International Journal of e-Collaboration
Volume 17 • Issue 2 • April-June 2021

Effects of Social Network Information on Online Language Learning Performance: A Cross-Continental Experiment

Abrar Al-Hasan, Kuwait University, Kuwait
https://orcid.org/0000-0002-1662-6417

ABSTRACT

This study examines the value and impact of social network information on a user's language learning performance by conducting an online experiment in a peer-to-peer collaborative language learning marketplace. Social information or information about others in one's network can present a socially networked learning environment that enables learners to engage more in the learning process. Experimental research design in an online language learning marketplace was conducted. The study finds evidence that the mere visibility of social network information positively impacts a learner's learning performance. Learners that engage with social interaction perform better than those that do not. In addition, active social interaction has a stronger impact on learning performance as compared to passive social interaction. The study concludes with implications for platform developers to enable the visibility of social information and engineer the user experience to enhance interactive learning.

KEYWORDS

E-Collaboration, Interactive Learning, Learning Efficiency, Online Language Learning, Peer-to-Peer, Social Information, Social Interaction, User-Generated Content

INTRODUCTION

Web 2.0 technologies such as e-learning platforms, podcasts, social network sites, mobile applications, and online learning marketplaces are now used as a source of language learning (Godwin-Jones, 2018). Web 2.0 learning tools have helped in making foreign languages more easily accessible and offer endless possibilities for authentic interaction with native speakers in any target language (Sylv & Sundqvist, 2017).

In the past decade, the potential link between Web 2.0 learning tools and language learning has been frequently examined and has been a subject of debate (Alhamami, 2019; Shadiev, Hwang, & Huang, 2017; Y.-F. Yang, 2018). A meta-analysis of this stream of research found that the relationship between the use of Web 2.0 tools and language learning performance is weak and inconclusive in terms of direction and substantial effect (Luo, 2013; Parmaxi & Zaphiris, 2017). On one hand, studies have found that technological innovations can increase learner interest, pleasing value, and motivation (Chang, Chen, & Chiang, 2019; Collins & Halverson,

DOI: 10.4018/IJeC.20210401.oa1

2018), providing students with increased access to the target language (Ahn & Lee, 2016), providing new learning opportunities for the unfortunate (Schröder, Grüttner, & Berg, 2019), providing increased engagement opportunities (Batanero, de-Marcos, Holvikivi, Hilera, & Otón, 2019), and facilitating peer learning (Lim, Ab Jalil, Ma'rof, & Saad, 2020). On the other hand, studies have found that the use of Web 2.0 learning tools can result in inappropriate input, shallow interaction (Anshari, Almunawar, Shahrill, Wicaksono, & Huda, 2017), inaccurate feedback, frustration with the digital channel (Fisher, Howardson, Wasserman, & Orvis, 2017), and distraction from the learning task (Garcia, Falkner, & Vivian, 2018). With empirical evidence supporting both sides, it is difficult to see the nature of the actual relationship. The findings thus far seem to suggest that different types of Web 2.0 tools, designs, and use relate to differential impacts on learning performance (Parmaxi & Zaphiris, 2017; C. Wang, Fang, & Gu, 2020). Whether or not Web 2.0 learning tools fosters or undermines language learning remains a topic of discussion among scholars (Luo, 2013; Parmaxi & Zaphiris, 2017), and in particular, the design characteristics that promote learning in Web 2.0 learning tools is not yet clear (Gray, Thompson, Sheard, Clerehan, & Hamilton, 2010).

One popular and growing Web 2.0 learning tool is online language learning marketplaces (OLLMs) such as Babbel, Busuu, and Duolingo, where users can teach each other languages. These OLLMs allow for social information visibility. Users' learning network, performance activities of a user and his friends, how well the user is doing against others in the community, along with other related information - is all made visible. This type of information is social information – information about others in one's network. OLLMs have a choice of two broad information-provisioning strategies (Parmaxi & Zaphiris, 2017). These marketplaces can continue to target potential consumers using traditional "non-social" formats such as regular courses, quizzes, etc., or adopt emerging "social formats" such as the visibility of peers' performance, the interaction with peers, the newsfeeds from peers, etc. While firms are actively experimenting with both "social" and "non-social" information-provisioning formats, there is a dearth of research to guide decision making in this context (Chakowa, 2018; Gray et al., 2010). Furthermore, "social" collaboration and interaction on language learning has been examined on mainly Blogs and Wikis (Luo, 2013), studies have not yet examined OLLMs which have altered the level of interaction among users and the number of languages that can be learned. A current meta-analysis has highlighted the need to further investigate such emerging marketplaces (Parmaxi & Zaphiris, 2017). Understanding how social information can impact one's language learning performance in OLLMs remains a wide gap in the existing literature. Furthermore, while interaction has been commonly examined through English as the taught language, how Web 2.0 learning tools respond to less commonly taught languages are largely unknown (Luo, 2013).

The present study seeks to address the gap in the literature by investigating the relationship among the OLLM design characteristics and language learning performance by empirically examining the value of "social information" and social interaction on learning performance. This study seeks to examine the value and impact of "social information"—wherein, a user sees and interacts with the learning activities of her peers—on his language learning proficiency. This study will help academics better understand the relationship between Web 2.0 learning tools and learning effectiveness by examining factors that have been overlooked; the "social" design factor in an understudied emerging marketplace. This study responds to the call for research for such marketplaces, and in particular, for languages other than English (Luo, 2013). The findings of this study will enable e-learning platform providers and Web 2.0 tool designers to value the effectiveness of "social information," and will identify the types of information or viral product design features that impact use, effectiveness, and ultimately sales.

THEORETICAL BACKGROUND

This study draws upon two broad streams of literature. The first relates to research on Web 2.0 learning tools, educational benefits, and language learning. The second relates to social information and its impact on user behavior.

