



Efficacy of Using Social Networks in Learning and Teaching Based on Self-Determination Theory: An Interventional Study

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Abstract

Background: Self-determination theory, which deals with motivation and personality, comprises three factors of autonomy, competence and relatedness that can be influenced by the features and potentials of social networks.

Objectives: We aimed to investigate the influence of social networks on the three main factors of the self-determination theory in learners.

Methods: The present case-control study with a pretest-posttest design was conducted among 40 Iranian Ph.D. students who lived in Schengen area countries. Students were randomly divided into control (n = 20) and experimental (n = 20) groups. Before and after holding training sessions through a social media (Facebook) and face to face (FTF) education, Test of English as a Foreign Language (TOEFL) and the intrinsic motivation inventory were used for data collection. The intrinsic motivation inventory is a valid instrument that evaluates the three factors of autonomy, competence and relatedness.

Results: the results indicated a significant difference between the two groups in terms of the three factors. The means of all the three variables improved significantly in the social network group as compared to the FTF group (P = 0.00). Although competence had improved in both groups, this improvement was greater in the social media group relative to the FTF group (P = 0.00).

Conclusions: Social networks provide better learning experiences. They improve learning outcomes as they boost learners' relatedness, competence and autonomy.

Keywords: Facebook, Motivation, Online Social Networks, Teaching and Learning, Self-Determination Theory

1. Background

Since the youth, especially students, have a keen interest in using social networks (1) and the context and environment of these networks are conducive to learning and education, a large number of studies has been performed on the pedagogical use of social networks (2). Different capabilities and the flexibility inherent in these networks can generate new educational opportunities. As Selwyn (3) argues, online social networking applications are good representatives of the high-quality educational technologies. These networks provide opportunities for individual and collaborative learning. They also provide formal and informal learning environments.

However, limited knowledge in this regard impedes the optimal use of such networks for educational purposes (4). Moreover, students seem to be very engaged with online learning resources and social networks. Akbari et al. (5) argue that both students and instructors welcome the use of social networks in learning and teaching. Thus, it is

important to determine the potential of these networks in learning and teaching and to decide on how they should be used by educators.

Easy access to information and individuals through social networks makes it possible for second or foreign language learners to access native speakers and to have authentic interactions and exchange learning materials such as documents, files, and web links. In addition, researchers maintain that these networks have high potentials in learning and teaching (6-10).

Some researchers (1, 11) argued that from among social networks, Facebook should be given a greater consideration in the area of teaching and learning because it is the most popular social network besides the fact that the facilities it provides have more potential for the realm of education. According to Blattner and Fiori (12), Facebook provides authentic language interactions and is motivating. Moreover Kabilan et al. (13), stated that Facebook offers a facilitating environment for learning. According to Pat-

tanapichet and Wichadee (14), the use of Facebook in language learning results in a considerable improvement in learning. What's more Roblyer et al. (15), argued that university students could use Facebook to support classroom work.

We believe that social media such as Facebook can considerably promote both learning and motivation in learners. Self-determination theory is one of the theories that specifically addresses motivation and learning. Based on this theory, while increasing learners' motivation, an active learning environment should be able to enhance relatedness, autonomy and competence. Self-determination theory (SDT) is a general theory concerning individual motivation and personality (16). It emphasizes the relationship between human beings and the social contexts influencing individuals' motivation (16, 17). Moreover, Deci and Ryan (18) determined three factors that promote self-determination in classroom, namely autonomy (self-determination in resolving what to do and how to do it), competence (developing and implementing skills for the manipulation and control of the environment) and relatedness (association with others through pro-social relationships) (18). An explanation of these three factors follows.

Autonomy is defined as students' choice in performing academic tasks and their choice regarding when and how to perform them (19). Competence is defined as the need to feel a sense of mastery in interactions with the social environment (20) and at the same time, the experience of voicing and employing one's capacities and abilities (18). Finally, relatedness refers to the provision of opportunities for students to collaborate and interact, discuss, criticize and give feedback to each other, and enhance their self-confidence (21).

Given the lack of documented empirical studies on the effects of this method on English language teaching and learning, the researcher aimed to examine its effect on intrinsic motivation and the level of learning.

More precisely, it aims at answering the following questions:

1. What is the relationship between the three factors of autonomy, competence and relatedness and motivation?
2. Is there a significant difference between the two groups in terms of autonomy, competence and relatedness?
3. Is competence influential in the learning process in the two groups?

2. Methods

This quantitative field experiment with a case-control and pretest-posttest design was conducted through com-

parative analysis of Facebook and face to face (FTF) groups as experimental and control groups, respectively.

