Article

Exploring the Influence of Social Media Usage for Academic Purposes Using a Partial Least Squares Approach

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Abstract: Social media applications have been increasingly gaining significant attention from online education and training platforms. Social networking tools provide multiple advantages for communicating, exchanging opinions, and discussing specific issues. Social media also helps to improve the processes of teaching and learning through sharing educational programs. In this study, we used a quantitative research technique based on the partial least-squares (PLS) linear regression method to determine the influence of using social media as an online discussion and communication platform for academic purposes by assessing the relationships among the skills obtained through social media, the usage of social media, and the purpose of social media. A total of 200 students participated in this study (88% female and 12% males), and a purposive sampling technique was used to select a suitable population for the study. The results show that 61.5% of the participants use the web daily for more than five hours, mainly for social communication (meaningful dialog and discussion skills) and entertainment. The students agreed that social media develops their creative thinking, but it has no positive impact on their academic performance.

1. Introduction

Social media (SM) applications have gained significant attention in academia and practice; according to the annual reports of social media management platforms, social media and mobile apps achieved significant growth in usage in 2018. Throughout the Middle East, about 250 million people use 304.5 million mobile phones [1]. Social media has increasingly become a necessary tool for maintaining connections and transferring experiences globally. Emmert-Streib and Matthias examined incorporating big social data with social networks that needed to build accurate prediction models [2]. Emmert-Streib et al. described the importance of data from social media in a general context, which provides excellent opportunities for extensive mining amounts of text, image, and video-based data [3]. Statista has reported a steady increase in social media usage globally [4] and has recorded 2.82 billion users worldwide, which is expected to increase to 3.09 billion users, as shown in Figure 1.

Social networking tools provide multiple advantages for communicating, exchanging opinions, and discussing specific issues. Social media helps to improve the processes of teaching and learning by sharing educational programs. It helps to improve learning and distance learning methods, especially due to the divergence experienced during the COVID 19 pandemic. It also provides a platform for gaining experiences and analyzing and discussing different viewpoints on academic issues. It gives the possibility of creating unique rooms for training and exchanging study materials and useful links.
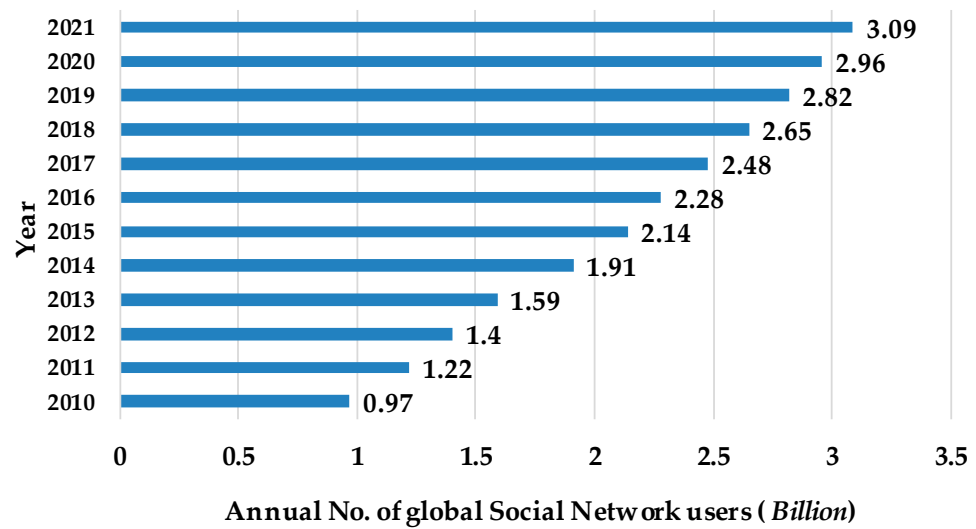
Figure 1. Annual number of global social network users (billion) 2010–2021 [1].

