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Impact Of Collaborative Learning On The Academic Performance: Mediator Role Of Satisfaction With E-Learning Service

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Abstract. Based on Vygotsky's sociocultural learning theory, this research aims to promote the use of social media in online learning with a view to enhancing the academic performance of learners. Using the online questionnaire, data was collected from 282 learners. To do this, this paper tests, via the method of structural equations applied on AMOS 21, (1) the impact of collaborative learning (CL) on the academic performance (PA) of Tunisian learners, (2) the impact of this collaborative learning on learner satisfaction with the e-Learning service and (3) the impact of this perceived satisfaction on academic performance. This research also tests the mediating effect of learner satisfaction with e-Learning between collaborative learning and academic performance, via the Hayes process. All tested relationships have been approved. Managerial implications have been recommended for marketing professionals and educational leaders are allocated around the opportunities offered by social media in learning

Keywords: Social media, Collaborative learning, academic performance, learner satisfaction

INTRODUCTION

Since its advent in 2004, Web 2.0 has greatly influenced the behavior of individuals on the Internet Torloting (2006). Indeed, as opposed to the first generation of the Web, Web 2.0 is based on a wide variety of active tools ensuring real interactivity between Internet users and allowing the pooling of individual knowledge and the sharing of information. In particular, social media, have fostered interaction and sharing and have had a significant impact on the attitudes and behaviors of individuals and groups. These networks gradually became involved in all aspects of human life including social, economic and political life (Algharabata et al., 2007; Abed et al., 2015; Rathore et al., 2016; Zhu et Chen,2015). The education system has not escaped this trend since teachers quickly understood that it is possible to exploit the pervasiveness of learners on social media to convey targeted informational content as well as to generate more interest in these learners in the course. Social media encompasses features that allow instructors to better communicate with students as

well as create an environment for fruitful interaction between users (Daspi and D'Souza,2012; Tess, 2013).

In addition, social media applications are flexible, user-friendly, spontaneous and informal (Mcafee,2007), which makes learning even more convenient and fun (Greasley el al., 2008). For all these reasons, the use of social media is now considered an interesting lever likely to promote collaborative learning and improve the performance of learners. And yet, interactive tools seem to be slowly taking hold in education. Learning through social media is not yet institutionalized but is often done by teachers in a self-taught way.

In the literature, the studies carried out around the use of social media in learning, such as (Al-Rahmi et al.,2015; Al-Rahmi et al., 2018) are few, relatively recent and linked to contexts specific cultures and different from ours. This encouraged us to conduct the investigation in the context of higher education in Tunisia. To do this, we propose to study, in particular, the direct and indirect effect (mediated by satisfaction) of collaborative learning on the academic performance of learners, by placing ourselves in the context of the use social media in learning.

This study proposes to simultaneously test three direct links, relative to the effect of collaborative learning on learner satisfaction, the effect of collaborative learning on academic performance and the effect of performance satisfaction. The research model also includes an indirect link with respect to the mediating role of satisfaction between collaborative learning and academic performance.

LITTERATURE REVIEW

Academic performance

The notion of performance is at the heart of all the assessment procedures of individuals and organizations. According to Notat (2017), performance is defined as an official report recording a result achieved at a given moment, with reference to a context, an objective and an expected result, regardless of the field. However, in practice, performance is a fuzzy and multidimensional construct that only makes sense in the context in which it is used (Salgado, 2013). In the context of e-Learning, believe that effectiveness and efficiency are important criteria for the performance of e-Learning Zhang et al. (2010). Effectiveness relates to the achievement of the objectives foreseen by the educational experience while efficiency reflects the maximization of the benefits of e-learning (Zhang et al., 2010). When applied to individuals, learning performance refers to the extent to which learners achieve the course's learning objectives in terms of acquiring knowledge, understanding key concepts, and developing skills (Alavi and Leidner, 2001).

Collaborative learning

Collaborative learning refers to a set of learning strategies that encourage students to work together in small groups (two to five students) to optimize their own learning and that of others (Johnson et al., 2007). Collaborative learning occurs when individuals in a group cooperate to achieve shared learning goals (Johnson et al., 2007). This type of learning is fundamentally linked to theories based on social interdependence, cognitive development and behavioral learning. However, the establishment of collaborative learning requires planning on the part of the teacher, particularly

around the activities to be undertaken but also the learning materials and tools to use. In this case, the use of social media would certainly be useful for implementing collaborative and fruitful learning online.