2.1. Participants

Initially, various groups of Iranian Ph.D. students living in European countries including Denmark, Belgium, Germany, Norway, the Netherlands, Sweden, and France were called for participation through email. They were notified that English language courses would be held. More than 250 individuals volunteered to participate in the study. However, only 120 Ph.D. students aged between 25 and 35 years with a moderate level of English language skills met the inclusion criteria to participate in the course. Fifty participants out of the initial 120 participants were living in the Netherlands and were assigned to the FTF group (participating in the formal course) and 20 participants from the remaining 70 participants living in other European countries were randomly assigned to the experimental group. Overall, 45% of the participants were women and 55% were men.

2.1.1. The Experimental Group

A group was created on Facebook, who were exposed to English language one hour a day for one month. In these sessions, students participated in different conversations and interactive activities with a native speaker teacher and their classmates. On the group's wall on Facebook, students interacted and conducted different tasks. Students posted short paragraphs on a specific topic on the group's wall. They were permitted to use a variety of educational resources including pictures, videos, and links. Students were also permitted to raise their questions on activities or to share interesting or useful materials.

2.1.2. The Control Group

In the control group, students participated in one hour and forty-minute sessions every day for one month and received formal English lessons by a native English teacher. Teaching methods and the participants' age range were the same in both groups. In the control group, students typed and printed short paragraphs on a specific topic that received feedback from fellow students. The teacher provided supervision and help when needed, while the majority of the discussions were student-centered.

2.2. Teaching Method

The two instructors organized their lesson plans based on the book "Face 2 Face". Each lesson included four sections (A, B, C, D). Students studied two sections before participating in the classes. Moreover, teachers asked questions about some exercises and explained ambiguous

grammar points and the linguistic concepts when needed. One figure of speech was also taught each day. In brief, each session in the traditional class consisted of three parts including conversations among students on different topics, answering questions and clarifying important linguistic concepts, and finally, speaking about students' assignments.

In the control group, assignments were commented on by peers during class time. Students were divided into groups of 4 to 5 to show their assignments to each other and give/receive feedback. After that, they discussed the feedbacks and questions. A difference between the two groups was uploading different educational videos on the group's wall in the experimental group.

2.3. Research Instruments

2.3.1. TOEFL Test

A pretest and a posttest were conducted via the standardized TOEFL test. The pretest was administered to investigate students' English level and the posttest was conducted to assess outcomes.

2.3.2. Questionnaire

The intrinsic motivation inventory (IMI) is a valid instrument that evaluates the three factors of autonomy, competence and relatedness. This questionnaire has been utilized in several studies concerning motivation and self-regulation (16-20). It includes different sections from among which we selected the following three scales:

Autonomy: This subscale consists of seven items, each modified to fit the research context. A sample item is: "I didn't really have a choice about doing these activities". The Cronbach's alpha reliability of this subscale was 0.95.

Competence: This subscale contains six items, each modified to fit the research context. A sample item is: "I think I am pretty good at language learning". The reliability test on the six items showed good internal consistency ($\alpha = 0.89$).

Relatedness: The subscale includes seven items each modified to fit the research context. A sample items is: "I really doubt that my classmate". The reliability test on the seven items indicated good internal consistency ($\alpha = 0.85$).

2.3.3. Analytical Procedure

The statistical procedures employed to answer the research questions were independent *t*-test, multiple regression analysis, and repeated measures analysis of variance (ANOVA), respectively. It should be noted that forward regression analysis with the criterion of 0.05 was run to estimate the relative importance of the predictors. Data analysis was performed in SPSS version 22.0.

Ethical considerations were taken into account in this study, and the study began after receiving the approval of the Ethics Committee of Utrecht University. The researcher first introduced herself, explained the study objectives and received written consent forms from the participants. Moreover, the students were ensured of the confidentiality of their data.

3. Results

In order to answer the first question, that is, whether or not the two groups are different in terms of autonomy, competence and relatedness, independent *t*-test was run. In the test, group (Facebook vs. FTF) was considered as the independent variable and autonomy, competence and relatedness were deemed as dependent variables. Therefore, independent samples *t*-test provided a comparison between the two groups in terms of the degrees of autonomy, relatedness and competence (Table 1).

The results illustrated in Table 1 show a significant difference between the two groups in terms of the mean values calculated for the three variables.

