Kasetsart Journal of Social Sciences 44 (2023) 1293–1302

Kasetsart Journal of Social Sciences

journal homepage: http://kjss.kasetsart.org

# An analysis of factors affecting English language learning in technology-mediated environments as perceived by the undergraduate language learners

**Nattakan Sukchuen**

*Former Lecturer of the Department of Foreign Languages, Faculty of Humanities, Kasetsart University, Bangkok 10900, Thailand*

**Article Info**

*Article history:*
Received 7 December 2022
Revised 5 February 2023
Accepted 14 February 2023
Available online 17 November 2023

*Keywords:*
Autonomous learning,
English learning in technology-mediated environments,
language learning factors,
learning perception,
Rosetta Stone Program

**Abstract**

This research investigated students' perception of learning English via technology and explored factors affecting English learning in technology-mediated environments. The subjects were 1,056 undergraduates randomly selected from the Tangtongchitr group. By implementing the Rosetta Stone program for at least one semester, all of them had access to technology. Additionally, some of them received English instruction using Google Classroom. A questionnaire was used to collect data in the second semester of 2018. Data were analyzed using descriptive statistics and exploratory factor analysis. Analysis of the descriptive statistics revealed that the subjects perceived the screen arrangement and colorful pictures as having a positive effect on their online learning. However, responses to open-ended questions showed that the subjects' perceptions of their online learning were negatively impacted by the difficulty of the log-in procedure. The subjects perceived that the Rosetta Stone program enhanced their English performance, though. Factor analysis revealed five groups of factors affecting English learning via technology: (1) Learning style factors required cognitive activities with analytical and critical thinking skills; (2) Attitude factors toward using technology indicated a negative attitude; (3) Anxiety factors indicated the anxiety of failing the exam and feeling insecure in autonomous learning; (4) Interaction factors indicated a preference for learning with peers; and (5) Environmental factors indicated a preference for learning without time control. Overall, the results of this study confirmed the theory of designing online learning and factors affecting learning in technology-mediated environments. It is recommended that teachers should be aware of those factors as well as technological factors affecting learning to make more efficient online language learning.



E-mail addresses: nattakan2011@gmail.com.

https://doi.org/10.34044/j.kjss.2023.44.4.33
2452–3151/© 2023 Kasetsart University.

## Introduction

Technology has been implemented in education all over the world for several decades. It was also integrated into the English language teaching and learning classroom with the use of computers as computer-mediated communication (CMC), Web-based instruction (WBI), or online learning. The development of technological innovation has increased more efficient communication through computer networks to enhance and facilitate learning. Previous studies relating to technology and language learning found that online learning appears to be slightly better than face-to-face learning (Despain, 2003; Isenberg, 2010). This is because a technology-mediated environment provides learners with more opportunities in their learning. Technology provides a community where learners can interact with their peers and teachers via three communicative modes: interpretive, interpersonal, and presentation (Lee, 2002). There are various tools that foster technology-mediated learning, and Google Classroom is one of them. Google Classroom is the Multi-User Dimension that teachers can manipulate online teaching and learning. Learning environment could be customized via synchronous chat, Google meetings, and also a database to provide content materials that learners can access anytime at their convenience. In addition to the use of computers for technology-mediated learning at the Tangrongchitr group, other devices such as mobile phones and tablets are integrated into the learning environments. Additionally, in order to increase students' attention and motivation for English language learning, the Rosetta Stone Program is implemented for autonomous learning.

Previous research studies indicate that there are several factors affecting effective learning outcomes in technology-mediated environments such as types of technology, and how it is used (Bauer & Kenton, 2005; Gorder, 2008). This means that just using technology does not guarantee effective outcomes. Hsu (2013); Jung (2014); LeNoue et al. (2011); Warschauer and Liaw (2011) reported that the implementation of different types of technology indicated results of both positive and negative reactions from learners. This is consistent with Oxford (2008); Hurd (2005) who claimed that learning outcomes may result from individual differences that can either hinder or enhance learning. Thus, the researcher conducted this study to investigate students' perception of the implementation of the Rosetta Stone program to find out the advantages and disadvantages of learning English through this program. Rosetta Stone is a language software learning program which claims to teach language as or even more effectively than a traditional classroom environment (Lord, 2016). There have been attempts to explore its effectiveness in replacing classroom instruction. A study by DeWaard (2013), for instance, explores the possibility of having the Rosetta Stone replace the traditional classroom instruction. Although the conclusion made was that the program is, "Not a viable replacement of current instruction at the postsecondary level" (DeWaard, 2013, p. 61), others found it to be advantageous (Santos, 2011). The other purpose of this study is to explore the factors affecting English language learning in technology-mediated environments. There is a need that research in technology-mediated teaching should target learners' perceptions and underlying factors affecting their learning to develop a model, and correct any mistakes for using technologies with the target group in the future rather than overgeneralizing that those learners are of the net generation and will welcome any technologies. Studies in the field of second language acquisition reveal that there are a number of factors contributing to the success of language learning. Among them, these five groups of factors are discussed as considerable factors affecting learners' success in technology-mediated learning, namely, (1) individual differences, (2) learning styles, (3) learning strategies, (4) affective factors, and (5) learning environments. The results of this study may provide educators, language teachers, and others, who are responsible for manipulating language teaching and learning via technology, with some ideas for implementing language teaching via technology. The significance of this study is that it is conducted among undergraduate learners of various institutions in the same group. In addition, this study deals with factors influencing second language learning, and factors which impact technology-mediated learning as perceived by learners. Additionally, the obtained results may enrich the existing theoretical concepts of integrating technology into practical development for successful language teaching and learning, and also provide insights and valuable reference for future studies related to this field.