Web 2.0 Education and Language Learning

Digital environments such as weblogs, wikis, online social communities, and online learning marketplaces are providing learners with new opportunities to engage with native speakers through original content and conversations (Gilmore, 2007). Web 2.0 learning technologies has blurred the role of producers and consumers of content and has shifted the learning culture from access to information toward access to other people (Brown & Adler, 2008). Students now take an active role in learning, rather than passively receive information from instructors. Web 2.0 has the potential to create more interactive and powerful learning environments in which learners become knowledge creators (Henry, Carroll, Cunliffe, & Kop, 2018; Richardson, 2010). Web 2.0 technologies facilitate personalized learning and enable the creation of personal learning environments where individuals can take control of and manage their learning and interact with others in the process of learning (Attwell, 2019; Xu, Chan, & Yilin, 2018).

Studies have sought to understand the benefits of Web 2.0 technologies in foreign language teaching and learning, especially in terms of fostering increased learner autonomy and promoting interaction and collaboration (Hung & Huang, 2016; Y. Yang, Crook, & O'Malley, 2014). Studies report increased motivation for learning (Liu et al., 2013; Stevenson & Liu, 2010), and interest in language learning (Chartrand, 2012). Other studies have focused on identifying usability issues and interface design (Stevenson & Liu, 2010). In a study by Brick (2013), language learners were pleased by the unique design features provided by the online learning marketplace to practice their oral skills with native speakers and to receive immediate peer feedback. Prichard (2013) examined the effectiveness of training learners on how to use Facebook safely and effectively for language learning purposes. Another study (Orsini-Jones, Brick, & Pibworth, 2013) reported concern regarding language variety and reliability of user corrections in online learning marketplaces. However, it is still not clear how effective digital instructional tools are (Parmaxi & Zaphiris, 2017); much insight is needed on the facilitative effects of site design for learning (Liu et al., 2013). This study furthers this stream of research by exploring the effectiveness of digital language learning marketplaces and by examining and comparing differing interface design features that promotes learning effectiveness.

Social Information and Social Influence

Social constructivists view learning not just as an individual process, but an ongoing process of knowledge construction within a social environment (Lantolf, 2000). Under this framework, learning is participatory, knowledge is social, and language develops via shared activities (Bronack, Riedl, & Tashner, 2006). This view draws upon social influence theory as a means of learning (Goyal, Bonchi, & Lakshmanan, 2010; Young, 2009). Social influence is when individuals are affected by the opinion and behaviors of others (Kelman, 1958). This study focuses on two closely related streams of research: the first being social information processing theory and the second focusing on how peer effects impact user behavior.

Social Information Processing Theory

Social information processing theory proposes that individuals may be influenced by cues from others about what to attend to, how to value the important dimensions of a phenomenon, and how others evaluate the same phenomena (Salancik & Pfeffer, 1978). Different sources of information have different impacts on outcomes. Social sources of information are more likely to influence a user's

attitude than non-social sources of information (Burt, 2017; Leary & Baumeister, 2017). Examining the role of social influence on consumers' pre-purchase search efforts (Y. Wang & Yu, 2017) show that information received from sources that have some personal knowledge about the consumer have more influence than sources that have no personal knowledge about the consumer.

This study seeks to take the social information processing theory a step forward by empirically analyzing the effectiveness of OLLMs through the increase in visibility of social information. The study also examines how different degrees of social information impacts the effectiveness of online language learning.

Peer Effects and Social Interaction

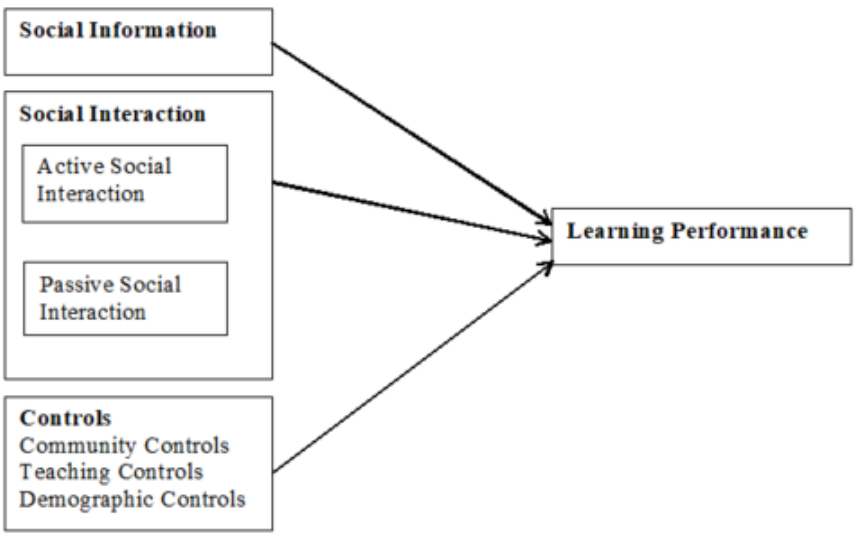
Current advances in technology have significantly increased the importance of consumer social interactions as a market force. There is growing evidence that social media allows firms to engage with customers more efficiently than do traditional marketing channels. Not only are consumers now better able to exchange information, but firms are also gaining the ability to directly initiate and manage consumer social interactions (Ascarza et al., 2018; Wang & Kim, 2017). While advances in technology are creating new opportunities for firms to directly facilitate and manage consumer social interactions, they also impose new challenges. Distinct strategic managerial actions are often necessary for such new social marketplaces. Deciding on the type of information presented to consumers is a crucial decision that will influence a firm's profitability and positioning (Chen, Wang, & Xie, 2011; Kim, Zhu, Xiao, & Lin, 2017).

This study seeks to take the literature on peer effects a step forward by empirically observing and analyzing the reception of peer effects on individual learning performance in an OLLM. The study also examines how the different types of peer effects and social interaction impacts the effectiveness of online language learning.