Learner satisfaction

The success of e-Learning systems relies in particular on user satisfaction (Sun et al., 2008). Satisfaction is a pivotal concept whose influence on consumer behavior has been recognized and widely demonstrated in academic research. In the majority of these studies, defining satisfaction refers to the paradigm of confirmation of expectations according to which satisfaction is a consequence of a subjective evaluation when comparing the characteristics of offers and consumers' expectations (Bloemer and Ruyter, 1998; Ray et al., 2001). In the context of e-Learning, the definition of satisfaction is consistent with the aforementioned definition. Indeed, according to (Sun et al., 2008), online learner satisfaction, also called "e-satisfaction" (Lee et al., 2009; Szymanski and Hise, 2000) is the total perception of the experience of online learners consuming the system e-learning. Giese and Gote (2000) define it as an affective response, of varying intensity and stimulated by several aspects such as content, interface use, personalization and learning performance (Wang,2003)

HYPOTHESES DEVELOPMENT

The conceptual model of this research brings together three direct links and one indirect link relative to the mediating role of satisfaction between collaborative learning and academic performance, as shown in Figure below:

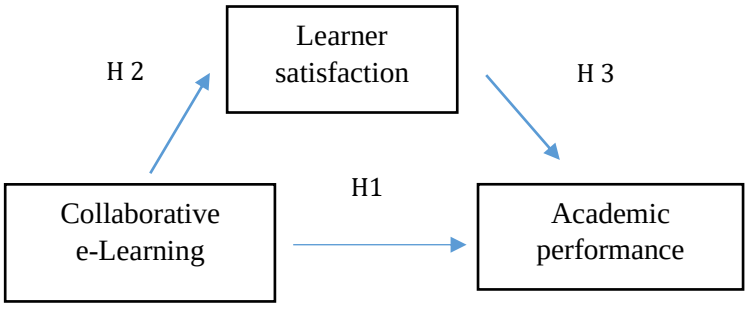

FIGURE 1. Conceptual Model

Effect of collaborative learning on leaner satisfaction

According to Vygotsky's socio-cultural theory of learning (Vygotsky, 1978), subjects learn through social interaction and the sharing of ideas and experiences. Indeed, Vygotsky, (1978), argues that human learning is largely a social process and that social interaction acquires a fundamental role in the development of cognition. The academic performance of learners seems to depend on several backgrounds, both individual and situational. Nevertheless, by focusing on the constructivist approach to learning, we are interested in understanding to what extent collaborative learning

could improve the performance of learners, especially if the collaborative atmosphere is established online. According to Anderson et al., (2010), thanks to the online social environment, learners will be more able to communicate with their peers, solve problems or organize social events in a collaborative way.

During a collaborative learning session, students work and learn together. They work not only on academic skills but also on social skills. The collaborative learning atmosphere is a real opportunity for students to adapt to the different learning styles, behaviors and abilities of others. Around the improvement of academic

performance, in particular, Al-Rahmi et al., (2018) have already highlighted the role of collaborative learning on the academic performance of learners, placing it in the context of the use of social media. Thus, the following hypothesis is proposed:

H1. Collaborative learning of social media has a positive effect on academic performance of learners.

Effect of collaborative learning on learner satisfaction

In the literature, the use of social media is likely to enhance learners' active collaborative learning (Ractham and Firpo, 2011; Liao et al., 2015). Better yet, learning in a collaborative online atmosphere helps to maximize the ability of learners to interact (Khalifa and Lam, 2002) and promotes their satisfaction with the learning activity (Al-Rahmi et al., 2018). Indeed, social media offer tutors and teachers the possibility of establishing a friendly, flexible and non-restrictive collaborative atmosphere. This atmosphere is perceived by learners as more suited to interacting either with their teachers or with their peers (Baran, 2010) and the collaborative learning that occurs there promotes learner satisfaction (Al-Rahmi and Othman, 2013). Hence, we present the following hypothesis:

H2. Collaborative learning has a positive effect on learner satisfaction

Effect of satisfaction on the academic performance

Aademic performance of learners depends on the mental capacity of the learner but also on the learning method itself, the good design of the course (Chiu et al., 2007) and the teaching tools used. In the literature, research has supported a positive and significant relationship between learner satisfaction within a collaborative learning environment and achieved performance (So and Brush, 2008; Wu et al., 2010). Satisfaction is considered here as one of the factors improving the ability of learners to assimilate new knowledge and acquire new skills. Indeed, Al-Rahmi et al., (2018) as well as Cao and Hong (2011) have shown that the use of social networks positively influences the link between satisfaction and learning performance among learners. This research has empirically demonstrated that satisfaction has a positive effect on learning performance. Hence, we present the following hypothesis:

H3. Satisfaction has a positive effect on learning performance.