## Literature Review

### *Learners' Perception towards the Use of Technology in Learning*

Although there is an increase in the use of multimedia technologies for online and blended learning by educators, the perception of its acceptance by students is still unclear in the realm of learners' perception research (Park et al, 2019).

As a result, different aspects of perception and the use of multimedia technologies are being studied from different angles. A recent study by Martin et al. (2020), for instance, examined students' perception of readiness for online learning. Using MANOVA as a tool of analysis, result shows that learner's race (white and nonwhite) and course format (a/synchronous and blended) contributed to their perceptions of online learning competencies. In addition, more recent studies have focused on perception in specific situations and context. For instance, Baczek et al. (2021) investigated students' perception towards e-learning in a health pandemic context (Baczek et al, 2021). Using questionnaire as a research tool to analyze data from 800 Polish medical students, it was found that no statistical differences were found between face-to-face and online learning in terms of delivering knowledge and content (Baczek et al, 2021). Although students enjoy e-learning, it was found that they were less active, and a more powerful tool is needed. There is perhaps the need to implement a well-planned strategy and approach. A similar study by Khan et al. (2020) also explores students' perception towards e-learning in the context of a pandemic period. This study, however, added in the readiness as another factor to analyze in the study. E-learning had been perceived as analogous to face-to-face learning by students.

One popular online learning software program is the Rosetta Stone program. Rosetta Stone is a language learning program that could provide learners with authentic online learning materials. At the heart of this program is the self-learning style program (Astanina et al., 2019). There has been a recent attempt to investigate its students' perception and its efficiency. For instance, Pahlepi (2022) investigated the students' perception and the use of Rosetta Stone program to learn. The study was qualitative in nature to determine students' perceptions of the Rosetta Stone application in terms of listening improvement. It was found that the Rosetta Stone application is perceived to be positive in providing students with different audio features available for learning. However, the study of other factors affecting learning outcome such as the individual differences, learning styles, learning strategies, affective factors, and learning environments could be determined quantitatively to gain deeper insight into students' perception towards the use of e-learning program.

### *Technology in Language Teaching*

Since 1980s, computers have been employed in education. They were also used to assist language teaching and learning (CALL) (Delcloque, 2000). In the beginning, CALL software was based on drills and practice. The interaction and motivation between learner-teacher, or learner-learner were not emphasized. Until the Communicative Approach was introduced for language teaching and learning, the implementation of CALL software became more efficient. It provided learners with more opportunities to improve their language skills by providing more authentic contexts and functions that can enhance learners' learning. Later in the 1990s, computer-mediated communication (CMC) became widely used in language teaching and learning in place of CALL. CMC incorporated multimedia and the internet together, which was how CMC differed from CALL. The two major forms of CMC are synchronous and asynchronous CMC. Synchronous CMC is the tool that provides real-time communication resembling authentic situations. Therefore, it can decrease learners' anxiety about being alone, and also facilitates interactive communication between teacher-learners or learners-learners. In contrast, asynchronous CMC is the tool for delayed-time communication which allows learners to learn at their own pace and interest. It is an anywhere, anytime learning environment. Since technology-mediated learning is learner-centered, the main focus is on the learners' role to construct new knowledge. To encourage learner autonomy, CMC software uses various sources of learning such as an attractive user-friendly interface, colorful pictures, video clips, and pleasant sounds. Currently, technologies include online resources from websites, networking, Chatroom, and mobile learning as their features. Therefore, technology-mediated learning environments optimize collaborative learning and have changed the way students learn. According to a survey, learners prefer to watch live videos rather than read books (Seemiller & Grace, 2016). The study by Bourelle et al. (2016) comparing online learning and a face-to-face class suggests better results for online learning than face-to-face classes. Overall, it can be concluded that technology has offered learners various benefits to enhance their learning. Despite all the benefits of technologies, researchers are still undecided about what might be the best way to use these technologies in order to maximize learners' learning outcomes.

Results from research on technology-mediated learning environments indicate that there are some factors affecting learning such as cognitive styles, affective factors, social factors, and individual differences. According to Waxman and Huang (1996), learners with different cognitive styles, interests, and motivations have different paces and styles in their learning. Sternberg and Grigorenko (2001) define learning styles as types of habits or preferences in doing things, that will not change over time. Kolb et al. (2000) distinguish learning into four different modes: (1) concrete-experience (CE), (2) reflective-observation (RO),

(3) abstract-conceptualization (AC), and (4) active-experimentation (AE). Several researchers conducted their studies based on Kolb's theory. The study of Aragon et al. (2003) found that online students prefer RO compared to learners in traditional classrooms. Aragon et al. (2003) also found that online students demonstrated a higher preference for learning by thinking. Those studies empirically confirmed that Kolb's theory was an excellent tool to survey learners' learning. However, more studies are still needed to find out the influence of learning styles on technology- mediated learning outcomes.