Research Model and Hypotheses

Figure 1 displays the conceptual research model. Following the research objectives and in line with the social constructivists' view of learning, social information processing theory, and

Figure 1. Conceptual model



peer effects literature, individuals are influenced by social sources of information and social interaction (Rice & Aydin, 1991; B. Yang, Lei, Liu, & Li, 2017) and are therefore modeled as determinants of learning. Learning performance is used as the outcome variable as it is used to assess the effectiveness of the knowledge attained through assessment and evaluation (Rosenberg & Foshay, 2002; Zhu, 2012).

Effects of Social Information on Learning Performance

According to social information processing theory, peer effects, and social constructivist' view of learning, individuals are influenced by social sources of information, as they are perceived to be more trustworthy (B. Yang et al., 2017). The influence of a peer to learn will also be stronger than the influence of a regular platform with no visibility of what other peers are doing (J. Yang, 2016). In networked social spaces, users with different interests are encouraged to improve their abilities and to 'contribute to distributed knowledge' from which everyone in the community can benefit (Gee, 2012). Such networked social spaces allow users to support and encourage each other and socially construct knowledge together (Kelm, 2011). This study proposes that OLLMs that make social information visible will influence a learners' performance more positively towards learning.

Hypothesis 1: Learning performance is higher when social information is presented as compared with the non-presentation of social information in the online language learning marketplace.

Effects of Social Interaction on Learning Performance

Language learners can learn by being the readers, writers, speakers, listeners, and thinkers in the classroom through engagement in social interaction with their peers (Vacca, Vacca, & Mraz, 2016). Learners can learn more when they can talk to one another and be actively involved (Routman, 2005). Social constructivist approaches to language learning and teaching encourage the integration of different language skills through social interaction (Harrison & Thomas, 2009). Within their shared space, learners have the opportunity to offer personal insights and obtain alternative perspectives (Bonk & King, 2012). Learners engage in the co-construction of knowledge during collaborative activities (Duffy & Cunningham, 1996). This study hypothesizes that social interaction with peers is vital to the learning process. Such that the more a user engages and interacts with peers, the stronger the impact on their learning performance.

Hypothesis 2a: Users that engage in social interaction in the online language learning marketplace are associated with higher learning performance as compared to users that do not engage in social interaction.

Social interaction with peers is of two folds: active and passive (Johansson, 1989; Persson, Wanek, & Johansson, 2001). According to Persson et al. (2001) definition, active social interaction is distinguished from the passive social interaction by the predominance of monitoring tasks. If most of the tasks are monitoring tasks, rather than tasks such a prediction, planning, etc., then the work is considered passive work. The "activeness" of a user is a result of task allocation between the user and the technology. Literature suggests that passive users may face problems in highly automated environments (Cummings, Mason, Shelton, & Baur, 2017; Mitchell, Petter, & Harris, 2017).

Learner control and learner activity in the education workplace has been shown to add more value to knowledge as compared to receiving feedback (Brick, 2013). Learner control and activity may lead to positive results because it is a way of allowing learners to exert their influence on knowledge without trainer control (Chou & Liu, 2005). Such active learning interaction and activity has a stronger impact on learning effectiveness as compared to passive learning interaction and activity.

In this study, active social interaction is when the user is in control of the social interaction such that the user is contributing towards the interaction; while passive social interaction is when there is no control of the social interaction, such that the user is monitoring the interaction rather than contributing towards the interaction. While a user can conduct both active and passive social interaction at the same time, the more active social interaction conducted the higher the learning performance as compared to passive social interaction.

Hypothesis 2b: Active social interaction in the online language learning marketplace will lead to higher learning performance as compared to passive social interaction.

DATA AND METHODOLOGY

The current study collaborated with one of the largest OLLMs to conduct a randomized experiment. This marketplace was founded in 2010 and teaches around 19 different languages. As of 2019, the marketplace has around 200 million active users, with an estimated value of $700 million. One thousand three hundred worldwide users that were interested in learning the Arabic language were randomly chosen from the marketplace to enroll in a free Arabic course. One thousand three hundred emails were sent out and 1032 members enrolled in the free Arabic course. The members were instructed that they had six weeks to complete the course. The course is composed of sub-units, units, and writing exercises. Thirty-two members did not even complete one sub-unit after six weeks and therefore were dropped from the sample.

The members were divided into two groups: a "social" group and a "non-social" group. The "social" group was able to see their "friends" learning performance and interact with them while the "non-social" control group was not able to see any "friends" or interact with them – no social information. Table 1 describes the details of the social information visibility for the groups. The

Table 1. Social information visibility

Social Group	Non-Social Group
Can Add Friends	Cannot Add Friends
Can See Friends Learning Performance (Percentage of Course Completion)	Cannot See Friends Learning Performance
Can Interact With Friends Through Posts and Writing Exercises	Cannot Interact With Friends

"social" group was instructed to check the profiles of the other users in the course and add them as "friends." There was no limit to the number of "friends" they chose to add.

The social group had 600 users and the control group 400. The proportion of users assigned to the baseline was chosen in agreement with the community to obtain a population size enough to establish a comparative baseline. There was no significant mean difference between the two groups in terms of age, gender, and education level. The empirical model for the study is shown in the equation below:

$$\begin{aligned} &Learning\ Performance \\ &= f(Social\ Information, Social\ Network\ Interaction, \\ &User\ Activity\ in\ the\ community, Teaching\ Performance, Demographics) \end{aligned} \quad (1)$$

Learning performance is used to assess the effectiveness of the knowledge attained through assessment and evaluation (Rosenberg & Foshay, 2002; Zhu, 2012). Learning performance is measured as lower errors on tests (Chou & Liu, 2005). In the OLLM used in this study, after the completion of a learning unit, the learner needs to pass a short test and complete a writing exercise. Thus, learning performance in this study is measured using two assessment outcome variables: (1) number of completed learning units *(ln_units)* and (2) number of completed writing exercises *(ln_writing)*. The outcome variables were skewed; therefore, the logarithmic transformation was used. Social information is measured using a dummy variable that indicates whether the user can see "friends" *(friend_visibility).* The ability to see "friends" and their information is social information (Sundararajan, Provost, Oestreicher-Singer, & Aral, 2013). Social interaction is measured using three variables: (1) total number of friends (*ttl_friends*), (2) number of corrections received on writing exercises from friends (*ttl_learn_writingcorrections_received*), and (3) total posts a user corrected for his friends (*ttl_posts_corrected*). The total number of friends (*ttl_friends*) and total posts a user corrects for his friends (*ttl_posts_corrected*) are both considered active social interaction since the user has control over the number of friends being added and is actively participating when posting corrections. On the other hand, the total number of corrections received from friends (*ttl_learn_writingcorrections_received*) is considered passive social interaction as the user has no control over what is being received. Community-related metrics are also controlled for. Table 2 describes the variables used in this study.