For the second question, whether or not the three independent variables of autonomy, competence and relatedness of students can predict the dependent variable of motivation, correlation analysis and multiple regression analysis with forward stepwise selection were used. The correlations of the variables are illustrated in Table 2. There were six significant correlations ($P \leq 0.01$). The strongest correlation was found between the two variables of relatedness and motivation ($r = 0.787$) and the weakest was between autonomy and motivation ($r = 0.630$).

The results of forward regression for predicting motivation scores from autonomy, competence and relatedness scores are reported in Table 3. It reflects that the three predictive variables, namely competence, autonomy and relatedness, added significantly to the prediction of motivation. A follow-up forward regression indicated that relatedness contributed relatively the most to the prediction ($F [1, 38] = 62.0, P < 0.001$), accounting for 62% of the variance in motivation (Table 2). The addition of the competence variable in step 2 explained a further 10.6% of the variance, and the addition of the autonomy variable in step 3 explained a further 3% of the variance. Table 3 shows that relatedness is the strongest predictor of motivation ($\beta = 0.425, t = 3.681$).

In an attempt to answer the third question, how competence affects learning process of the two groups, repeated measures ANOVA was conducted. In fact, it addresses how English students' feeling of competence develops over time (from pre-test to post *t*-test) and whether or not it develops differently for students in the Facebook group compared to the FTF group. To do so, repeated

Table 1. Independent *t*-Test to Compare Autonomy, Competence, and Relatedness Between the Two Groups

Variable	Descriptive Statistics, Mean \pm SD	t-Test Results		
		t	df	P Value
Relatedness				0.000 ^a
Facebook	3.45 \pm 0.28	9.832	38	
FTF	2.45 \pm 0.36			
Autonomy				0.000 ^a
Facebook	3.74 \pm 0.35	6.145	38	
FTF	2.87 \pm 0.52			
Competence				0.000 ^a
Facebook	3.59 \pm 0.32	7.287	38	
FTF	2.82 \pm 0.35			

Abbreviation: FTF, face to face.

^a Significant at $P < 0.001$.**Table 2.** Correlation Matrix

	1	2	3	4
1. Relatedness	1			
2. Autonomy	0.630 ^a	1		
3. Competence	0.658 ^a	0.688 ^a	1	
4. Motivation	0.787 ^a	0.749 ^a	0.749 ^a	1

^a Correlation is significant at the level of 0.01.**Table 3.** Summary of Forward Regression Analysis for Predicting Motivation (N = 40)^a

Role	B	SE of B	β	R ²	t	P Value
Step 1				0.620		
Relatedness	0.938	0.119	0.787		7.874	0.000
Step 2				0.726		
Relatedness	0.623	0.132	0.523		4.720	0.000
Competence	0.481	0.127	0.419		3.779	0.001
Step 3				0.756		
Relatedness	0.507	0.138	0.425		3.681	0.001
Autonomy	0.345	0.138	0.300		2.507	0.017
Competence	0.363	0.171	0.262		2.122	0.041

^a F(1, 38) = 62.0, $P < 0.001$ for step 1; F(2, 37) = 48.976, $P < 0.001$ for step 2, $\Delta R^2 = 0.106$; F(3, 36) = 37.243, $P < 0.001$ for step 3, $\Delta R^2 = 0.030$.

measures ANOVA was used with measurement occasion (time, Table 3) as a two-level (pre-test and pos *t*-test) within-subject factor and experimental condition (group, Table 3) was considered as a two-level (Facebook and FTF) between-subject factor. The results of the repeated measures ANOVA are presented in Table 4. The significant time \times group interaction effect shows that competence developed differently in the Facebook group compared to the FTF group. Figure 1 shows that in the Facebook group, students' feeling of competence increased significantly more than the FTF group. The significant effect of measurement occasion (time) displayed in Table 4 indicates that students' feeling of competence had increased from pre- to pos *t*-test irrespective of the experimental condition they participated in. Further, the significant main effect of group on competence shows that the Facebook group perceived higher

levels of competence than did the FTF group.