Isenberg (2010) did a comparative study on the outcome of online courses and a face-to-face classroom. The result showed that the outcome of online courses is slightly better. Online learning is learner-centered. It is an autonomous learning environment. Learners may feel frustrated from being alone with no teacher's presence (Murphy et al., 2011). If learners' motivation is negative, it can reduce their interest in learning. This might obstruct effective learning since motivation is one of the affective factors which are important in learning achievement (Gardner, 2005). Motivation affects attitude toward learning. This implies that there is a positive relationship between motivation and attitude which contributes to how learners perceive their learning. Moreover, motivation causes learners to put their effort into learning to achieve the goal (DÖrnyei, 2003).

Factors such as individual differences have a significant impact on how well learners learn a language. In the view of the cognitivist, the concern is primarily with the individuals' specific characteristics, and how these characteristics interact with the learning process. Those characteristics are believed to be correlated with psychological variables which will likely influence learning outcomes. Studies that have been conducted since 1970 have found that personalities have an indirect relationship with success in learning. This is supported by Verhoeven and Vermeer (2002)'s research study in which they examined 241 learners learning Dutch in the Netherlands and found that personality positively correlated with communication ability.

Most research on the success of online learning focuses on two different aspects. The first aspect is the learner's personality. The second aspect is the learning environment (Roblyer et al., 2008). Learners can perceive learning experiences from interaction, between teacher-learners, learners-learners, or program-learners (Stone & Perumean-Chaney, 2011). Online learning environments, both synchronous and asynchronous learning, play an important role in one's achievement. Learners perceive synchronous (real-time) learning as if they are not alone (Stavredes, 2011). However, most of the programs involve asynchronous (delayed- time) learning. Arguably, the differences between these two environments cause different learning outcomes (Mitchell et al., 2007). Meyers' study indicates that learners prefer face-to-face learning to e-learning (Meyer, 2006). The lack of research on the factors that can enhance interactive communication on technology-mediated learning environments to support learners of different personalities are needed to be studied.

The current paper proposes and investigates factors affecting language learning, learning styles, cognitive styles, personality, learning environments, and affective filters such as motivation, attitude, interest, and anxiety.

## Methodology

This study is based on the second language acquisition theory, concepts and theory related to implementing technology in language teaching. The approach of this study is quantitative research using a survey design with a five-point Likert scale questionnaire to collect data. The first part of the questionnaire required respondents to provide personal data including the place of study, age, gender, and experience in using technology. The second part lists factors causing an impact on second language learning in technology-mediated environments. Based on the literature review, in total, nine groups of factors were selected for the analysis. These factors are as follows: (1) belief refers to the level of learners' opinions or views that the learners have on the implementation of technology on learning effectiveness; (2) attitude refers to both positive and negative attitudes toward technology; (3) motivation refers to active, personal involvement in learning. This involves both types of motivation: intrinsic and extrinsic; (4) interest refers to the learner's interest in learning via technology-mediated environments; (5) learning styles refer to learner's characteristics, and physiological behaviors that serve as indicators of how learners perceive, interact with and respond to learning environments; (6) learning strategy refers to methods, steps, or techniques that learners use to learn; (7) anxiety refers to the subjective feeling of tension, apprehension, nervousness, and worry associated with the autonomic nervous system; (8) learning environments refer to the learning situations with technology-enhanced learning, and are learner-centered approach; and (9) interaction refers to communication either between teacher-student or student-student. The questionnaire was validated by two experts in teaching English and technology instruction. Next, it was pilot tested with the other group of learners and was analyzed for the internal consistency reliability using

Cronbach's Alpha Coefficient. The reliability value was .953, which was very high, indicating that the construct of the questionnaire was reliable. To find out the factors affecting learning in technology-mediated environments, Exploratory Factor Analysis (EFA) was conducted. EFA was used to reduce a large number of variables into fewer underlying factors. According to the Kaiser Criterion, Eigen Value is a criterion for determining a factor. The factors with the Eigen Value greater than 1.0 were retained for further interpretation. The factors with the Eigen Value below 1.0 were not considered. To retrieve learners' opinions specifically for the implementation of the Rosetta Stone Program, the researcher added 14 questionnaire items for descriptive analysis. The framework of this study is shown in Figure 1.

### *Data Collection*

Students from the Tangtrongchitr Group were randomly selected as respondents in this study because they comprise of diverse educational backgrounds including vocational and undergraduate levels. Moreover, they have similar experiences in using the technological devices and the Rosetta Stone program. To estimate the number of cases of this research, the researcher used the Hair et al. (2010) suggestion. As this research is an exploratory factor analysis in nature, the proportion of 20:1 parameter was calculated to get the number of cases (Hair et al, 2010, p.11). The total number of factors in this study was 36. Thus, the number of respondents needed in this study was 720. However, the actual number of the responses after distributing the questionnaire and collecting the data in the second semester of 2018 was 1,056. The respondent demographic data is seen in Table 1.