Mediation role of satisfaction

Past research has been interested in validating, separately, all the direct effects that constitute the mediating effect of the satisfaction between collaborative learning and academic performance. No

research has so far attempted to empirically validate this mediating effect of satisfaction by judging in particular its intensity and significance. This being the case, we propose to test it within the framework of this present study, for (1) affirm or deny the existence of a mediating relationship beyond the separate partial effects and (2) specify whether it is a total or partial mediation, placing it in the context of the use of social media in learning. Thus, we present the following hypothesis:
H4. Satisfaction plays a mediating role between collaborative learning and the academic performance of learners.

METHODS

To empirically test the above research model, we surveyed 282 online student learning social media users. The questionnaire was self-administered by these students, via a link on a form launched on Google drive and posted to teaching groups created by teachers on Facebook for educational purposes.

Measures

The measurement scales relating to the variables integrated into the model were borrowed from the literature. Indeed, we adopted the scale adapted by So and Brush (2008) to measure collaborative learning. The Academic Performance Scale was adapted by Hsiao et al. (2017). Finally, we adopted by Casalo et al. (2008), the satisfaction scale. These scales were selected because they were validated in theory and revealed good psychometric quality at the level of previous research. Their items were submitted on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Data collection was carried out via an online questionnaire on a sample of 282 respondents, of which 61.7% are women and 38.3% are men, 85.8% of them are between 19 and 24 years old and 14, 2% between 25 and 30 years

RESULTS

Before testing the causal relationships, the object of our conceptual model, we first verified the psychometric quality of the scales borrowed from the literature, by proceeding in two stages. First we conducted an exploratory factor analysis on each variable using SPSS 25 software. In parallel, we tested the internal consistency of these measurement scales using the "Cronbach's alpha" reliability index. Then, a confirmatory analysis was carried out in order to confirm the factorial structures obtained during the exploratory phase. This step was also used to verify the reliability as well as the convergent and discriminant validity of these measuring instruments (Nunnally, 1978; Fornell and Larcker, 1981).

Finally, we carried out a simultaneous analysis in order to submit the causal relationships that constitute our model to empirical validation, using the method of structural equations applied on AMOS 21. The mediating effect of satisfaction between collaborative learning and academic performance was tested using the process of Hayes (2018).

The following table presents the results of the principal component analyze carried out on the model variables as well as the internal consistency indices obtained. This table indicates for all the

variables a very satisfactory value relative to the KMO index. The latent structure obtained being one-dimensional for all the scales tested. Bartlett's sphericity test is significant at the 5% level. In addition, the quality of representation of the items is also good, respectively for all the variables. Examination of the internal reliability for each of the dimensions obtained shows very satisfactory Cronbach's Alphas coefficients (well above the threshold of 0.7 recommended by Peterson (1995).

Table 1. Results of exploratory analyzes

Items		**Quality of representation**	**Contribution to factor formation**
Collaborative Learning	CL1	0,74	0,86
	CL2	0,783	0,885
	CL3	0,825	0,908
	CL4	0,81	0,9
	CL5	0,802	0,895
	CL6	0,788	0,888
	CL7	0,715	0,846
	CL8	0,719	0,848
KMO = 0.944 ; Meaning of Bartlett = 0,000			
Cronbach's alpha = 0.958			
Cumulative percentage of variance explained =77.257 %			
Learner Satisfaction	SAT1	0,831	0,911
	SAT2	0,861	0,928
	SAT3	0,787	0,887
	SAT4	0,833	0,912
KMO = 0.861 ; Meaning of Bartlett = 0,000			
Cronbach's alpha = 0.931			
Cumulative percentage of variance explained = 82,776%			
Academic performance	AP1	0,877	0,937
	AP2	0,818	0,904
	AP3	0,877	0,937
	AP4	0,835	0,914
KMO = 0.866 ; Meaning of Bartlett = 0,000			
Cronbach's alpha = 0.942			
Cumulative percentage of variance explained = %85,187			