The distribution of social media users worldwide shows considerable variation in the number of users from one place to another, depending on the types of social sites and their features and support for different natural languages. Figure 2 illustrates that Facebook usage dominates in most Western countries, with 2.3 billion users, followed by YouTube with 1.9 billion users and WhatsApp with 1.5 billion users.
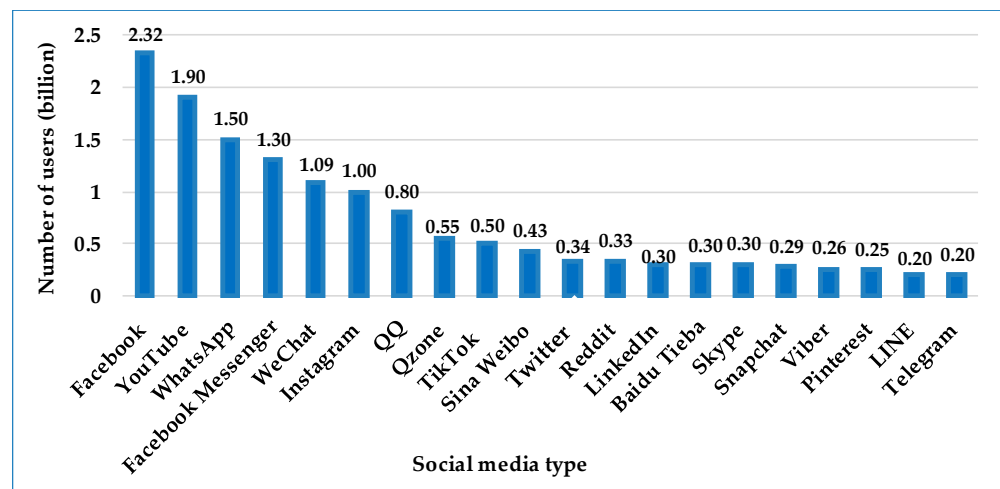

Figure 2. Globally distributed number of users using social media networks [4].

The recent reports indicate an increase of 11% in the number of social media users in Oman in 2021, reaching 4.14 million users [5]. Uddin M. found that addiction to social media affected mental health, and psychological disturbances could lead to anxiety, sleeping disorders, depression, and poor academic performances [6]. Al Rahmi and Othman concluded that social media facilitated students' educational experiences; however, if not controlled and time managed, it could negatively affect students' academic performances [7]. Nasrullah and Khan conducted a study in Saudi Arabia and revealed that social media did not support student learning. Students enjoyed meeting new friends online using social media, thereby spending too much of their time on such due to their online addiction [8]. El Khatib and Khan claimed that most Omani students used social networking (SN) for social purposes rather than academic purposes. The students diverted their attention to social communications, which caused lower academic achievements [9]. Therefore, a compelling reason for this study was to investigate using social networks. In this study, we deployed a quantitative research technique based on the linear regres-

sion method to determine the influence of using social media as a communication and discussion channel for academic purposes by assessing the relationships among the skills obtained through social media, the usage of social media, and the purpose of social media.

2. Literature Review

The first part of the literature review focuses on the positive usage of social media. Chytas D. confirmed that most students used Facebook and YouTube channels for communicating and studying [10]. Hashim et al. found that most publications were available through social media networking, and most manuscripts focused on applying social media [11]. Al-Rahmi confirmed that using social media positively improved most students' performances [12]. Price et al. showed that using social media positively encouraged students to discuss and exchange information [13]. Bagarukayo E. confirmed that Facebook had a positive impact on students as a learning tool for assignment activities [14]. Alhaddad M. showed that students preferred social media platforms as a source for information [15]. Duke confirmed the possibility of using social media to discuss academic issues [16]. Bal E.B. claimed that social media contributed to increased understanding and ease of sharing information [17]. Tang confirmed that students used Twitter for sending subject-related materials and formative assessment activities, and therefore, Twitter in education promoted student interactions and learning content [18]. Rueda L. showed that there were high-performing students using social media but claimed that teachers using traditional teaching methods engaged their students more and, therefore, enhanced their performance [19]. Ali et al. showed a strong relationship between student learning performance and the satisfaction rate in information system courses using social media. The use of social media improved their academic performance, while traditional teaching methods allow instructors to engage more with students [20]. Benetoli et al. performed a comparison study, which indicated that 62% of participants agreed that social media positively improved their performance [21]. Kitching et al. claimed that students' communication skills improved by using healthcare programs with blogs, Twitter, and YouTube [22]. Van R. indicated that social media has made teaching more accessible and enjoyable and that students also supported social media technologies [23]. Eger L. stated that students felt that using Facebook was important for learning and identifying false information [24]. Dunn L. indicated that students believed that social media networks were very helpful and could increase their learning experience [25]. Junco et al. proved that social networking sites, such as Twitter, Wiki, and blogs, effectively enhanced students' academic performances. Junco claimed that students and academic staff were both interested in the learning process through Twitter instead of traditional learning. Therefore, it promoted social media as a suitable method for engaging students in their academic development [26]. Moran et al. indicated that social media sites had a significant impact on teaching and collaborative learning [27]. George and Dellasega showed that students preferred teachers who used social media as electronic resources in education, as it seemed to be very helpful in the medical curriculum [28]. Alshdefait et al. confirmed sustained use of social media by students as a helpful medium for the education and learning process at Jordanian public universities [29]. Sobaih et al. showed that social media had a significant impact on academic-related issues and, in particular, on teaching and learning [30]. Vollum M. analyzed social media usage in physical and health education and showed that social interaction positively influenced educational outcomes [31].