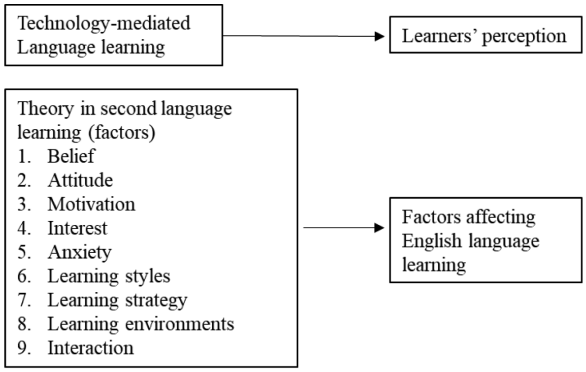


**Figure 1** Research framework

**Table 1** The percentage of the respondent demographic

| Respondent Demographic | Count ($n$ = 1056) | Percent |
|---|---|---|
| Institutions | | |
| Rajapruk University | 352 | 33.33 |
| Tangtrongchitr College | 354 | 33.52 |
| Vimon Technical College | 167 | 15.81 |
| Vimon Business College | 183 | 17.32 |
| Gender | | |
| Male | 485 | 45.9 |
| Female | 560 | 53.1 |
| Age | | |
| 16–17 | 546 | 51.7 |
| 18–19 | 215 | 20.4 |
| 20–21 | 133 | 12.6 |
| 22–23 | 109 | 10.3 |
| Computer performance | | |
| Capable of using computer | 1019 | 91.5 |
| None | 33 | 3.1 |
| Internet access | | |
| Yes | 1010 | 95.6 |
| No | 36 | 3.4 |
| N/A | 10 | 1.0 |
| English language proficiency | | |
| Excellent | 81 | 7.7 |
| Good | 163 | 15.4 |
| Fair | 387 | 36.6 |
| Poor | 286 | 27.1 |
| Very poor | 139 | 13.2 |

Table 1 shows the demographic data of the respondents; 352 respondents from Rajapruk University, 354 from Tangtrongchitr College, 167 from Vimon Technical College, and 183 from Vimon Business College ($n$ = 1056). Their ages vary, but the highest percentage is between 16–17 years old (51.7%). Majority of them have computer competency (91.5 %), and the internet access experience (95.6%).

### *Data Analysis*

This study employs quantitative research methods. The five-point Likert scales were used. Data from the questionnaire were analyzed using descriptive statistics, and Factor Analysis. Descriptive statistics were analyzed for Mean ($\bar{x}$) and standard deviations ($SD$) to determine the differences in opinions after the implementation of the Rosetta Stone Program. Factor Analysis with Varimax Rotation was analyzed to select factors with the Eigen Value greater than 1.0, and all the others with values lower than 1.0 were deleted (Straub et al., 2004) seen in Figure 2.

### *Descriptive Analysis*

Table 2 shows the distributions of respondents' opinions indicating the Mean ($\bar{x}$) and the Standard Deviation ($SD$) of each variable. The questionnaire consisted of 14 items with a five-point Likert scale. Based on Table 2, the highest level of user satisfaction was item 6: the colorful, attractive screen ($\bar{x}$ = 3.75). The second highest was item 1: the ability to enhance English performance ($\bar{x}$ = 3.69). The third highest was item 7: appropriate level of difficulty ($\bar{x}$ = 3.68). They also like the feedback at the end of the activities ($\bar{x}$ = 3.60). The lowest is that they dislike this program ($\bar{x}$ = 3.09).

Table 2 shows the distributions of respondents' opinions indicating the Mean ($\bar{x}$ ) and the Standard Deviation ($SD$) of each variable. The questionnaire consisted of 14 items with a five-point Likert scale. Based on Table 2, the highest level of user satisfaction was item 6: the colorful, attractive screen ($\bar{x}$ = 3.75). The second highest was item 1: the ability to enhance English performance ($\bar{x}$ = 3.69). The third highest was item 7: appropriate level of difficulty ($\bar{x}$ = 3.68). They also like the feedback at the end of the activities ($\bar{x}$ = 3.60). The lowest is that they dislike this program ($\bar{x}$ = 3.09).

