# A Positive Psychological Study of Iranian University Students' Perceptions Toward ICT Use in Online and Face-to-Face Classes

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**Abstract**
The primary objective of this research is to assess the utilization of Information Communication Technology (ICT) among university students and the frequency with which they engage with electronic devices during their online classes. The study also examines the existing differences between students with different majors and their effect on their ICT use, frequency of use, and perceptions of their digital literacy. The third purpose of this study is to differentiate between students' perceptions of ICT use in online and face-to-face classes. A mixed-method design was employed to gather data at the University of Tabriz, with a sample size of 99 students. The qualitative and quantitative data analysis was conducted using SPSS software, version 26, and a text mining software called Wordstats 7.0.11. To this end, 90 university students from three groups were invited to participate. The three groups were seniors and juniors of English Literature and Foreign Languages students and other significant students (computer sciences). The results showed that students have a favorable view toward ICT use, and their opinion on the difference between ICT in online and face-to-face classes was that they should integrate both. The results can be used as a reference for decision-makers, professors, and university students to develop ICT skills effectively during the pandemic or under normal circumstances.
*Keywords*: ICT, Digital literacy, Online classes, Face-to-face classes, University students, Perception

**Introduction**

Every possible innovation rooted in technology such as computer, the Internet, smartphone, online class, and even social networks, is gaining popularity quickly, with millions of users, particularly among young individuals. The world is transforming. In response to its evolving demands, scholars have developed the term Information Communication Technology (ICT) to describe the commonly utilized tool, namely the computer. The advancement of information communication technology, known as ICT, has

dramatically influenced various aspects of human life, including health, agriculture, housing, transportation, education, power generation, communication, military hardware, commerce, geography, weather forecast, banking, culture, politics, economy, and sports (Agboola et al., 2023; Roztocki et al., 2019; Zohrabi, & Khalili, 2024).

The application of ICT has become an integral component of the learning process for university students, revolutionizing the way knowledge is acquired and shared (Emezirinwune et al., 2024). The significance of incorporating technology into various aspects of life and education has been enduring, highlighting its indispensable nature in modern society. Integrating teaching and learning with available ICT tools has gone through many ups and downs, especially in Iran (Abbasi Kasani et al., 2020). Dockstader (1999) defines technology integration as the proficient and effective utilization of digital tools across various subject areas to facilitate students in acquiring practical computer skills. Meanwhile, he states that technological innovation, along with the growth of education, has changed how students communicate. From the beginning, the integration process was not easy, and educational scholars were well aware of the existing challenges and barriers (Dinc, 2019; Rogers, 2000). These challenges increased much more with the spread of Coronavirus (Ameri et al., 2023). Although technology integration was used in the educational context, it was considered a supplementary option until the epidemic of COVID-19 (Patwardhan et al., 2020). It is crucial to be aware of the potential outcomes and the effects that the existence or nonexistence of ICT can have on students' teaching and learning experiences. With the pandemic's influence on education, technology seemed to become the only solution for learning to be continued (Ardiansyahmiraja et al., 2021). In other words, technology has helped extend learning and has gone even further by making teaching and learning possible from far away. In this regard, studying the students' perceptions to understand their point of view on the matter at hand is of great importance.

According to Gros et al. (2012), over the past ten years, a significant discussion has emerged regarding the traits of students, primarily influenced by their extensive engagement with ICT. Given this fact, it is crucial to consider the psychological effects of information and communication technology (ICT) in both online and face-to-face educational settings. Az Hjalmarsson (2015) states that technology has become an integral aspect of students' everyday lives, and its incorporation into teaching has positively affected language acquisition. With this in mind, those concerned need to take every opportunity to delve into this matter and fill in the existing gaps. This paper examines this issue by examining the psychological element of university students' Perception of Information Communication Technology utilization in education.