The other part of the literature review focuses on the requirements of using social media in education platforms. Wang et al. confirmed that only a very few students used social media to complete their assignments and experienced improvements [32]. Ghani and Hamid highlighted state-of-the-art social media big data analytical techniques and described the challenge of research problems in the field [33].

Willis and Exley proposed that using social media in the curriculum increased parents' engagement in student learning activities. However, teachers should have the essential substantive knowledge of language to inquire and contribute to social networking spaces

online [34]. Carranza et al. suggested that there were advantages of using mobile learning to streamline the training process [35].

Table 1 presents the comparative study results of the literature survey for the period between 2011 and 2019.

Table 1. Comparative study results. 1, Facebook; 2, Twitter; 3, YouTube; 4, LinkedIn; 5, Instagram; 6, Snapchat; 7, Research gate; 8, WhatsApp; 9, SM-Others; 10, Comparison study and Survey; 11, Questionnaire; 12, Interview; 13, Methods-Others.

Reference/Year	Type of Social Media										Method			Findings
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Chytas, 2019 [10]	X	X	X							X				84% supported using Facebook, and 86% supported using YouTube in the teaching environment
Hashim, 2018 [11]	X	X	X					X	X	X			X	Comparison study of published papers over ten years (2008–2018); 85% of the publications were published as journal articles, 30% focused on social media in general, and 70% focused on specific applications, including 23% Twitter, 20% Facebook, 10% weblogs, 9% YouTube, 3% WhatsApp, and 40% adopted quantitative research; 10% of the research papers utilized a mixed-method
Al-Rahmi et al. 2018 [12]	X	X		X			X		X		X			95% supported using social media for education and participation
Price et al. 2018 [13]		X							X	X				81% supported using Twitter in teaching nursing courses
Bagarukayo, 2018 [14]	X										X			Questionnaire to explore using Facebook as a facilitated tool in teaching; 26.8% strongly agreed, and 44.4% agreed; however, 16.7% were neutral, and 12.1% did not agree or strongly disagreed.
Alhaddad, 2018 [15]	X	X	X		X	X		X			X			90% supported using social media networking in medical studies
Duke et al. 2017 [16]	X		X								X			96% supported using social media to discuss academic problems
Bal Erkan, 2017 [17]	X	X	X								X			83% mentioned that using social media was an effective learning tool
Tang, 2017 [18]		X								X				Examined 51 research papers and showed positive attitudes related to using Twitter in education; 56.8% used Twitter for subject-related materials, 33.3% used Twitter for formative assessment activities, and 90% of research work was implemented in the higher education field
Rueda, 2017 [19]	X	X		X					X	X	X			156 students participated in the questionnaire; 90% of students regularly attended the classes, a strong relationship between student performance and satisfaction rate in information system courses using social media
Ali, 2017 [20]	X		X					X	X			X		62% agreed, 23% disagreed, and 15% were not sure that social media positively improved the performance of students
Benetoli, 2015 [21]	X	X							X	X				Twenty-four studies were included in this study based on inclusion criteria; the results showed that 78.5% of studies used specific social media tools in teaching pharmacy courses, and 58.3% of studies implemented social media sites, such as Twitter, Wiki, and blogs
Kitching, 2015 [22]		X	X						X			X		Twelve staff participated in this study (in the healthcare sector from 11 organizations); most participants were cautioned about using social media in education
Van Rooyen, 2015 [23]										X	X			94% supported using social media technologies; 93.63% indicated that using social media made teaching more accessible and enjoyable
Eger, 2015 [24]	X									X				77% used Facebook to improve their knowledge; 9% stated that they had not joined any study group on social media
Dunn, 2013 [25]	X	X							X	X			X	68% believed that social media could improve the learning activity, 22% of participants disagreed, 10% of them were unsure; the experimental group results showed that 75% indicated using social media networks was very helpful, and 18% admitted it was helpful; however, 7% specified it as slightly helpful
Junco, 2011 [26]		X								X				48.20% indicated that Twitter could enhance academic development.
Moran, 2011 [27]	X	X	X	X					X	X				40% of faculty members asked students to use social media networks to read and solve assignments
George, 2011 [28]		X	X						X	X		X		Students rated the quality of teaching through social media as 4.8 out of 5; the rate of using social media as electronic resources in medical schools was 4.7 out of 5
Wang, 2011 [32]	X	X	X	X					X		X			20% of students used social media to solve their assignments, which contributed to their achievements