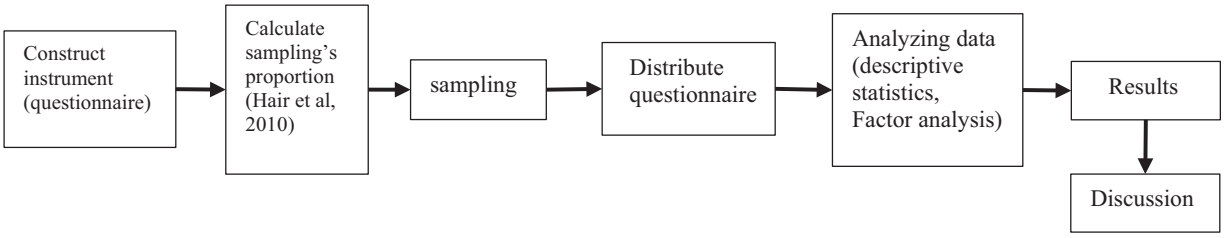


**Figure 2** Summary of research procedures

**Table 2** Descriptive statistics of learners' opinions after using the Rosetta Stone program

| Item | Rosetta Stone application | $\bar{x}$ | $SD$ | Level | Order |
|---|---|---|---|---|---|
| 1 | has more positive impact on learning than face-to-face learning | 3.63 | 1.068 | good | 4 |
| 2 | can enhance English proficiency | 3.69 | 0.993 | good | 2 |
| 3 | more confident in communicating with foreigners after learning | 3.44 | 1.079 | fair | 12 |
| 4 | easy to use | 3.55 | 1.109 | good | 9 |
| 5 | clear instructions of use | 3.59 | 1.071 | good | 6 |
| 6 | colorful screen and good arrangement | 3.75 | 1.052 | good | 1 |
| 7 | appropriate difficulty level | 3.68 | 1.030 | good | 3 |
| 8 | convenient, fast log in | 3.49 | 1.172 | fair | 10 |
| 9 | quick access to activities | 3.47 | 1.104 | fair | 11 |
| 10 | makes me feel happy | 3.56 | 1.084 | good | 7 |
| 11 | makes me want to further my study in English at the higher level | 3.55 | 1.064 | good | 8 |
| 12 | I like the feedback at the end of the activities | 3.60 | 1.040 | good | 5 |
| 13 | I dislike this program | 3.09 | 1.341 | fair | 14 |
| 14 | I want to use this program again | 3.43 | 1.288 | fair | 13 |

### *Factor Analysis*

The analysis of Kaiser-Mayer-Olkin (KMO) and Bartlett's test indicated the value at .949, which was close to 1.0. This value indicated that the data were appropriate to conduct Factor Analysis at a very high level. Bartlett's test showed the Chi-Square value at the significant level of .000. This indicated the correlation Matrix of each factor which could be analyzed by Factor Analysis. The KMO and Bartlett's Test is shown in Table 3.

The Principal Component Analysis by factor extraction using Varimax Rotation with Kaiser Normalization showed five groups of factors with the Eigen Value over 1.0 and the loading of each factor exceeding .40. These factors could explain the variance in the data at 54 percent. The results of EFA are shown in Table 4.

### *Results of EFA*

The results of the EFA analysis showed that there were five groups of factors. The first group was learning styles consisting of 11 factors from items 15, 16, 17, 14, 18, 10, 9, 24, 1, 12, and 21 (see Appendix). Cognitive activity received the highest weight as a factor (.784). The respondents preferred learning activities that required critical and analytical thought. The second group was attitude consisting of six factors from items 3, 8, 2, 7, 4, and 13 (see Appendix). The factor which gained the highest weight was being able to learn without technology (.695). The subjects did not appreciate using technology in learning. Thus, they had a negative attitude toward technology. The third group was anxiety consisting of six factors from items 27, 28, 29, 19, 18, and 17 (see Appendix). The factor with the highest weight was being afraid when learning alone (.730). The fourth group was interaction consisting of four factors from items 34, 33, 20, and 35 (see Appendix). The factor with the highest weight was group work preference (.765). The fifth group was learning environments consisting of three factors from items 31, 32, and 30. The factor with the highest weight was online learning without time control (.691) shown in Figure 3.

**Table 3** Analysis of Kaiser-Mayer-Olkin KMO-Meyer-Olkin Measure of sampling adequacy

| | | |
|---|---|---|
| KMO-Meyer-Olkin Measure of Sampling | | .949 |
| | Bartlett's Test of Sphericity | |
| | Approx. Chi-Square | 1,630 |
| | *df* | 630 |
| | *p* | .000 |

*Note:* ***$p < .000$

**Table 4** The principal component analysis (see Appendix for more detail on each factor)

| Factors | Factor variance | Percentage of variance | Percentage of cumulative variance |
|---|---|---|---|
| Learning styles | 9.454 | 30.496 | 30.496 |
| Attitude | 3.534 | 11.399 | 41.896 |
| Anxiety | 1.429 | 4.609 | 46.505 |
| Interaction | 1.258 | 4.058 | 50.563 |
| Learning environments | 1.058 | 3.412 | 53.974 |