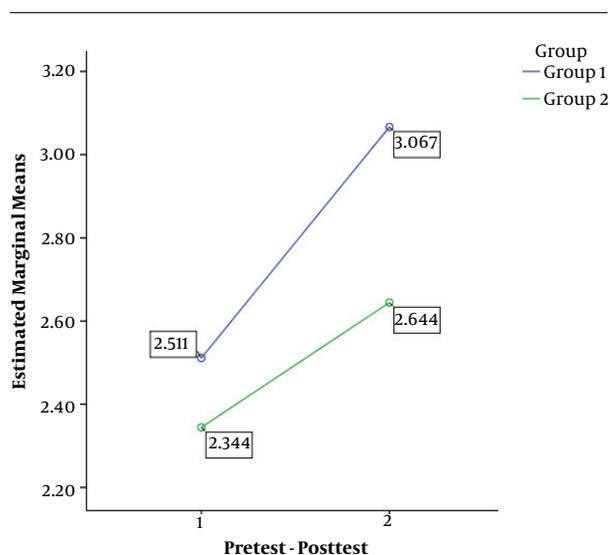
4. Discussion

The present article investigated difference in motivation based on the self-determination theory, which incorporates the three factors of competence, autonomy and relatedness. According to the self-determination theory, motivation which plays a crucial role in the improvement of learning, is influenced by these three factors.

Investigation of the first research question indicated that all the three variables were capable of predicting motivation and the variables of relatedness, autonomy and competence were the most influential in the prediction, respectively. Therefore, our findings support the influence of these three factors on motivation.

Table 4. Repeated Measures Results for Comparing Competence

Source	Type III Sum of Squares	df	Mean Square	F	P N ²
Between-Subjects					
Intercept	558.272	1	558.272	3539.365	0.000 ^a
Group	1.734	1	1.734	10.993	0.002 ^a
Error	5.994	38	0.158		
Within-Subjects					
Time	3.660	1	3.660	74.554	0.000 ^a
Time group ^a	0.327	1	0.327	6.652	0.014 ^a
Error (time)	1.865	38	0.049		

^a p < 0.05**Figure 1.** Marginal means of competence

Social networks can increase the degree of relatedness and eventually, create a community of learners (12). This fact is supported by the present research observations as the majority of the participants after several months, still communicated with each other and even interacted through the webpage created in Facebook. From a different perspective (22), emphasized that “intra-organizational social networks improve interpersonal relationships in organizational conduct”. Accordingly, it is logical for relatedness to be the strongest predictor of motivation as was shown in the present research (23) investigated teachers’ motivation to continue to use e-learning technology on the basis of the self-determination theory and reported that from among the three main variables, competence had the greatest impact on motivation. Moreover (24), found that perceived autonomy was the most important predictor of students’ motivation.

The results regarding the second research question on

the difference between the two groups with respect to the three variables indicated that the means of all of the variables were higher in the Facebook group than the FTF group.

Since relatedness was discussed earlier, here we just mention that developing relatedness is one of the most important functions of social networks. As to autonomy, however, based on the self-determination theory, autonomy is related to the fact that students should have a choice over the time of doing academic tasks and the manner of doing them.

A look at the features of social networks indicates the differences between face to face classrooms and the classes in the environment of social networks. It is clear that there is a choice over time because these networks are not limited to a specific time and space and they are accessible at any point in time.

Access to opportunities provided by social networks is impossible or very difficult in classrooms. Therefore, it seemed that developing autonomy is easier and simpler through online social networks. As to competence, based on the self-determination theory, there are two very important matters: effective communication and interaction and control over the environment. As mentioned, students can interact, ask their questions, answer others’ questions and at the same time, give/receive feedback. In fact, feedback is quite clear within the formats of discussion, writing, picture, like and dislike in the social network of Facebook.

Moreover, because such networks can be easily used, students usually have control over the environment. Therefore, it seems that social networks can positively influence the two important elements of competence, that is, effective interaction and control over the environment. Results related to the other research questions indicated that competence was developed in both groups. However, this development was greater in the Facebook group than in the FTF group (25) argued that by developing cooperation among learners, online networks provided opportuni-

ties for developing competence. Furthermore, he emphasized that these networks improved the key competences required for lifelong learning.

In general, on the basis of all these features, it can be suggested that the targeted use of social networks in education can enhance these three interrelated factors. Therefore, these networks definitely have a high potential in teaching and learning and the mentioned features can resolve some of the problems in today's educational system. Certainly, these features and facilities should not be ignored by researchers in various learning and teaching fields and further comprehensive studies should be carried out regarding them.

Footnotes

Authors' Contribution: Elham Akbari devised the study concept, designed the study, ran the study intervention and conducted data collection and analysis. Robert-Jan Simons participated in the coordination of the study and critically revised the manuscript.

Conflict of Interests: The authors declare that they have no competing interests.

Ethical Considerations: First, we obtained the approval of the Ethics Committee of Utrecht University. After obtaining permission from the university officials, the research began at the Utrecht University. At the onset of the experiment and after the researchers had introduced themselves, they explained the research objectives and the need for its implementation. Then, written informed consent was obtained from students participating in the study. They were also assured that all the collected information will remain confidential.

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