3. Data and Methods

3.1. Data

Table 2 presents the results of respondents' descriptive demographic information. The data for this study were collected through a printed questionnaire that was provided to individual undergraduate students at different universities in Oman. The data collection period was two weeks. The students permitted us to use their responses in this study provided we did not publish personal information such as names, emails, or mobile numbers. The participants were given a training session to explain the study's aims and provide instructions on filling out the questionnaire. A purposive sampling technique was implemented to select a suitable population for the study. Therefore, 250 questionnaires were distributed, and only 200 students (176 females and 24 males) were selected. Each student answered the questions honestly according to his/her opinion. A total of 85 students were between the age of 16 and 19, and 114 students were between 20 and 29. One student was aged more than 30 years old. The social media sites included in this study were Instagram, Facebook, WhatsApp, Twitter, Snapchat, Pinterest, YouTube, LinkedIn, Google+, and Tumblr.

Table 2. Respondents' descriptive statistical, demographic information.

Characteristics		Frequency	Percent %
Gender	No. of males	24	12.0
	No. of females	176	88.0
Age	16 to <20 years old	85	42.5
	20 to <30 years old	114	57.0
	30 years and above	1	0.5
Educational qualification	Primary	4	2.0
	Secondary	1	0.5
	Undergraduate	195	97.5
Daily usage of social media	1 to <3 h	30	15.0
	3 to <5 h	47	23.5
	5 to <7 h	62	31.0
	7 h and above	61	30.5

Source, questionnaire.

3.2. Research Methodology

In this study, we used a quantitative research technique based on partial least-squares (PLS) linear regression to determine the influence of using social media as a communication and discussion channel for academic purposes by assessing the relationships among the skills obtained through social media, the usage of social media, and the purpose of social media. A purposive sampling technique was used to select suitable participants for the study.

The research hypotheses were as follows:

Hypothesis 1 (H1). *The purpose of social media influences the skills obtained through social media.*

Hypothesis 2 (H2). *The purpose of social media influences the usage of social media.*

3.3. Partial Least Squares Method (PLS)

Partial least-squares (PLS) is a statistical method that finds a linear regression model by projecting the predicted variables and the explanatory variables to a new space. Therefore, it is sometimes called a "projection to latent structures". PLS requires that standardize latent variable scores have a mean value of 0 and a standard deviation value of 1. The latent variable approach is used to model the covariance structures in the two spaces (predicted and experimental variables). The main advantage of PLS is the ability to model multiple

dependent and independent variables. The PLS algorithm was proposed by Lohmöller, in 1989, including three stages [36,37], as presented in Algorithm 1.

Algorithm 1 Partial least-squares (PLS) algorithm [36,37].

Input: standardize latent variable
Output: latent constructs score, loading and path coefficients, location parameters
Step 1: Estimation of latent variable scores Iteratively (1.1–1.4) until convergence is achieved or the maximum number of iterations is reached. Then go to Step 2.
    1.1 outer approximation of the latent variable scores,
    1.2 estimation of the inner weights,
    1.3 inner approximation of the latent variable scores, and
    1.4 estimation of the outer weights.
Step 2: Estimation of outer weights/loading and path coefficients.
Step 3: Estimation of location parameters.

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4. Results and Discussion

Table 2 presents the respondents' descriptive statistical, demographic information.

The current study considers factors such as skills obtained through social media, the usage of social media, and the purpose of social media. Details of the factors (latent variables) and subfactors (apparent variables) are presented in Table 3.

Table 3. Details of the latent and apparent variables.