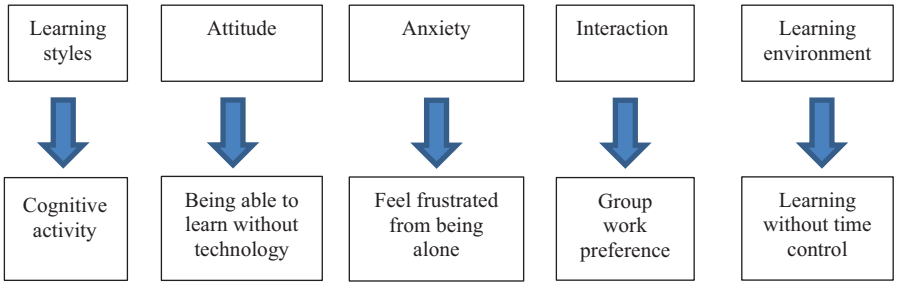


**Figure 3** Descriptions of the five groups of factors

## Discussion

Seemiller and Grace (2016) mentioned that learners prefer to watch live video rather than reading books, which is in line with the perception result in the highest level of user satisfaction from item 6 in Table 2. Similar to Pahlepi (2022), students perceived the Rosetta Stone program to be positive and able to enhance their language skills. This supports the second highest item in Table 2 on the ability to improve English performance. Such perceptions of positivity in online learning and enhancement of language skills appears to pave way to the claim made by Lord (2016), who stated that online language learning program such as the Rosetta stone is more effective than traditional classroom teaching. However, the statement ought to be cautiously considered as recent findings by Baczek et al. (2021) claim students to be less active despite their positive preference found in online learning.

The results of EFA indicated that the participants' learning style preference in this study is cognitive activity, which requires critical and analytical thinking learning. The results are in line with those of Aragon et al. (2003); Seemiller and Grace (2016) in that the online learners prefer abstract conceptualization activities more than traditional classroom learners. Attitude factor showed the negative attitude toward learning with technology. Anxiety indicated the fear of autonomous learning. The result is consistent with Hurd, Howland & Moore and Murphy's study. Hurd argues that anxiety is an important factor that contributes a high impact on learning performance especially independent learning environment (Hurd, 2005). The reason given by Howland and Moore (2002) and Murphy et al. (2011) was that they feel frustrated from being alone with no teacher's presence (Howland & Moore, 2002; Murphy et al., 2011). Interaction factor indicated the preference of working in groups. This is consistent with Maina, Waiganjo, Khoro and Oboko in that co-operative learning is the type of learning appropriate for online learning. This kind of learning can enhance learners learning from interaction with others and experts (Maina et al., 2014). The last factor is learning environment, which confirmed the benefit of online learning, that learning without time control is important. Learning without time control is one of the important benefits of online learning environments. With the autonomous activity, learners are able to complete their independent learning to their satisfaction (Burgess & Russell, 2003). The findings provide more insight about using technology in teaching English so that a well-planned approach can be provided for teaching and learning in technology-mediated environment. Types of learning activities, role of teachers, and learning environments are crucial to be considered especially in the autonomous learning environment.

## Conclusion and Recommendation

The findings of this study revealed that the Rosetta Stone program has problems with users' log-in process. This might be related to the large number of users and insufficient internet bandwidth of the institutions. It is recommended that the institutions should widen the bandwidth of the internet to accelerate the speed of accessibility. The results of participants' opinions can be interpreted that learners are interested in learning English with this program. Based on this study, the program is useful and effective in teaching English and has a positive impact on improving learners' English language skills. Analysis of factors indicated that there are five groups of factors with the Eigen Value greater than 1.0. They are learning styles, attitude, anxiety, interaction, and learning environments. They are consistent with previous studies in that they have impact on learning outcomes. Additionally, the findings showed that the learners preferred learning activities that required cognitive thinking skills. It follows that the activities provided in online materials should be activities that enhance cognitive skills. As mentioned in the literature review, the design of online materials should be pleasant and attractive, with user-friendly interface, colorful pictures, and appropriate sounds that make it easy to provide user feedback in order to positively affect learners' interest and decrease their anxiety. The function of teachers is equally crucial. Teachers should serve as facilitators who give advice and reduce learners' learning efforts. Online learning should enhance learners' ability to communicate with someone or work together with their peers to reduce their anxiety and also provide two modes of interaction: teacher-learners, or learners-learners.

## Limitations

There are several limitations in this study. As the author was working with the Tangtrongchitr group while conducting this research, the data were mostly from the institutions belonging to the Tangtrongchitr group. Taking it as a case study, this replication of this study could not entirely ensure the same result in different

context. The nationality of students was Thai, who were taught with the same teaching aims and philosophy of the Tangtrongchitr group. Learning English is in the EFL (English as a foreign language) paradigm in this study. Their perceptions and outcomes may be different compared to different larger institutions where English may be used as a medium of instruction. It is hoped that future study can be further conducted and confirm the findings of this study.

## Conflict of Interest

The author declares that there is no conflict of interest.

## Acknowledgments

This study was supported by the research fund of Rajapruk University. I also would like to express my appreciation to Mrs. Nanthaporn Choosup, Vice President of Human Development Department, Rajapruk University, Director of Tangtrongchitr College, Director of Vimon Business Technical College, and Director of Vimon Commercial College, Sriyan for data collection.