Barrett (2010) argues that using ICT in online classes has initiated a new era in education. Although online instruction has proved to be promising in terms of student performance in other countries (Jaggars & Xu, 2016; Gopal et al., 2021; Spencer & Temple,

2021; Zohrabi & Nasirfam, 2024), it seems to suffer from a lack of interaction, attention, and motivation in Iran (Dashtestani, 2014; Khalili et al., 2024; Khatoony & Nezhadmehr, 2020). Thus, this highlights the importance of the issue in question. It is worth noting that throughout this phenomenon, what is mainly essential is the fact that to get pedagogy and the act of teaching and learning right, educators have to use technology effectively (Hung et al., 2012; Kaware & Sain, 2015).

Regarding these inquiries, it can be mentioned that students nowadays are from a new type of generation known as the Net Generation; their technology intelligence has grown (Boorman, 2019). The present paper will give insights into this matter and look at university students' use of information communication technology. This study suggests a plausible implementation of ICT-based education, combining the advantages of embracing technology in the classroom with integrating positive psychology through digital applications.

## Literature Review

The global shift in education from the already-known teaching scenarios and environments to ICT integration has recently been the cause of the emergence of several research studies on teaching and learning (Dobakhti & Shams Khorm, 2020). Many scholars have investigated ICT. Several researches were carried out because of its significance in education. Exploring several of these scholars' perspectives on ICT for the sake of the study at hand, we will shed light on some of the research in the field. By harnessing the capabilities of ICT, educational programs can benefit from the ability to generate, store, transmit, and employ a wide range of audio and video data (Njoku, 2015). Gasaymeh (2018) undertook a study to analyze the degree to which undergraduate students employ Information and Communication Technologies (ICT) for personal and educational use. The researchers examined the variations in ICT usage among participants, considering their gender, academic year, field of study, ICT access, and ICT competencies. According to the results of their research, students primarily use technology for personal rather than educational purposes. Another result worth considering was connecting ICT Use to the students' academic year and majors**.**

Regardless of the academic year they were in, students' utilization of ICT for personal and non-personal motives remained consistent, as indicated by the study's results. Additionally, it was also found that students' majors did not have a significant impact on their personal or educational ICT use. As mentioned by the authors of this paper, one of their study's limitations was generalization. Additional research is needed to generalize the findings, which will be explained in the present paper. One of the influential works among the related studies was conducted by Kozlova and Pikhart (2021). The study sought to examine how university students perceive the use of ICT in higher education. The participants in this study were students who had experience participating in face-to-face classes and had studied almost exclusively in online courses for three semesters. According

to the results, students held a unanimous view on using ICT in the learning process: they mostly reacted positively to how their teachers adapted to the changes imposed by external circumstances. Alharthi (2020) appropriately links distance education and technology by drawing on Saykili (2018), who states that technology has played a crucial role in defining and molding the environment of distance education. In a recent study, Alharthi (2020) examined the use of technology among students, their attitudes toward technology in online courses, and the positive outcomes associated with its integration into the learning environment. The findings indicated that students were discontent with the technologies employed in online classes. Regarding Iran, Xodabande (2018) investigated Iranian EFL learners' preferences for different digital technologies for language learning outside the classroom**,** providing evidence of the most commonly used technologies, e.g., websites**,** electronic dictionaries, and movies**.** This study also provided insight into the effects of each type of digital technology on Iranian EFL learners' language skills, which showed that electronic dictionaries and websites were valid based on the participants' attitudes.

The discussion surrounding the preferences of EFL learners for digital technologies in language acquisition is closely linked to the positive effects these technologies have on the learning process. The positive impact of enjoyment on learning was not given the same level of academic attention in the EFL context until the introduction of Positive Psychology to L2 education Li, (2022). Early researchers like MacIntyre and Gregersen (2012) and  Lake (2013) highlighted the prominence of positive emotions and affectivity in EFL learning and teaching. This study's implication builds off the framework of positive psychology and acknowledges the students' beliefs on the strengths and shortcomings of the current educational systems' ICT use. According to Seligman and Csikszentmihalyi (2014), the foundation of positive psychology is built upon three key elements: positive institutions, positive personality traits, and positive experiences encompassing emotions. The main focus is the positive experience that students gain through technology integration into their education. A research investigation carried out during the COVID-19 lockdown by Shenoy et al. (2020) sought the beneficial aspects of COVID-19, particularly the transformation within the education sector through the integration of technology and the involvement of students in diverse virtual learning sessions. This research indicated that, in light of the circumstances, higher education institutions in Bangalore, India, have extensively embraced technology, resulting in student engagement surpassing traditional classroom interactions.