Factors (Latent Variables)		Subfactors (Apparent Variables)
Skills obtained through social media	s1	Social media helps students improve their communication skills
	s2	Using social media, students' scientific level increases
	s3	Social media develops students' creative thinking
	s4	Social media develops meaningful dialog and discussion skills
	s5	Social media affects the students' social skills
Usage of social media	u1	I use social media for educational purposes
	u2	Social media offers diversified educational experiences
	u3	Social media offers lectures outside of study time
	u4	Social media maintains the confidentiality of user information
	u5	The use of social media has become a necessity because it shortens the effort and time
Purpose of social media	p1	I use social media for entertainment purpose
	p2	I use social media for study purposes
	p3	I used social media mainly for social communications
	p4	I use social media for trade and labor

The measurement model is used to test the latent variables and the apparent variables, as shown in the conceptual model in Figure 3. The variables used include the skills obtained through social media, the usage of social media, and the purpose of social media.
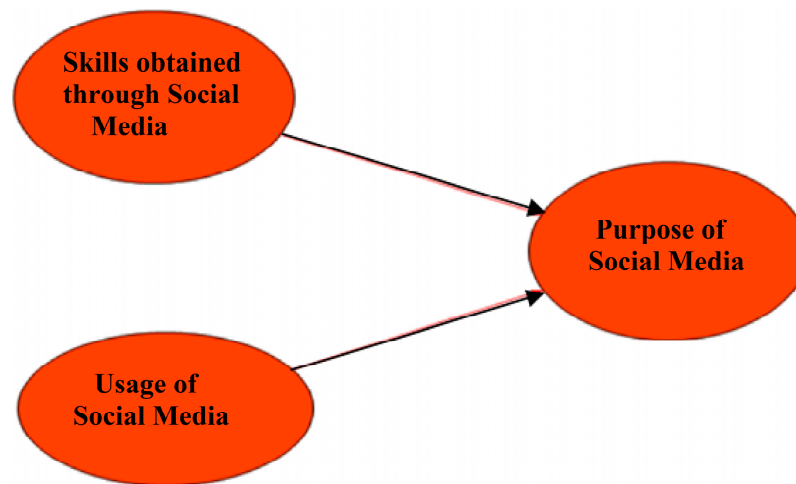
Figure 3. Conceptual model for assessing the relationships among the skills obtained through social media, the usage of social media, and the purpose of social media.

4.1. Measurement Model

The relationships were shown among the skills obtained through social media, the usage of social media, and the purpose of social media. The reliability of the model was tested based on validating the discriminant and convergent results [38]. Figure 4 shows the initial path model coefficients and the values of the variables (the skills obtained through social media, the usage of social media, and the purpose of social media).
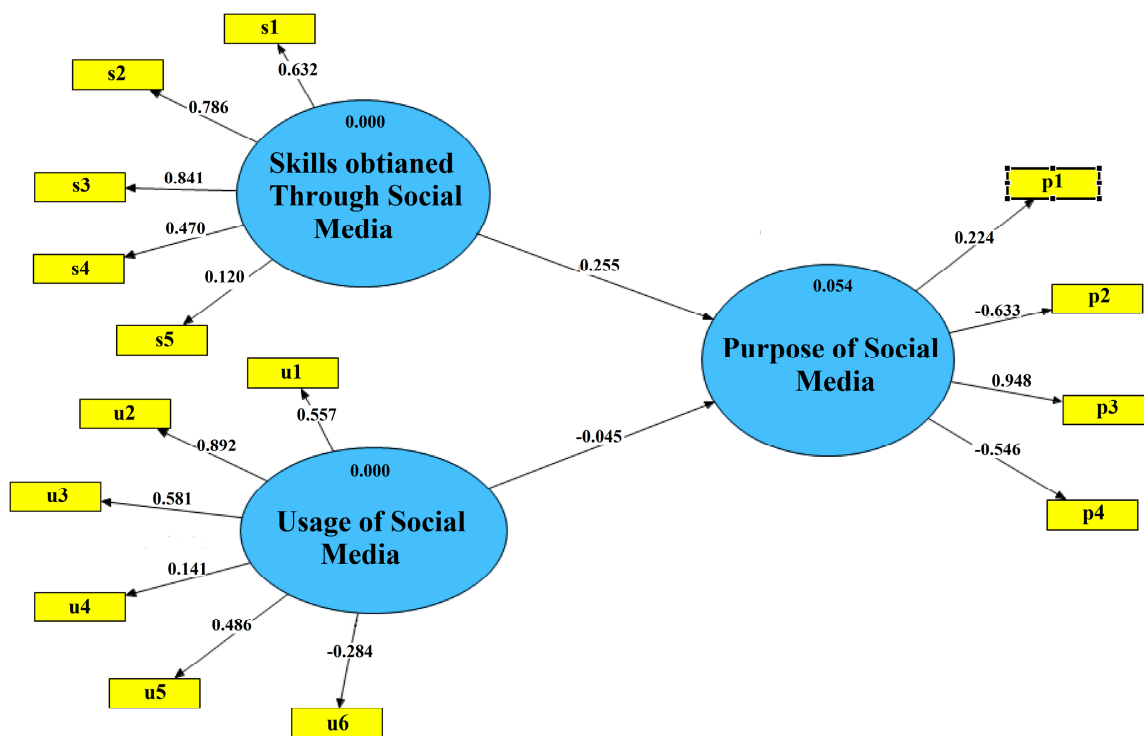