To examine the impact of social information visibility, and different types of social interaction on learning performance, multiple regression is conducted. Given that the constructs of the model are single-item variables, it is recommended to use ordinary least squares (OLS) regression method (Nazim & Ahmad, 2013). OLS regressions using STATA version 11 was conducted to examine the impact of social information visibility and social interaction on the learning performance.

ANALYSIS AND RESULTS

Table 3 displays the descriptive statistics and their pairwise correlations for the main variables. There are a total of 28 units and 35 writing exercises. The data was taken six weeks later: 71% of the enrolled members completed the course, and the remaining did not complete the complete course. On average, the data finds that the members completed 22 out of the 28 units in the six-week period. On average, each member had 26 writing posts completed.

Table 4 shows the results of the OLS regression models for the two learning performance variables (*ln_writing* and *ln_units*). The results show that the *ln_writing* model explains around 42% of the variance, and the *ln_units* model explains around 58% of the variance. All independent variables in the model are statistically significant, and the value of AVE (Average Variance Extracted) for all constructs is greater than 0.50 showing that convergent validity was achieved at the required level. Fitness indices also met the required level (F/Chi-Sq= 2885.9) showing construct validity. The correlation between all constructs is lower than 0.85 showing that discriminant validity was satisfied at the required level. The value of Cronbach Alpha is greater than 0.60 showing the internal reliability was achieved at the required level.

The results show that the social information variable, *friend_visibility*, which indicates whether the user can see friends, is positively and significantly associated with learning performance variables ln_writing and ln_units ($\beta = 0.6388, p < 0.01; \beta = 0.5631, p < 0.01$, respectively). The result indicates that a user that can see social information from friends is associated with 63.88% more writing exercises completed and 56.31% more units completed as compared to a user that is not able to see social information from friends. This result highlights the importance of social information from friends in terms of learning performance. This finding indicates that the mere visibility of friends' information is positively associated with learning performance supporting hypothesis one.

Table 2. Variables and description

Variable Name	Description
ln_units	Outcome Variable: Log (Number of completed learning units)
ln_writing	Outcome Variable: Log (Number of writing exercises completed)
friend_visibility	*Independent Variable: Social Information.* Binary, whether friends' performance is visible or not.
ttl_friends	*Independent Variable: Active Social Interaction.* Total number of friends.
ttl_posts_corrected	*Independent Variable: Active Social Interaction.* Total posts corrected for friends.
ttl_learn_writing_corrections_received	*Independent Variable: Passive Social Interaction.* The number of corrections received on writing exercises from friends.
mem_age	*Control Variable: User activity in the community.* Total number of days the member has been in the community.
ttl_group_mem	*Control Variable: User activity in the community.* Total number of community groups the member is part of.
ttl_group_leader	*Control Variable: User activity in the community.* Total number of community groups the member is a group leader of.
lastlogin_todate	*Control Variable: User activity in the community.* Last Login in the community till today's date or the date the data was collected.
ttl_spoken	*Control Variable: Teaching Performance.* Total number of languages spoken.
avg_spoken_lvl	*Control Variable: Teaching Performance.* Average Spoken Level (beginner = 1, intermediate = 2, advanced = 3).
Occupation	*Control Variable: Demographics* Categorical: Student, Working, Other, Undisclosed (Reference)
Age	*Control Variable: Demographics* Age of the member.
Gender	*Control Variable: Demographics* Gender of the member. Male (Reference).
rel_status	*Control Variable: Demographics* Relationship Status Categorical: in a relationship, single, prefer not to say, undisclosed (Reference).
Continent	*Control Variable: Demographics* Geographic Continent Categories: Africa, Asia, Australia, Europe, North America, South America, Undisclosed (Reference).

The study further finds that the social interaction variables are all positive and significantly associated with learning performance variables. In particular, *ttl_friends* is positively and significantly associated with learning performance variables ln_writing and ln_units ($\beta = 0.1179$, $p < 0.01$; $\beta = 0.1158$, $p < 0.01$, respectively). The total number of corrections received from friends (*ttl_learn_writingcorrections_received*) is also positively and significantly associated with

Table 3. Summary statistics and pairwise correlations on main variables

Variable	Obs	Mean	St. Dev.	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)
(1) ln_units	1000	22.06	3.1	0	28	1					
(2) ln_writing	1000	26.36	3.07	0	35	0.39*	1				
(3) friend_visibility	1000	0.43	0.5	0	1	0.15*	0.14*	1			
(4) ttl_friends	1000	12.36	3.07	0	35	0.16*	0.19*	0.17*	1		
(5)ttl_learn_ writingcorrections_ received	1000	9.32	5.42	0	19	0.05	0.06	0.11	0.09	1	
(6) ttl_posts_ corrected	1000	11.12	4.37	0	22	0.13*	0.12*	0.08	0.18*	0.12*	1

** Significant at p<0.001.*

learning performance variables ln_writing and ln_units ($\beta = 0.0153$, $p < 0.01$; $\beta = 0.0128$, $p < 0.01$, respectively). Lastly, the total number of posts corrected by the user (*ttl_posts_corrected*) is also positively and significantly associated with learning performance variables ln_writing and ln_units ($\beta = 0.1199$, $p < 0.01$; $\beta = 0.1551$, $p < 0.01$, respectively). These results show that the group that was able to interact with friends performed better than the group that was not able to interact with friends. Also, the more a user interacts with friends, the higher the learning performance. This result shows the importance of the ability to interact and communicate when it comes to language learning. The more friends a user has to interact with, the higher the performance. Furthermore, the more a user corrects posts and receives corrections from his/her friends, the higher the users' performance, supporting hypothesis two-a.