## References

Aragon, S., Johnson, S., & Shaik, N. (2003). The influence of learning style preferences on student success in online versus face-to-face environments. *The American Journal of Distance Education*, *16*(4), 227–244. https://doi.org/10.1207/S15389286AJDE16043

Astanina, A., Ryabkova, G., & Beklemysheva, V. (2019, March 11–13). *The use of blended learning in EFL reading: a case for Rosetta Stone software* [paper presentation]. INTED2019: Proceedings (pp. 6728–6733). IATED. The 3th International Technology, Education and Development Conference. https://www.researchgate.net/ publication/347166002_The_Use_of_Blended_Learning_in_EFL_Writing_Skills_A_Case_for_Rosetta_Stone_Software

Baczek, M., Zagańczyk-Bączek, M., Szpringer, M., Jaroszyński, A., & Wożakowska-Kapłon, B. (2021). Students' perception of online learning during the COVID-19 pandemic: Asurvey study of Polish medical students. *Medicine*, *100*(7), e24821. https:// doi.org/10.1097/MD.0000000000024821

Bauer, J., & Kenton, J. (2005). Toward technology integration in the schools: Why it isn't happening. *Journal of Technology and Teacher Education*, *13*(4), 519–546. https://www.learntechlib.org/primary/p/4728/

Bourelle, A., Bourelle, T., Knutson, A. V., & Spong, S. (2016). Sites of multimodal literacy: Comparing student learning in online and face-to-face environments. *Computers and Composition: An International Journal for Teachers of Writing*, *39*, 55–70. https:// doi.org/10.1016/j.compcom.2015.11.003

Burgess, J. R. D., & Russell, J. E. A. (2003). The effectiveness of distance learning initiatives in organizations. *Journal of Vocational Behavior*, *63*(2), 289–303. http://www.qou.edu/arabic/researchProgram/distanceLearning/effectivenessDista nce.pdf

DeWaard, L. (2013). Is Rosetta tone a viable option for L2 learning. *ADFL Bulletin*, *42*(2), 61–72. http://searchgate.net/publication/275811921_Is_Rosetta_Stone_a_Viable_Option _for_Second-Language_Learning

Delcloque, P. (2000). A history of computer-assisted language learning web exhibition. *Information and Communications Technology for Language Teachers*. Cambridge University Press. https://www.researchgate.net/publication/304147920_The_History_ and_the_Current_Status_of_Computer_Assisted_Language_Learning

Despain, J. S. (2003). Achievement and attrition rate differences between traditional and Internet-based beginning Spanish courses. *Foreign Language Annals*, *36*(2), 243–257. https://doi.org/10.1111/j.1944-9720.2003.tb01474.x

Dörnyei, Z. (2003). Attitudes, orientations, and motivations in language learning: Advanced in theory, research, and applications. *Language Learning*, *53*(1), 3–32. https://doi.org/ 10.1111/1467-9922.53222

Gardner, R. C. (2005, May 30). *Integrative Motivation and second language acquisition*. [presentation]. Canadian Association of Applied Linguistics/Canadian Linguistics Association Joint Plenary Talk London, Ontario. http://publish.uwo.ca/~gardner/ docs/caaltalk5final.pdf

Gorder, L. M. (2008). A study of teacher perceptions of instructional technology integration in the classroom, *The Delta Pi Epsilon Journal*, *50*(2), 63–76. https://www.proquest.com/docview/195592643

Hair, J. F., Black, W. C., Babin B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson Prentice Hall.

Howland, J., & Moore, J. (2002). Student perceptions as distance learners in internet-based courses. *Distance Education*, *23*(2), 183-195. https://doi.org/10.1080/01587910220 0000 9196

Hsu, L. (2013). English as a foreign language learners' perception of mobile-assisted language learning: A cross-national study. *Computer Assisted Language Learning*, *26*(3), 197–213. https:// doi.org/10.1080/09588221.2011.649485

Hurd, S. (2005). Autonomy and the distance language learner. In B. Holmberg, M. Shelley, & C. White (Eds.), *Languages and distance education: Evolution and change* (pp. 1–19). Multilingual Matters. https://www.researchgate.net/publication/277175892_Distance Education_and_Languages_evolution_and_change

Isenberg, N. A. (2010). *A comparative study of developmental outcomes in web-based and classroom-based German language education at the post-secondary level: Vocabulary, grammar, language processing, and oral proficiency development* [Doctoral dissertation, The Pennsylvania State University]. ProQuest Dissertation and Theses Global. (UMI No. 746773121).

Jung, H. J. (2014). Ubiquitous learning: Determinants impacting learners' satisfaction and performance with smartphones. *Language Learning & Technology*, *18*(3), 97–119. https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/41720e5c-e42e-4a67-99d5-e2b5dae7eef9/content

Khan, M. A., Nabi, M. K., Khojah, M., & Tahir, M. (2020). Students' perception towards e-learning during COVID-19 pandemic in India: An empirical study. *Sustainability*, *13*(1), 57. https://doi.org/10.3390/su13010057

Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2000). Experiential learning theory: Previous research and new directions. In R. J. Sternberg & L.-f. Zhang (Eds.), *Perspectives on thinking, learning, and cognitive styles* (pp. 227–248). Lawrence Erlbaum Associates. https://www.researchgate.net/publication/284458870_Experiential_Learning_Theory_Previous_Research_and_New_Directions_in_in_Perspectives_on_Thinking_Learning_and_Cognitive_Styles

Lee, L. (2002). Synchronous online exchanges: A study of modification devices on nonnative discourse. *System*, *30*(3), 275–288. https://doi.org/10.1016/S0346-251X(02)00015–5