Figure 4. Initial path model coefficients and the values of the variables (s1–s5 skills obtained through social media; u1–u6 the usage of social media; p1–p4 the purpose of social media).

4.2. Model Reliability

Composite reliability is used to validate the construct reliability results and inner consistency values, which is more suitable than Cronbach's alpha. Hair et al. determined the least score value of composite reliability should be 0.7, and the Cronbach's alpha

minimum score should be 0.6 [39]. The measurement model reliability was validated based on subfactor and factor loading reliability. A score of 0.45 for the subfactors' loading is preferable [40]. The scores of subfactor loadings are examined, and any variable with a score greater than 0.50 is accepted [41], and any subfactors with low loading scores are removed from the final model, as shown in Figure 5. In addition, Table 4 presents the latent construct scores of composite reliability, factor loadings, and Cronbach's alpha, which were achieved using the PLS algorithms. The results show the proposed model can be reliable because Cronbach's alpha score is above 0.437, and the score of composite reliability is greater than 0.621.
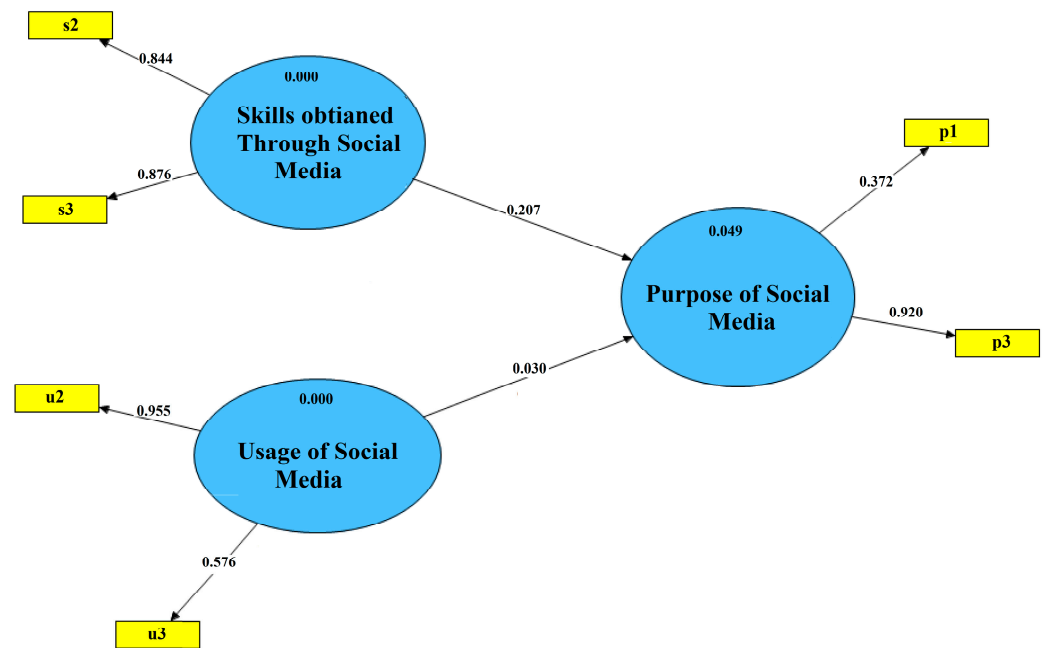

Figure 5. Final path model after removing the least significant variables.

Table 4. Indicators of latent constructs score.

	Factors and Subfactors	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE
P	Purpose of Social Media		0.437012	0.621947	0.492445
p1	I use social media for entertainment purpose	0.372376			
p3	I used social media mainly for social communication	0.919905			
S	Skills obtained through Social Media		0.649058	0.850378	0.739767
s3	Social media develops students' creative thinking	0.844226			
s4	Social media develops meaningful dialog and discussion skills	0.87568			
U	Usage of Social Media		0.472086	0.756344	0.622276
u3	Social media offers lectures outside of study time	0.955464			
u4	Social media maintains the confidentiality of user information	0.575882			

4.3. Convergent Validity

To verify the convergent validity of the proposed model, the following two conditions were required:

(a)   Achieve a score greater than or equal to 0.7 for the outer loadings.