The coefficients for active social interaction variables are much higher than the passive social interaction variables for both dependent variables. A unit increase in the number of friends a user has is associated with an 11.79% increase in writing exercises completed and an 11.58% increase in the number of units completed. A unit increase in the number of posts corrected for friends is associated with an 11.99% increase in writing exercises completed and a 15.51% increase in the number of units completed. On the other hand, a unit increase in the total number of writing corrections received is associated with only a 1.53% increase in writing exercises completed and 1.28% in the number of units completed. These results support hypothesis two-b that active social interaction impacts learning performance more than passive social interaction.

DISCUSSION

This study examined the impact of social information and social interaction on language learning performance in the emerging OLLMs. The findings of this study provide interesting insights. The first finding indicates the importance of social information for language learning. The study finds that information attained from peers, particularly relating to information about a user's friends, or social information, significantly influences a user's online language learning performance. This highlights the importance of providing information about peers' performance as well as peers' activity to enhance one's performance. This study further finds that social interaction has an impact on learning performance. In particular, the higher the number of friends using the learning platform, the higher the user's learning performance. This finding highlights the importance of having "friends" and interacting with friends to enhance one's learning performance. Active social interaction has a stronger impact on learning performance as compared to passive social interaction. This result

Table 4. OLS regressions

OLS Regressions	Variable	(1) LN_WRITING	(2) LN_UNITS
Social Information	friend_visibility	0.6388*** (0.2195)	0.5631*** (0.1948)
Social Interaction – Active	ttl_friends	0.1179*** (0.0159)	0.1158*** (0.0152)
Social Interaction – Active	ttl_posts_corrected	0.1199*** (0.0146)	0.1551*** (0.0141)
Social Interaction – Passive	ttl_learn_writing corrections_received	0.0153*** (0.0032)	0.0128*** (0.0028)
Controls			
mem_age		0.1009*** (0.012)	0.0287** (0.0107)
ttl_group_member		-0.1509 (0.0794)	-0.0122 (0.0705)
ttl_group_leader		0.0384 (0.4367)	0.0188 (0.3877)
lastlogin_todate		-0.1202*** (0.0165)	-0.0396** (0.0146)
ttl_spoken		0.3846* (0.1898)	0.0356 (0.1685)
avg_spoken_lvl		0.3092 (0.2063)	0.0364 (0.1832)
Occupation_other		0.0498 (0.4133)	-0.4142 (0.3669)
Occupation_Working		-0.1789 (0.3324)	-0.1016 (0.2951)
Occupation_Student		0.1136 (0.3171)	0.1944 (0.2815)
age		0.0119 (0.0097)	0.0009 (0.0086)
gender_female		0.0258 (0.1739)	-0.0407 (0.1544)
rel_status_inaRelationship		0.2636 (0.3035)	0.3113 (0.2694)
rel_status_PreferNotToSay		0.2538 (0.3254)	0.5861 (0.3889)
rel_status_Single		0.2881 (0.2811)	0.5729 (0.3595)
Continent_Africa		1.1698 (2.7252)	-0.7816 (2.4192)
Continent_Asia		1.6375 (2.7138)	-0.7183 (2.4091)
Continent_Australia		0.3957 (3.0890)	-1.9489 (2.7421)

continued on following page

Table 4. Continued

OLS Regressions	Variable	(1) LN_WRITING	(2) LN_UNITS
Continent_Europe		0.8112 (2.6798)	-1.4365 (2.3789)
Continent_NorthAmerica		0.6105 (2.7085)	-1.7715 (2.4044)
Continent_SouthAmerica		0.8089 (2.6801)	-1.5847 (2.3792)
_cons		18.8465* (8.8385)	10.0476 (7.8461)
No. Observations		1000	1000
R-squared		0.4256	0.5818

*p< 0.10, **p< 0.05, ***p< 0.005. Standard errors shown in parentheses.

shows that the "activeness" dimension of social interactivity is an important determinant of learning performance in such OLLMs.

The results of this study have interesting implications for firms in managing consumer social interactions and e-learning platforms. The results show that traditional non-social e-learning platforms may no longer be as effective and underscore the importance of the use of social information in e-learning. This study also sheds light on how e-learning platforms can be designed to generate social contagion not only through social information visibility but also by the interactivity of the information (active versus passive). These findings draw attention to the fact that with the increase in information visibility online, e-learning methods should adapt to provide the right type of information to attract and engage consumers. Platform designers should thus optimize the use of social engagement and interaction in such learning environments. This study highlights that learners are not only interested in their performance, but they are also interested in viewing the performance of their peers that also may be a factor in improving their performance.

This study makes several contributions. It is one of the first studies to examine the value of "social information" in an OLLM and the consequences of different social information. Using detailed data from several countries worldwide on different types of "social" and "non-social" information, the study can tease out the differing impacts of "social" and "non-social" information relating to language learning performance. Furthermore, this study is one of the first to identify the effects of the interactive nature of such information on learning performance. More importantly, the study sheds light on the overall impact of IT and Web 2.0 on not only firms, but also on user behavior in the context of the e-learning marketplace, and how a consumer can be used in the e-learning campaign as a "co-creator" of value to the firm. Web 2.0 is shifting the role of a traditional learner to become an active co-creator of one's learning process. As part of the Web 2.0 social phenomenon, the concept of knowledge and how it is created is significantly changing (Lambert, Philp, & Nakamura, 2017). Web 2.0 knowledge seekers take advantage of the web as a platform not only to consume knowledge but also to generate knowledge (Orús et al., 2016). Such user-generated content and mass participation enable new ways of co-constructing ideas leading to "wisdom-of-crowds." This study highlights the impact of the role of a co-creator and sheds light on the debate of what to teach and how to teach with Web 2.0 and the user-generated content movement (Lee & McLoughlin, 2007).