Reliability and convergent and discriminant validity

The confirmatory analysis allowed us to confirm the structure obtained from the scales at the exploratory level and to verify the reliability and the convergent and discriminant validity of these scales by applying the procedure of Fonell and Larcker (1981). As shown in the following table, the Jöreskog's Rhô indicates satisfactory values exceeding the minimum threshold of 0.7. The Rho of

convergent validity is well above the minimum threshold of 0.5 for all variables. The discriminant validity was also checked since the extracted mean variance is greater than the square of the correlation between the latent variables (Fornell and Larcker, 1981). Thus, we can conclude that the scales used are reliable and valid.

Table 2. Tests of reliability and convergent validity

	Reliability (Jöreskog's Rho)	Convergent validity
Collaborative Learning	0,959	0,744
Satisfaction	0,931	0,772
Academic Performance	0,939	0,793

Table 3 presents the adjustment indices of our structural model. The model presents a good quality of fit. Absolute, incremental, and parsimony indices are all satisfactory. The model is parsimonious because the value of khi 2 is much less than 5, he values of RMSEA is less than 0.08 and the GFI, CFI and TLI values all exceed 0.9

Table 3. Discriminant validity Test

	CL	SAT	AP
CL	**0,744**		
SAT	0,4624	**0,772**	
AP	0,5041	0,4761	**0,793**

CL:Collaborative Learning; SAT: satisfaction; AP:Academic Performance

To check the significance of the different existing relationships between the variables, we used the Student's test (CR). Regression coefficients are also recommended to assess the direction and strength of the relationship between different variable

Tableau 4. Structural model Adjustment

	Parsimony index	Absolute indices				Incremental indices	
Indice	χ^2/ddl	GFI	AGFI	RMR	RMSEA	CFI	TLI
Value	2,112	0,917	0,879	0,039	0,063	0,978	0,971

Based on the results presented in the following table we notice that:
The collaborative learning atmosphere has a positive and significant effect on academic performance (γ = 0.445; CR = 6.891> 1.96; p = 0.00), which means that the first H1 research hypothesis is well validated. The atmosphere of collaborative learning has a positive, significant effect, but also important for learner satisfaction (γ = 0.683; CR = 11.658> 1.96; p = 0.00), which means that the second research hypothesis H2 is well validated. The satisfaction felt by learners has

a positive and significant effect on academic performance, of these (γ = 0.385; CR = 6.02> 1.96; p = 0.00), which means that the Third H3 research hypothesis is well validated.

Table 5: Results of hypothesis testing

Hypotheses	Path	C.R.	SE	Standardized coefficient	Results
H1	CL → AP	6,891	0.000	0,445	Supported
H2	CL → SAT	11,658	0.000	0,683	Supported
H3	SAT → AP	6,020	0.000	0,385	Supported
Sig* : Significatif avec p = 0,000					

The following table presents the results relating to the mediation effect:
The results in the table above indicate a partial mediating effect of satisfaction between collaborative learning and academic performance. Indeed, the effect of the collaborative learning atmosphere on academic performance is represented by a direct effect (0.4274) and an indirect effect (0.2435) induced by the integration of satisfaction as a mediating variable. These direct and indirect effects are estimated based on a 95% confidence interval. They were confirmed with a significant p and a confidence interval that excludes zero. Thus hypothesis 4 is confirmed.

Table 6: Results of mediation effects

Total effect of Collaborative Learning on Academic performance						
	B	SE	T	P	LLCI	ULCI
	0,6709	0,0596	11,2565	0,000	0,5536	0,7882
Direct Effect of Collaborative Learning on Academic performance						
	B	SE	T	P	LLCI	ULCI
	0,4274	0,0984	4,3433	0,000	0,2337	0,6211
indirect Effect of Collaborative Learning on Academic performance						
	B	Boot SE	Boot LLCI		Boot ULCI	
SAT	0,2435	0,0590	0,1303		0,3645	

DISCUSSION AND IMPLICATIONS

The results of this study demonstrated a positive and significant effect of collaborative learning on learning performance and this, in the context of the use of social media in learning for Tunisian students. Collaboration is therefore essential for the student to achieve good academic result, especially when this collaboration takes place in a friendly atmosphere with interactive applications. This result confirms the importance attributed in the literature collaborative learning and its impact on the academic performance of learners, whether in the classroom (Blasco-Arcas et al., 2014; Cabrera et al., 2002) or on social media (Al-Rahmi et al., 2018; Al-Rahmi et al., 2017).