(b) Ensure that the score of average variance extracted (AVE) for all latent variables is more than 0.50 [42]. A score of 0.4 is adequate [43] with the condition that the composite reliability score is more than 0.6 [44]. Table 4 shows that the convergent validity is acceptable based on the obtained variance extracted score ranging from 0.492 to 0.739. Discriminant validity should evidence that the construct (latent variable) in the PLS path model has the most robust relationship score as compared with other construct variables. Table 5 shows that the obtained results of the square root of AVE and constructs correlation score were in the accepted ranges, which indicates a satisfactory discriminant validity for constructs.

Table 5. Discriminant validity results.

	Purpose of Social Media	Skills Obtained through Social Media	Usage of SOCIAL Media
Purpose of social media	1		
Skills obtained through social media	0.219999	1	
Usage of social media	0.119495	0.433187	1

4.4. Structural Model Analysis

The PLS bootstrapping test is used to determine the R-squared results of independent and dependent variables, in addition to path coefficient values, which are shown in Table 6 and illustrates in Figure 6.

Table 6. Bootstrap values and T-values of path coefficients.

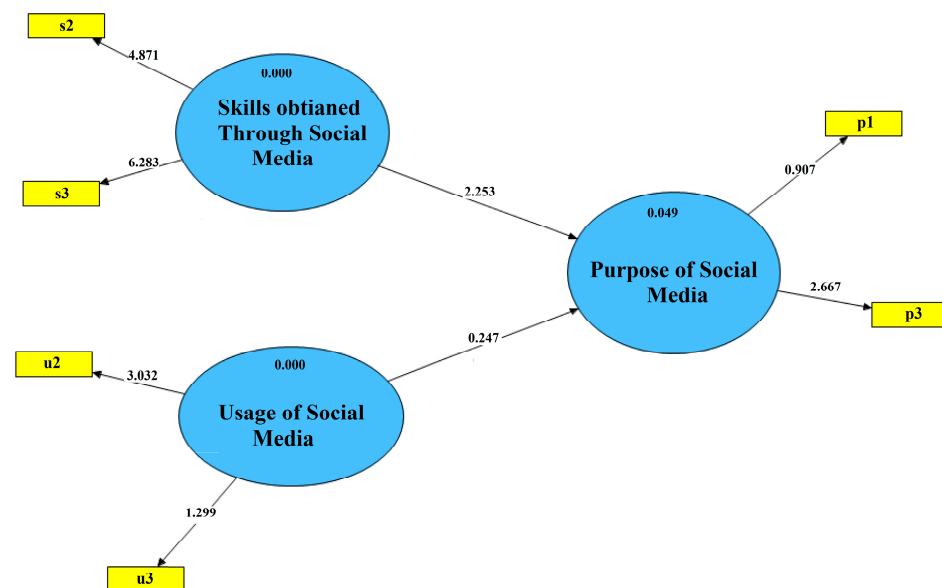| Factors	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)	Supported	Significance Values
Skills obtained through social media > purpose of social media	0.207098	0.203789	0.09044	0.09044	2.289899	Yes	$p < 0.05$ 1.96
Usage of social media > purpose of social media	0.029783	0.081326	0.119063	0.119063	0.250144	No	—

Figure 6. Values of selected variables after implement the PLS bootstrap method.

Equation (1) determines the goodness-of-fit (GOF) value, which is the overall model fit for PLSEM as follows:

$$\text{GOF} = \sqrt{\text{average R}^2 \times \text{average communality}} \tag{1}$$

Table 7 presents that the GOF of the proposed model is equal to $\sqrt{0.04912 \times 0.618163}$ = 0.174253.

Table 7. Model evaluation results.