Limitations and Future Research

The current study uses a sample of enrolled members in an OLLM. These users already have an interest in learning a language and are currently using an online platform to learn a language; the

current sample does not observe users outside of this community. The generalization of the results is therefore limited to users that already have an interest in learning a language and are users of OLLMs. Future studies can replicate the study and control for this selection bias using a more general sample such that users outside of the community can also enroll.

Furthermore, this study was only able to create two groups for the randomized experiment due to restrictions from the OLLM. Future studies could take this study a step forward and create more experimental groups to strengthen the findings of this study. Also, the study was not able to directly measure the strength of the social tie between users. A fine-grained analysis could be useful to provide additional insight into social information of different "strengths" and their impact on user behavior. A natural question that arises is whether some social information from certain friends is more salient and "influential" than others. The identification of such leaders of social information would be an interesting and important area for future research.

Although social influence is present, the precise mechanism through which social influence exerts itself in this specific context is less understood. This study identified social information as a possibility, but there may be others, and the current analysis does not distinguish between them. More qualitative data via interviews or surveys may shed further light on this issue. Lastly, the current study was limited to a single OLLM; corroboration of these novel findings by subsequent research would be useful. This is especially so as the amount of social information, social interaction, and use of the platform are likely to be contingent on the nature of the platform. Overall, the findings of the study can be generalized to most language e-learning platforms.

CONCLUSION

This study examined the value and impact of social information on language learning proficiency. The study finds that the mere visibility of friends' performance enhances a user's performance. Furthermore, the more friends a user interacts with, the higher the user's performance. The more posts a user corrects for his friends, and the more posts a user receives corrected by his friends, the higher the user's learning performance. Lastly, active social interaction has a stronger impact than passive social interaction in terms of learning performance. These findings indicate the importance of social interaction and the "activeness" dimension when it comes to learning a language. This randomized cross-continental experimental study provides strong indications of the importance of social information in the context of language learning. The results of this study take the social information processing theory a step forward by providing empirical evidence on the impact of increased visibility of social information on user performance in the OLLM.

This study provides empirical evidence on how Web 2.0 has changed the role of the consumer and emphasizes the importance of using consumers and their social information as an essential learning medium. Firms can use the findings to develop guidelines for optimal investments in various social information and interaction methods. The findings of this study would guide platform developers to enable and constrain the visibility of information that operates in their ecosystem and to engineer the user experience to increase sharing, interaction, and virality.

ACKNOWLEDGMENT

This study has been funded by Kuwait University Grant Number IQ01/15. I would like to thank Kuwait University's Research Administration for granting the project and facilitating the research implementation.

REFERENCES

Ahn, T. Y., & Lee, S. M. (2016). User experience of a mobile speaking application with automatic speech recognition for EFL learning. *British Journal of Educational Technology*, *47*(4), 778–786. doi:10.1111/bjet.12354

Alhamami, M. (2019). Learners' beliefs about language-learning abilities in face-to-face & online settings. *International Journal of Educational Technology in Higher Education*, *16*(1), 31. doi:10.1186/s41239-019-0162-1

Anshari, M., Almunawar, M. N., Shahrill, M., Wicaksono, D. K., & Huda, M. (2017). Smartphones usage in the classrooms: Learning aid or interference? *Education and Information Technologies*, *22*(6), 3063–3079. doi:10.1007/s10639-017-9572-7

Ascarza, E., Neslin, S. A., Netzer, O., Anderson, Z., Fader, P. S., Gupta, S., & Neal, D. et al. (2018). In Pursuit of Enhanced Customer Retention Management: Review, Key Issues, and Future Directions. *Customer Needs and Solutions*, *5*(1-2), 65–81. doi:10.1007/s40547-017-0080-0

Attwell, G. (2019). E-Learning at the Workplace. Handbook of Vocational Education and Training: Developments in the Changing World of Work, 1-25.

Batanero, C., de-Marcos, L., Holvikivi, J., Hilera, J. R., & Otón, S. (2019). Effects of New Supportive Technologies for Blind and Deaf Engineering Students in Online Learning. *IEEE Transactions on Education*, *62*(4), 270–277. doi:10.1109/TE.2019.2899545

Bonk, C. J., & King, K. S. (2012). *Searching for learner-centered, constructivist, and sociocultural components of collaborative educational learning tools. In Electronic collaborators*. Routledge.

Brick, B. (2013). *Social networking sites and language learning. In Technologies, Innovation, and Change in Personal and Virtual Learning Environments*. IGI Global.

Bronack, S., Riedl, R., & Tashner, J. (2006). Learning in the zone: A social constructivist framework for distance education in a 3-dimensional virtual world. *Interactive Learning Environments*, *14*(3), 219–232. doi:10.1080/10494820600909157

Brown, J., & Adler, R. (2008). Open education, the long tail, and learning 2.0. *EDUCAUSE Review*, *43*(1), 16–20.

Burt, R. S. (2017). *Structural holes versus network closure as social capital. In Social capital*. Routledge.

Chakowa, J. (2018). Enhancing Beginners' Second Language Learning through an Informal Online Environment. *Journal of Educators Online*, *15*(1), n1. doi:10.9743/JEO2018.15.1.7

Chang, Y.-S., Chen, Y.-S., & Chiang, C.-W. (2019). The differences in pleasing value and learning performance among different groups using mobile augmented reality system for cultural environment learning. *Multimedia Tools and Applications*, *78*(4), 4965–4986. doi:10.1007/s11042-018-6928-y

Chartrand, R. (2012). Social networking for language learners: Creating meaningful output with Web 2.0 tools. *Knowledge Management & E-Learning: An International Journal*, *4*(1), 97–101.

