTok 6 times or more per week, followed by 30 percent who used it 4 to 5 times a week. In contrast, only 5.6 percent of the students used the app once a week.

Table 2: Usage of TikTok on Daily and Weekly Basis

		Frequency	Percentage
How much time do you spend on TikTok per day?	Less than 30 minutes	29	11.6
	30 minutes to less than 1 hour	44	17.6
	1 hour to less than 2 hours	61	24.4
	2 to less than 3 hours	73	29.2
	3 hours and more	43	17.2
How often do you visit TikTok per week?	Once a week	14	5.6
	2 to 3 times a week	36	14.4
	4 to 5 times a week	75	30.0
	6 times or more in a week	125	50.0

Most of the respondents agreed with the statement "Through TikTok, I can create personalized content which is fun to share" (M = 3.42, SD = 1.09; see Table 3). Accordingly, creating and easily sharing personalized content is one of the factors that increase the usefulness of TikTok as a social media platform. Similarly, in the context of perceived ease of use, the results showed that the majority of the respondents found TikTok easy to use ("It is very convenient and flexible for me," M = 3.67, SD = 1.12). On the other hand, the intention of using TikTok to earn money was not widely spread among the study respondents, as many disagreed with the statement "I am currently using TikTok because it could help me make extra money on the side" (M = 2.80, SD = 1.52). The most agreed reason for using TikTok among the study participants was to connect with like-minded people who share similar interests (M = 3.80, SD = 1.0).

Table 3: Descriptive Statistics of the Variables Related to TikTok Adoption

Variables	Mean	SD
I started using TikTok because it helped me to acquire valuable content and information [Perceived Usefulness].	2.51	1.02
Using TikTok has added value to my life in terms of meeting my personal, social, and leisure requirements [Perceived Usefulness].	3.18	0.99
Through TikTok videos, I can access personalized content which is fun to watch and share [Perceived Usefulness].	3.21	1.04
Through TikTok, I can create personalized content which is fun to share [Perceived Usefulness].	3.42	1.09
It was easy to create and use my personal account on TikTok [Perceived Ease of Use].	3.55	1.08
I find TikTok features easy to manage [Perceived Ease of Use].	3.60	1.14
I use TikTok because it has some features that allow me easily to create, watch and share videos with my colleagues [Perceived Ease of Use].	3.64	1.12
Using TikTok is very convenient and flexible for me [Perceived Ease of Use].	3.67	1.12
I can easily find videos on TikTok that satisfy my needs [Perceived Ease of Use].	3.66	1.12
I am currently using TikTok because its video content interests me [Usage].	3.73	1.04
I am currently using TikTok because it could help me to make extra money on the side [Usage].	2.80	1.52
I use TikTok because it helps me to connect with people who have similar interests [Usage].	3.80	1.04
I use TikTok because it helps me to cultivate my hobbies [Usage].	3.63	1.220

Additionally, the respondents' ratings of the items showed that they either disagreed with using TikTok for educational purposes or were neutral regarding this issue (see Table 4). For instance, the statement "On many instances, video content on TikTok has helped me understand

my course subjects better" had the mean rating of 2.84 (SD = 1.1), implying that most students were neutral about this idea. Similarly neutral were the study respondents concerning uploading educational videos on their accounts and sharing them with their colleagues (M = 2.97, SD = 1.15) and sharing course-related materials and resources with their classmates (M = 2.96, SD = 1.04).

Table 4: Descriptive Statistics of the Variables of Educational Use of TikTok

Variables	Mean	SD
I spend time on TikTok because it helps me to find video content related to my course [Facilitating Access to Information].	2.60	1.05
On many instances, video content on TikTok has helped me to better understand my course subjects [Facilitating Access to Information].	2.84	1.10
I can easily find information for my academic work using hashtags on TikTok [Facilitating Access to Information].	2.80	1.13
I often find myself sharing video content on TikTok related to classwork with my friends [Sharing Material and Information].	2.88	1.11
I know how to use TikTok videos to share course-related materials and resources with my classmates [Sharing Material and Information].	2.96	1.04
TikTok motivates me to upload educational videos on my account and share them with my colleagues [Sharing Material and Information].	2.97	1.15

As concerns the study participants' online engagement, the results revealed that the respondents mostly participated in online learning sessions or virtual classrooms via engaging with other students in the class (M = 3.81, SD = 1.05) or through asking questions in the chat rooms or on online discussion boards accessible during online classes (M = 3.62, SD = 1.02; see Table 5). In contrast, the least agreed-upon ways to stay engaged included staying focused on online lecture during virtual class (M = 3.40, SD = 1.18), helping colleagues to understand difficult concepts (M = 3.43, SD = 1.22), and actively participating in online classes during academic discussion (M = 3.45, SD = 1.04).