Factors	R^2	Communality	H^2	Redundancy	F^2
Purpose of social media	0.04912	0.492445	−0.01	0.023786	−0.122
Skills obtained through social media		0.739767	0.229		0.229
Usage of social media		0.622277	−0.022		−0.022
Average	0.04912	0.618163	0.017	0.454	0.316

GOF = square-root (average R^2 × average communality) = $\sqrt{0.04912 \times 0.618163}$ = 0.174253, H^2 is CV-communality index and F^2 is CV-redundancy index

The path coefficient β is tested based on the obtained structural model and hypothesis, as PLS does not require normally distributed data. However, the latent dependent variables are evaluated using R^2 and the average variance. The construct's percent variation of the model is measured using R^2 [45]. The model has a predictive significance if the R^2 score is greater than zero, and a score less than 0 indicates a predictive insignificance model, as shown in Figure 7.
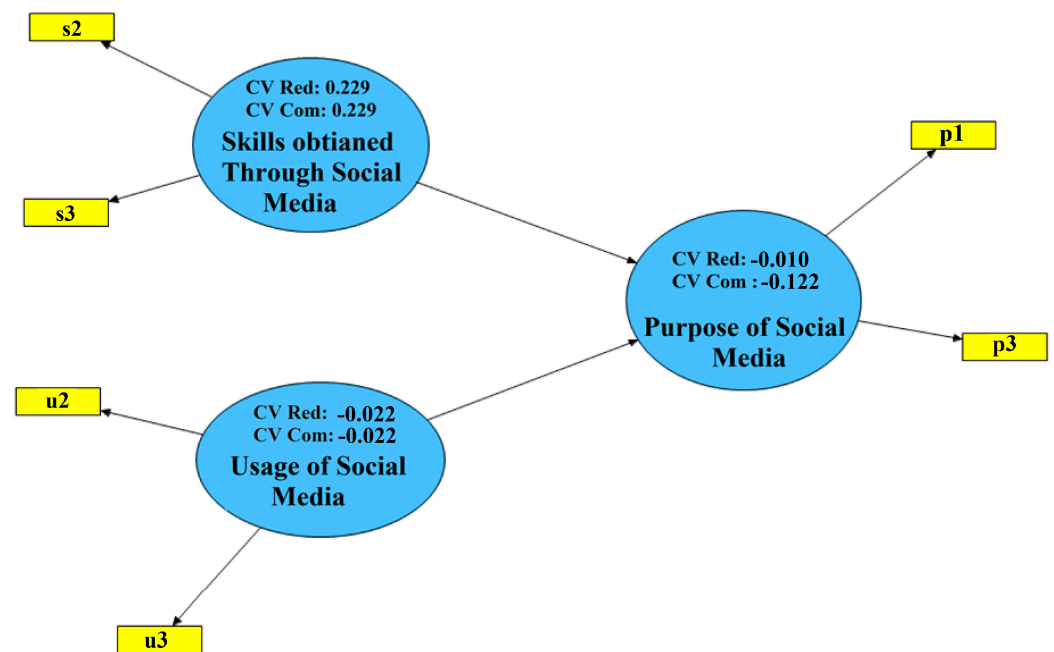

Figure 7. Blindfolding evaluation procedure for validating the predictive accuracy of the model.

5. Conclusions

Many studies have examined the purpose of using social media for teaching and training in academic platforms and have shown that social media does not support students' learning and that its use should be controlled and time managed to prevent adverse effects on students' academic performance. Therefore, in this study, we investigated the influence of using social media as a communication and discussion channel for educational purposes

by assessing the relationship between the skills obtained through social media and using social media and the purpose of social media. We used a quantitative research technique based on the linear regression method to examine and investigate the influence of using social media as a discussion and communication platform for academic purposes. A total of 200 participants, including 195 undergraduate students from various Omani universities, participated in this study (88% female and 12% males). 61.5% of the student respondents reported using the web daily for more than 5 h and mainly for social dialog communication and entertainment purposes. The students agreed that social media develops their creative thinking, but it has no positive impact on their academic performance. The conceptual model reliability was validated based on subfactor loading with a score of 0.45. The result of the mathematical PLS model based on Cronbach's alpha score (0.437) was valid, and the composite reliability was greater than 0.621. This means that the students were more focused on the skills they obtained through social media than the purpose of social media as a communication and discussion channel, and they did not focus on enhancing academic performance.

The following are some suggestions for increasing students' engagement and interests:

(a) Encourage students to use social media for academic purposes and practice;
(b) Encourage teachers to create and monitor special classes for engaging students in discussions and presentations;
(c) Create free space for dialogue between students and exchanging views regarding solving school assignments;
(d) Closely monitor and direct the students to use social media positively as flipped classrooms;
(e) Restrict the students from wasting their time indulging in unproductive chat purposes;
(f) Raise awareness of the risks involved in using social media platforms (due to security concerns) rather than curtailing them.

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