Chen, Y., Wang, Q., & Xie, J. (2011). Online social interactions: A natural experiment on word of mouth versus observational learning. *JMR, Journal of Marketing Research*, *48*(2), 238–254. doi:10.1509/jmkr.48.2.238

Chou, S. W., & Liu, C. H. (2005). Learning effectiveness in a Web-based virtual learning environment: A learner control perspective. *Journal of Computer Assisted Learning*, *21*(1), 65–76. doi:10.1111/j.1365-2729.2005.00114.x

Collins, A., & Halverson, R. (2018). *Rethinking education in the age of technology: The digital revolution and schooling in America*. Teachers College Press.

Cummings, C., Mason, D., Shelton, K., & Baur, K. (2017). *Active learning strategies for online and blended learning environments. In Flipped Instruction: Breakthroughs in Research and Practice*. IGI Global.

Duffy, T. M., & Cunningham, D. J. (1996). *Constructivism: Implications for the Design and Delivery of Instruction*. Academic Press.

Fisher, S., Howardson, G., Wasserman, M. E., & Orvis, K. (2017). How do learners interact with e-learning? Examining patterns of learner control behaviors. *AIS Transactions on Human-Computer Interaction*, *9*(2), 75–98. doi:10.17705/1thci.00090

Garcia, R., Falkner, K., & Vivian, R. (2018). Systematic literature review: Self-Regulated Learning strategies using e-learning tools for Computer Science. *Computers & Education*, *123*, 150–163. doi:10.1016/j.compedu.2018.05.006

Gee, J. P. (2012). *Situated language and learning: A critique of traditional schooling*. Routledge.

Gilmore, A. (2007). Authentic materials and authenticity in foreign language learning. *Language Teaching*, *40*(2), 97–118. doi:10.1017/S0261444807004144

Godwin-Jones, R. (2018). Chasing the butterfly effect: Informal language learning online as a complex system. *Language Learning & Technology*, *22*(2), 8–27.

Goyal, A., Bonchi, F., & Lakshmanan, L. V. (2010). Learning influence probabilities in social networks. *Proceedings of the third ACM international conference on Web search and data mining*. doi:10.1145/1718487.1718518

Gray, K., Thompson, C., Sheard, J., Clerehan, R., & Hamilton, M. (2010). Students as Web 2.0 authors: Implications for assessment design and conduct. *Australasian Journal of Educational Technology*, *26*(1). Advance online publication. doi:10.14742/ajet.1105

Harrison, R., & Thomas, M. (2009). Identity in online communities: Social networking sites and language learning. *International Journal of Emerging Technologies and Society*, *7*(2), 109–124.

Henry, M., Carroll, F., Cunliffe, D., & Kop, R. (2018). Learning a minority language through authentic conversation using an online social learning method. *Computer Assisted Language Learning*, *31*(4), 321–345. doi:10.1080/09588221.2017.1395348

Hung, S.-T. A., & Huang, H.-T. D. (2016). Blogs as a learning and assessment instrument for English-speaking performance. *Interactive Learning Environments*, *24*(8), 1881–1894. doi:10.1080/10494820.2015.1057746

Johansson, G. (1989). Job demands and stress reactions in repetitive and uneventful monotony at work. *International Journal of Health Services*, *19*(2), 365–377. doi:10.2190/XYP9-VK4Y-9H80-VV3K PMID:2714928

Kelm, O. R. (2011). Social media: It's what students do. *Business Communication Quarterly*, *74*(4), 505–520. doi:10.1177/1080569911423960

Kelman, H. C. (1958). Compliance, identification, and internalization three processes of attitude change. *The Journal of Conflict Resolution*, *2*(1), 51–60. doi:10.1177/002200275800200106

Kim, D.-Y., Zhu, P., Xiao, W., & Lin, D. (2017). Does Customer Network Centrality Matter in Enhancing Supplier Performance? *Academy of Management Proceedings*. doi:10.5465/AMBPP.2017.17340abstract

Lambert, C., Philp, J., & Nakamura, S. (2017). Learner-generated content and engagement in second language task performance. *Language Teaching Research*, *21*(6), 665–680. doi:10.1177/1362168816683559

Lantolf, J. P. (2000). *Sociocultural theory and second language learning* (Vol. 78). Oxford University Press.

Leary, M. R., & Baumeister, R. F. (2017). *The need to belong: Desire for interpersonal attachments as a fundamental human motivation. In Interpersonal Development*. Routledge.

Lee, M. J., & McLoughlin, C. (2007). Teaching and learning in the Web 2.0 era: Empowering students through learner-generated content. *International Journal of Instructional Technology and Distance Learning, 4*(10), 21-34.

Lim, C. L., Ab Jalil, H., Ma'rof, A. M., & Saad, W. Z. (2020). Assisting Peer Learning Performance Using Online Collaborative Tools in Virtual Learning Environments. In *Preparing 21st Century Teachers for Teach Less, Learn More (TLLM) Pedagogies* (pp. 108–124). IGI Global.

Liu, M., Evans, M., Horwitz, E., Lee, S., McCrory, M., Park, J., & Parrish, C. (2013). *A Study of the Use of Language Learning Websites with Social Network Features By University ESL Students*. Academic Press.

Luo, T. (2013). Web 2.0 for language learning: Benefits and challenges for educators. *International Journal of Computer-Assisted Language Learning and Teaching*, *3*(3), 1–17. doi:10.4018/ijcallt.2013070101

Mitchell, A., Petter, S., & Harris, A. (2017). Learning by Doing: Twenty Successful Active Learning Exercises for Information Systems Courses. *Journal of Information Technology Education: Innovations in Practice, 16*, 21-46.

Nazim, A., & Ahmad, S. (2013). A Comparison Between Ordinary Least Square (OLS) And Structural Equation Modeling (SEM) Methods in Estimating The Influential Factors of 8th Grades Student's Mathematics Achievement In Malaysia. *International Journal of Scientific and Engineering Research*.

Orsini-Jones, M., Brick, B., & Pibworth, L. (2013). *Practising language interaction via social networking sites: The expert student's perspective on personalized language learning. In Computer-assisted foreign language teaching and learning: Technological advances*. IGI Global.