LeNoue, M., Hall, T., & Eighmy, M. A. (2011). Adult Education and the Social MediaRevolution. *Adult learning*, *22*(2), 4–12. https://doi.org/10.1177/10451 5951102200 201

Lord, G. (2016). Rosetta Stone for language learning: An exploratory study. IALLT. *Journal of Language Learning Technologies*, *46*(1), 1–35. https://www.researchgate.net/publication/331138279_Rosetta_Stone_for_Language_Learning

Maina, E. M., Waiganjo, P. W., Kihoro, J., & Oboko, R. (2014). *Students' perceived challenges in an online collaborative learning environment: A case of higher learning institutions in Nairobi, Kenya*. *International Review of Research in Open and Distance Learning*, *15*(6). ProQuest Dissertations and Theses database. (UMI No. 1634145750) https://www.researchgate.net/publication/275252796_Students'Perceived_Challenges_in_an_Online_Collaborative_Learning_Environment_A_Case_of_Higher_Learning_Institutions_in_Nairobi_Kenya

Martin, F., Stamper, B., & Flowers, C. (2020). Examining student perception of readiness for online learning: Importance and confidence. *Online Learning*, *24*(2), 38–58. https://doi.org/10.24059/olj.v24i2.2053

Meyer, K. A. (2006). When topics are controversial: Is it better to discuss them face-to-face or online? *Innovative Higher Education*, *31*(3), 175–186. EBSCO database. https://eric.ed.gov/?id=EJ747616

Mitchell, T. V., Gadbury-Amyot, C. C., Bray, K. K., & Simmer-Beck, M. (2007). Advanced degree seeking students' satisfaction with online courses at UMKC – An early investigation. *Journal of Dental Hygiene*, *81*(3), 1–8. EBSCO database. https://www.scribd.com/document/81783818/637

Murphy, E., Rodríguez-Manzanares, M. A., & Barbour, M. (2011). Asynchronous and synchronous online teaching: Perspectives of Canadian high school distance education teachers. *British Journal of Educational Technology*, *42*(4), 583–591. https://doi.org/10.1111/j.1467-8535.2010.01112.x

Oxford, R. L. (2008) *Teaching and researching language learning strategies*. Longman.

Pahlepi, R. (2022). *Students' perception of using "Rosetta stone: learn language" application as learning media at SMPN 35 MAKASSAR* [Unpublished doctoral dissertation]. Universitas Bosowa.

Park, C., Kim, D. G., Cho, S., & Han, H. J. (2019). Adoption of multimedia technology for learning and gender difference. *Computers in Human Behavior*, *92*, 288–296. https://doi.org/10.1016/j.chb.2018.11.029

Roblyer, M. D., Davis, L., Mills, S., Marshall, J., & Pape, L. (2008). Toward practical procedures for predicting and promoting success in virtual school students. *The American Journal of Distance Education*, *22*(2), 90–109. https://doi.org/10.1080/0892 3640802039040

Santos, V. D. O. (2011). Review of Rosetta Stone Portuguese, Levels 1, 2, & 3. *CALICO Journal*, *29* (1), 177–194. https://www.jstor.org/stable/calicojournal.29.1.177

Seemiller, C., & Grace, M. (2016). *Generation Z goes to colle*ge. Jossey-Bass.

Stavredes, T. (2011). *Effective online teaching: Foundations and strategies for student success*. John Wiley & Sons.

Sternberg, R. J., & Grigorenko, E. L. (2001). A capsule history of theory and research on styles. In R. J. Sternberg & L.-f. Zhang (Eds.), *Perspectives on thinking, learning, and cognitive styles* (pp. 1–21). Lawrence Erlbaum Associates. https://psycnet.apa. org/record/2001-16270-001

Straub, D., Boudreau, M., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association of Information Systems*, *13*(24), 380–427. https://doi.org/10.17705/1CAIS.01324

Stone, M., & Perumean-Chaney, S. (2011) The benefits of online teaching for traditional classroom pedagogy: A case study for improving face-to-face instruction. *MERLOT Journal of Online Learning and Teaching*, *7*(3), 393–400. https://www.semanticscholar.org/paper/The-Benefits-of-Online-Teaching-for-Traditional-A-Stone-PerumeanChaney/0a3fa30b11d45217dd0eea 2268d305e9f2d56c80

Verhoeven, L., & Vermeer, A. (2002). *Communicative competence and personality dimensions in first and second language learners*. *Applied Psycholinguistics*, *23*, 361–374. https://www.cambridge.org/core/journals/applied-psycholinguistics/article/abs/ communicative-competence-and-personality-dimensions-in-first-and-second-language-learners/30642653C1C46AB8A2B779D802A2CD96#

Warschauer, M., & Liaw, M. (2011). Emerging technologies for autonomous language learning. *Studies in Self-Access Learning Journal*, *2*(3), 107–118. https://doi.org /10.37237/020302

Waxman, H. C., & Huang, S. L. (1996). Motivation and learning environment differences in inner-city middle school students. *The Journal of Educational Research*, *90*(2), 93–102. https://doi.org/10.1080/00220671.1996.9944450