Table 5: Descriptive Statistics of the Items of Online Student Engagement

Variables	Mean	SD
I stay focused during my online classes.	3.40	1.18
I look over class notes before getting online to understand the course topic.	3.48	1.20
I actively participate in online academic conversations.	3.45	1.04
I efficiently use time in interacting with my instructor and classmates in online classes using discussion boards, chat, and other interactive features.	3.50	1.02
I help my colleagues in my online classes in understanding some concepts that are difficult to grasp.	3.43	1.22
I find ways to make my online course interesting to me.	3.56	1.16
I find ways to apply online course materials or find the relevance of it to my life for a better understanding.	3.57	1.13
I ask questions through chat rooms or discussion boards during online classes in case of any confusion, query, or misunderstanding.	3.62	1.02
I regularly post my opinions, examples, or comments on discussion boards during online classes.	3.57	1.06
I try to get to know other students in class.	3.81	1.05

The results of Pearson correlations among the main variables are summarized in Table 6. The results of correlation analysis revealed a statistically significant correlation between the perceived usefulness of TikTok and online engagement (r = 0.301, p < 0.01). The magnitude suggested a moderate strength of relationship, while the association was positive, thereby suggesting that a greater perceived usefulness of TikTok was associated with a greater online student engagement.

Similarly, the relationship between the perceived ease of use of TikTok had a statistically significant correlation with online engagement (r = 0.291, p < 0.01). Although the extent of the relationship was weak, the positive sign of the coefficient suggests that a higher score of perceived ease of use was linked with a greater online student engagement.

Another important construct that could positively drive students' online engagement was the social influence of TikTok. According to the results, there was a significant and positive link between social influence and online student engagement (r = 0.271, p < 0.01), suggesting that the overall adoption and use of TikTok were significantly and positively associated with online student engagement.

Furthermore, the results of correlation analysis showed that both constructs of the educational use of TikTok were statistically significantly correlated with online student engagement. Specifically, a greater access to information via TikTok was associated with more online engagement (r = 0.408, p < 0.01). Similarly, the sharing of material and information with the help of TikTok was beneficial for a stronger online engagement (r = 0.415, p < 0.01).

Table 6: Pearson Correlations among the Main Variables

		[1]	[2]	[3]	[4]	[5]	[6]
Perceived Usefulness [1]	Pearson Correlation	1	0.673[**]	0.692[**]	0.473[**]	0.403[**]	0.301[**]
Perceived Ease of Use [2]	Pearson Correlation	0.673[**]	1	0.732[**]	0.427[**]	0.385[**]	0.291[**]
Social Influence [3]	Pearson Correlation	0.692[**]	0.732[**]	1	0.512[**]	0.508[**]	0.271[**]
Facilitating Access to Information [4]	Pearson Correlation	0.473[**]	0.427[**]	0.512[**]	1	0.772[**]	0.408[**]
Sharing Material and Information [5]	Pearson Correlation	0.403[**]	0.385[**]	0.508[**]	0.772[**]	1	0.415[**]
Online Student Engagement [6]	Pearson Correlation	0.301[**]	0.291[**]	0.271[**]	0.408[**]	0.415[**]	1

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

In summary, the results revealed that both the adoption and educational use of TikTok significantly contributed to online student engagement. Of note, all items measuring the adoption of TikTok and educational use of TikTok were found to be significantly associated with each other, with few strong relationships. This may suggest a mediating role of different variables in the key relationships. To explore this possibility, we further evaluated the proposed moderating effects of the demographic variables (included as control variables) using a GLM with two-way interaction effects. The results are summarized in Table 7.

The GLM interaction effects revealed only two significant moderations: Gender x Access Info and Age x Sharing Material. The former interaction significantly predicted online student engagement (F = 2.183, p < 0.1). The parameter estimates revealed that the coefficient of gender 1 (male) was positive, suggesting that access to information contributed more to online student engagement specifically in the case of male students.

Furthermore, the second interaction (Age x Sharing Material) was also significant ($F = 2.33$, $p < 0.1$). The coefficient signs revealed that sharing material impacted online student engagement more with an increase of age of the respondents. In conclusion, the results of GLM analysis revealed that gender and age play a moderating role in the relationship between the educational use of TikTok and student online engagement.