Orús, C., Barlés, M. J., Belanche, D., Casaló, L., Fraj, E., & Gurrea, R. (2016). The effects of learner-generated videos for YouTube on learning outcomes and satisfaction. *Computers & Education*, *95*, 254–269. doi:10.1016/j.compedu.2016.01.007

Parmaxi, A., & Zaphiris, P. (2017). Web 2.0 in Computer-Assisted Language Learning: A research synthesis and implications for instructional design and educational practice. *Interactive Learning Environments*, *25*(6), 704–716. doi:10.1080/10494820.2016.1172243

Persson, A., Wanek, B., & Johansson, A. (2001). Passive versus active operator work in automated process control—A job design case study in a control centre. *Applied Ergonomics*, *32*(5), 441–451. doi:10.1016/S0003-6870(01)00022-9 PMID:11534789

Prichard, C. (2013). Training L2 learners to use SNSs appropriately and effectively. *CALICO Journal*, *30*(2), 204–225. doi:10.11139/cj.30.2.204-225

Rice, R. E., & Aydin, C. (1991). Attitudes toward new organizational technology: Network proximity as a mechanism for social information processing. *Administrative Science Quarterly*, *36*(2), 219–244. doi:10.2307/2393354

Richardson, W. (2010). *Blogs, wikis, podcasts, and other powerful web tools for classrooms*. Corwin Press.

Rosenberg, M. J., & Foshay, R. (2002). E-learning: Strategies for delivering knowledge in the digital age. *Performance Improvement*, *41*(5), 50–51. doi:10.1002/pfi.4140410512

Routman, R. (2005). Writing essentials: Raising expectations and results while simplifying teaching. *Education Review*.

Salancik, G. R., & Pfeffer, J. (1978). A social information processing approach to job attitudes and task design. *Administrative Science Quarterly*, *23*(2), 224–253. doi:10.2307/2392563 PMID:10307892

Schröder, S., Grüttner, M., & Berg, J. (2019). Study Preparation for Refugees in German'Studienkollegs'–Interpretative Patterns of Access, Life-wide (Language) Learning and Performance. *Widening Participation and Lifelong Learning: The Journal of the Institute for Access Studies and the European Access Network*, *21*(2), 67–85. doi:10.5456/WPLL.21.2.67

Shadiev, R., Hwang, W.-Y., & Huang, Y.-M. (2017). Review of research on mobile language learning in authentic environments. *Computer Assisted Language Learning*, *30*(3-4), 284–303. doi:10.1080/09588221.2017.1308383

Stevenson, M. P., & Liu, M. (2010). Learning a language with Web 2.0: Exploring the use of social networking features of foreign language learning websites. *CALICO Journal*, *27*(2), 233–259. doi:10.11139/cj.27.2.233-259

Sundararajan, A., Provost, F., Oestreicher-Singer, G., & Aral, S. (2013). Research commentary—Information in digital, economic, and social networks. *Information Systems Research*, *24*(4), 883–905. doi:10.1287/isre.1120.0472

Sylv, L. K., & Sundqvist, P. (2017). Computer-assisted language learning (CALL) in extracurricular/extramural contexts. *CALICO Journal*, *34*(1), i–iv. doi:10.1558/cj.31822

Vacca, R. T., Vacca, J. A. L., & Mraz, M. E. (2016). *Content area reading: Literacy and learning across the curriculum*. Pearson.

Wang, C., Fang, T., & Gu, Y. (2020). Learning performance and behavioral patterns of online collaborative learning: Impact of cognitive load and affordances of different multimedia. *Computers & Education*, *143*, 103683. doi:10.1016/j.compedu.2019.103683

Wang, Y., & Yu, C. (2017). Social interaction-based consumer decision-making model in social commerce: The role of word of mouth and observational learning. *International Journal of Information Management*, *37*(3), 179–189. doi:10.1016/j.ijinfomgt.2015.11.005

Wang, Z., & Kim, H. G. (2017). Can social media marketing improve customer relationship capabilities and firm performance? Dynamic capability perspective. *Journal of Interactive Marketing*, *39*, 15–26. doi:10.1016/j.intmar.2017.02.004

Xu, X., Chan, F. M., & Yilin, S. (2018). Personal learning environment: An experience with ESP teacher training. *Interactive Learning Environments*, 1–16. doi:10.1080/10494820.2018.1552872

Yang, B., Lei, Y., Liu, J., & Li, W. (2017). Social collaborative filtering by trust. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *39*(8), 1633–1647. doi:10.1109/TPAMI.2016.2605085 PMID:27608451

Yang, J. (2016). Effects of popularity-based news recommendations ("most-viewed") on users' exposure to online news. *Media Psychology*, *19*(2), 243–271. doi:10.1080/15213269.2015.1006333

Yang, Y., Crook, C., & O'Malley, C. (2014). Can a social networking site support afterschool group learning of Mandarin? *Learning, Media and Technology*, *39*(3), 267–282. doi:10.1080/17439884.2013.839564

Yang, Y.-F. (2018). New language knowledge construction through indirect feedback in web-based collaborative writing. *Computer Assisted Language Learning*, *31*(4), 459–480. doi:10.1080/09588221.2017.1414852

Young, H. P. (2009). Innovation diffusion in heterogeneous populations: Contagion, social influence, and social learning. *The American Economic Review*, *99*(5), 1899–1924. doi:10.1257/aer.99.5.1899

Zhu, C. (2012). Student satisfaction, performance, and knowledge construction in online collaborative learning. *Journal of Educational Technology & Society*, *15*(1), 127.

Abrar Al-Hasan received a B.Sc. degree in Computer Engineering from Kuwait University, and the M.B.A. and Ph.D. degrees in Management of Information Systems from the University of Maryland at College Park. She is an Assistant Professor of Information Systems with the College of Business Administration, Kuwait University. She has more than five years of consulting experience in IT fields, specializing in software engineering and data mining and market analysis. Her research interests include social media and social networks, online markets and digital innovation, health IT, crowdsourcing and open innovations, and economics of information systems.