This finding is particularly relevant given that very little research has investigated the use of social media to promote collaborative learning. Thus, it is now recommended that tutors and teachers create and lead interactive groups on social networks. thereby encouraging students to interact with their teachers and collaborate with their peers to achieve their educational goals. In this regard, social media offers several useful features, applications and platforms to proliferate synchronous and asynchronous communication, and even to allow stakeholders to interact with ease and freedom.

In addition, the use of social networks as a lever for learning is also interesting because it makes the learning experience more convenient for the learners. This lever offers these learners the possibility of accumulating knowledge by overcoming a set of constraints related to face-to-face learning (time and / or space constraint). It also allows them to develop skills such as the ability to collaborate with people with different learning styles and abilities and to deal with problematic situations collaboratively (Anderson et al., 2010). These acquired skills are likely to last and therefore help the learner to excel in different projects and contexts.

In terms of the implications of this study, the emphasis here is on the possibility of institutionalizing the use of interactive and collaborative tools, in particular social networks for learning purposes to improve students' academic performance as well as their social skills, as elsewhere, to put in place the necessary tools (material conditions, awareness seminars, technical and pedagogical training for teachers, etc., to encourage the use of the development of collaborative learning, particularly through social media.

It is also recommended that digital marketing professionals improve further the interaction and socialization features attached to social networks and to attract more attention to their role in creating a friendly atmosphere, especially in the context of teaching. These features, based on interactivity, will also lead to greater delegation towards the users who will become actors within the virtual learning communities (Caru and Cova, 2006). The learner then becomes a "consumer actor" also known as "prosumer" or "post-consumer"(Cova and Cova, 2009), likely to play a proactive role in developing content and building their own knowledge.

On the other hand, this research has shown that developing an atmosphere of active collaborative learning has a positive effect on learner satisfaction. This result is in agreement

with previous studies (Al-Rahmi et al., 2018; Wu et al., 2010). Indeed, according to (Al-Rahmi et al. 2018), creating and maintaining a collaborative learning space within an e-learning environment is important for improving learner satisfaction. Thus, it is necessary to promote social interactions between the teacher and the other participants as well as between learners and their peers in order to proliferate their satisfaction with the learning obtained.

In this direction, Chiu et al. (2007) recommend that online courses be delivered through interactive tools to achieve a higher level of interaction and therefore better satisfaction.

In addition, the present study has shown that satisfaction has a positive effect on the performance of learners. This result is in agreement with the work of Chiu et al., (2007) and that of Al-Rahmi et al. 2017). According to Chiu et al. (2007), for example, the more the learner is satisfied with the instructor / tutor, course design and / or the choice of teaching method, the more it affects his academic results.

Finally, this research has shown that satisfaction plays a mediating role between collaborative learning and academic performance. The challenge now is to create an atmosphere of collaborative learning but also and above all to promote the satisfaction induced by this atmosphere and this, with a view to further improving the academic performance of learners. To do this, it is necessary to choose in particular social media within which interaction and collaboration generate the highest level of satisfaction, in order to hope for a better impact of this collaboration on the performance of learners.

The results interpreted here come from a cross-sectional survey, so they should be interpreted with more caution. In this sense, the study should be repeated at different times and under similar conditions. It would also be interesting to increase the number of participants, as well as their degree of heterogeneity (specialties, culture, lived conditions, etc.). Besides, carry out comparative studies confronting universities based on their experience using collaborative learning in teaching may reveal useful findings.

In order to improve and deepen the results obtained as part of this work, the possible prospect is to enrich the work by integrating variables, such as learners' learning styles, self-efficacy, engagement, etc. It is also strongly recommended to test the effect of collaborative learning on learners' attachment to interaction groups and their intention to reuse these interactive groups for teaching.

CONCLUSION

This study adopted a quantitative approach in order to comment on the opportunities offered by social media in learning, in the Tunisian context. The results of this study confirmed the interest shown by recent studies in the role that social media can play in education. Indeed, this research has shown that the use of these media is important to develop collaborative learning, as well as to promote learner satisfaction with learning and their academic performance. From now on, it is recommended that teachers design their

teaching modules by increasingly integrating the functionalities offered by these media for educational purposes.

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