Table 7: GLM Analysis

Dependent Variable: Online Student Engagement					
Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	69.043[a]	35	1.973	3.467	0.000
Intercept	51.302	1	51.302	90.170	0.000
Perceived Usefulness	0.591	1	0.591	1.039	0.309
Perceived Ease of Use	1.471	1	1.471	2.585	0.109
Social Influence	1.351	1	1.351	2.375	0.125
Access Info	1.681	1	1.681	2.955	0.087
Sharing Material	0.081	1	0.081	0.142	0.707
Gender * Perceived Usefulness	0.008	1	0.008	0.014	0.907
Gender * Perceived Ease of Use	0.005	1	0.005	0.009	0.925
Gender * Social Influence	0.659	1	0.659	1.158	0.283
Gender * Access Info	2.183	1	2.183	3.838	0.051
Gender * Sharing Material	0.685	1	0.685	1.203	0.274
Age * Perceived Usefulness	2.088	4	0.522	0.917	0.455
Age * Perceived Ease of Use	1.770	4	0.443	0.778	0.541
Age * Social Influence	2.704	4	0.676	1.188	0.317
Age * Access Info	2.439	4	0.610	1.072	0.371
Age * Sharing Material	5.296	4	1.324	2.327	0.057
Academic* Perceived Usefulness	0.178	1	0.178	0.313	0.576
Academic* Perceived Ease of Use	0.260	1	0.260	0.457	0.500
Academic* Social Influence	0.277	1	0.277	0.487	0.486
Academic* Access Info	0.002	1	0.002	0.004	0.949
Academic* Sharing Material	0.089	1	0.089	0.157	0.692
Error	121.755	214	0.569		
Total	3322.990	250			
Corrected Total	190.798	249			
a. R Squared = .362 (Adjusted R Squared = .257)					

Discussion and Conclusion

In this study, we examined the use of TikTok videos among university students in Egypt, with a specific focus on how these videos enhance student online engagement in virtual classrooms. We also evaluated the moderating effect of gender, age, and academic major on the relationship between the adoption and educational use of TikTok and student online engagement.

Taken together, the results of the present study revealed several significant relationships between independent and dependent variables, including the moderation effects that proved that some demographic characteristics play a vital role in TikTok adoption and online student engagement.

Overall, our findings about significant relationships between the adoption of TikTok, educational use of TikTok, and online student engagement in virtual classrooms are consistent with the results of previous studies. For instance, Amadu et al. (2018) found that TikTok positively affects students' well-being in virtual classrooms. Here, it is important to highlight the role of the perceived usefulness and perceived ease of use of technology (based on the TAM) in influencing students' intention to use TikTok. Our results also revealed that both perceived usefulness and perceived ease of use of TikTok significantly correlate with online engagement. These findings are well aligned with previous studies, showing that perceived usefulness and ease of use positively influence the students' motivation to use technology associated with online applications and virtual classrooms, leading to high online engagement (e.g., Peng and Hwang 2021). Furthermore, our finding about the important role of social influence is consistent with previous results reported by Milošević et al. (2015). Based on this evidence, the education sector and policymakers may consider the important role of technology acceptance while integrating it into curriculum and online education.

Furthermore, our results also showed that the educational use of TikTok, in terms of both facilitating access to information and sharing materials, positively affects student online engagement. Here, we also found significant moderating effects of gender and age. Specifically, in our results, the impact of sharing material and information on online student engagement was stronger with an increase of students' age. Based on this evidence, it can be concluded that the educational use of TikTok is more effective among older students. Another interesting moderating effect we observed in the results was related to gender. Specifically, we found that the relationship between access to information, facilitated by TikTok, and student online engagement was moderated by male gender. Based on these findings, it can be concluded that viewing TikTok video content for educational purposes is more beneficial for male students than for their female counterparts.

Interestingly, our findings on the moderating effects of age and gender were not previously reported in the literature. For instance, Alt (2017) observed no significant moderating effects of gender and age on students' social media engagement. Relevant previous studies on the moderating impact of demographic factors predominantly concerned social media usage, rather than student engagement, or took into account business or brand perspectives (Twenge and Martin 2020; Tiruwa, Yadav, and Suri 2018). Accordingly, our findings provide a novel insight for extant research on student engagement.

With regard to the limitations of our findings, while our results convincingly demonstrate the pedagogical use of TikTok has positive consequences for online education, it should be noted that online learning experiences can be adversely affected by inaccurate or deceptive content spread on TikTok (and other social media platforms). For instance, according to Sarwar's (2023) assessment, a significant proportion (83%) of mental health videos on TikTok contain misleading content. Another limitation associated with TikTok use in virtual classrooms is that the use of this app can divert students' attention away from their academic pursuits or have an adverse impact of their cognitive abilities, thereby potentially

leading to poorer academic performance (Mekler 2021). These limitations should be taken into account when considering using TikTok in educational settings.

One more limitation—now more related to the design of the present study—is that we did not conduct a comparison of the effectiveness of using TikTok with that of conventional digital pedagogical approaches. This decision was underpinned by our focus on the effectiveness of TikTok as an educational tool rather than on its comparison with conventional digital pedagogical approaches.

Notwithstanding the aforementioned limitations, an important insight provided by our results is that the use of TikTok in educational contexts has beneficial effects on student engagement regardless of students' majors. This suggests that the replicability of our results can be tested in other academic institutions and universities in Egypt. Testing this possibility warrants further research using representative samples of Egyptian students across various educational institutions in the country. Likewise, in future studies, it would be meaningful to compare the effectiveness of using TikTok and that of conventional educational tools.

Informed Consent

The author has obtained informed consent from all participants.

Conflict of Interest

The author declares that there is no conflict of interest.

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