## Research Questions

Research Question 1: Are there any differences between English-significant juniors and seniors in their ICT use and frequency of using electronic devices?

Research Question 2: Are there any differences between EFL students and students of other fields of study (computer sciences) in their ICT use and frequency of electronic device use?

Research Question 3: What are the students' perceptions of their digital literacy?

Research Question 4: How do students perceive ICT use in online and face-to-face classes?

# Methods

## Research Design

The research design of the present study incorporated both qualitative and quantitative data, with one dataset complementing the primary focus on the other type of data (Creswell et al., 2003; Dobakhti, 2020). This method is also known as the Embedded Design approach. According to Creswell et al. (2003), The Embedded Design is a mixed method design in which one data set provides a supportive, secondary role in a study based primarily on the other data type. The premise underlying this design posits that a sole data set is inadequate for addressing the matter at hand, necessitating responses to various inquiries, each of which demands distinct data types. In this paper, convenience sampling was adopted. Three groups were chosen: one from EFL juniors, the other from EFL seniors, and the last group from computer science students. The primary objective of the research is to ascertain the differences between these groups on their ICT use and frequency of using electronic devices, their perceptions of their digital literacy, and their opinion on ICT use in online and face-to-face classes.

## Participants

The current study's participants are the University of Tabriz (Iran) students in the faculty of Persian Literature and Foreign Languages, Department of English Language and Literature and Mathematical Sciences during the academic year 2022-2023. One group was of freshman students who chose English as their university major. The second group consisted of students in their last semester, finishing their educational stage in the same field of study (English Language and Literature), and the previous group consisted of freshmen studying computer science at the same university. A total of 90 students were included through convenience sampling in this research: 24 senior students studying English literature, 30 Juniors of the same field of study, and 36 students learning other fields of study (computer sciences).

## Instrumentation

The instrument used was the ICT Tools Questionnaire (Nagy & Habók, 2018), which was adapted to collect data. The subsections that were not pertinent to the nature of the study at hand were removed. Furthermore, the researchers devised an additional segment to obtain details regarding the participants' age, gender, field of research, and permission to collect data. The data were collected by providing translated questionnaires for non-English majors (computer sciences). The translated questionnaires underwent an evaluation process that included both forward and backward translation. As mentioned, the first part of the questionnaires addressed the general information necessary for the study. The second part contained eight items from the Use of ICT Tools Questionnaire (Nagy & Habók, 2018) and then adapted for the study's goal. The following part aimed at drawing upon the students' ICT

use on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, 5 = strongly agree). In this section, the students were to state their use of technology for different purposes. According to Nagy and Habók (2018), the questionnaire items focus on (1) ICT attitudes, (2) frequency of ICT tool usage in a broad context, and (3) frequency of ICT tool usage in the context of language learning. Due to the purpose of the study, which is mainly ICT use, the sections used for this study were primarily taken from the first section of the questionnaires focusing on ICT attitudes, as the researchers stated, and ICT use as it is considered. As for the qualitative phase, each participant was asked two open-ended questions. The questions were developed based on the study's last question, which was to find students' opinion about the difference between ICT use in online and face-to-face classes. Two experts in the field have checked the validity of the questionnaire.

## Reliability

### Cronbach's Alpha Reliability Indices

The survey used in this research included Likert scale items in two sections, i.e., ICT use (8 items) and digital literacy (5 items). Table 1 shows the Cronbach's alpha reliability indices for these sections. The reliability indices for ICT use and digital literacy were 0.675 and 0.723, respectively.

**Table 1**

*Cronbach's Alpha Reliability Indices*

|  | Cronbach's Alpha | N of Items |
| --- | --- | --- |
| ICT Use | .675 | 8 |
| Digital Literacy | .723 | 5 |

It should be noted that Tseng et al. (2006), Dörnyei and Taguchi (2009), Fryer et al. (2018), and Harrison et al. (2021) believe that .70 is an appropriate Cronbach's alpha reliability index for an instrument. However, Vaske et al. (2017), quoting several scholars i.e. (Cortina, 1993; Nunnally & Bernstein, 1994; DeVellis, 2003; Vaske, 2008), state that a minimum alpha value of .65 is also acceptable. It can be inferred from this criterion that the reliability indices for the two variables, ICT use, and digital literacy, are acceptable.

## Data analysis

The computation of frequency distributions in the quantitative phase using SPSS software, version 26. Frequency distributions were employed to respond to the three research queries concerning the participants' ICT use, electronic device use frequency, and digital literacy perceptions. Then, the results were presented through figures, tables, and graphs. A Chi-Square Test examines whether the observed results correspond to the expected values. The non-English students' questionnaires were translated to their mother tongue and then re-translated into English for better results. Back translation is employed as a method for ensuring quality assurance. Exploring the fourth research question regarding the students'

perceptions of ICT use in online and face-to-face classes, an open-ended question was asked from students. The help of text mining software Wordstats 7.0.11 gathered the results for the qualitative phase. Through Wordstats 7.0.11, the most frequent phrases used by students were obtained, and from these phrases, four of them for each question were presented. The results for each step were displayed through figures**,** tables, and graphs.

# Results

## Research Question 1

## Are there any differences between English juniors and seniors in their ICT use?

The data presented in Table 2 displays the frequencies, percentages, and standardized residuals (Std. Residual) about the ICT use of senior and junior English students. The first two indices are explanatory, while Std. Residuals are normalized metrics that allow comparing cell frequencies to identify significant variances. A Standard Residual exceeding 1.96 suggests that the observed frequency deviated significantly from the expected frequency, while values lower than 1.96 show that the frequency was significantly below expectation.

The data in Table 2 illustrates that almost equal percentages of English seniors (40.3 %) and juniors (39.7 %) strongly agree that they used ICT. Moreover, 34 percent more senior English students than junior students (29.3 %) agree that they used ICT. Despite the observed differences, all Std. Residuals were within the range of ±1.96, i.e., no significant difference was observed in the utilization of ICT between the two groups.

**Table 2**

*Frequencies, Percentages, and Std. Residuals for ICT Use by English Majors*

| | | Choices | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | Strongly disagree | Disagree | Unsure | Agree | Strongly agree | Total |
| English Senior | Count | 2 | 16 | 31 | 65 | 77 | 191 |
| | % | 1.0% | 8.4% | 16.2% | 34.0% | 40.3% | 100.0% |
| | Std. Residual | -.6 | -.4 | -.5 | .7 | .1 | |
| English Junior | Count | 5 | 24 | 45 | 70 | 95 | 239 |
| | % | 2.1% | 10.0% | 18.8% | 29.3% | 39.7% | 100.0% |
| | Std. Residual | .6 | .4 | .4 | -.6 | -.1 | |
| Total | Count | 7 | 40 | 76 | 135 | 172 | 430 |
| | % | 1.6% | 9.3% | 17.7% | 31.4% | 40.0% | 100.0% |

Table 2 also demonstrates that negligible percentages of the two groups, i.e., English seniors (1 %) and juniors (2.1 %), strongly disagree with the idea that they used ICT.

Moreover, 8.4 percent of senior English students, less than junior students (10 %), disagree that they used ICT, and another 16.2 percent of senior and 18.8 of junior students were neutral. Despite the observed differences, all Std. Residuals were within the range of ±1.96, i.e., no significant difference was observed in the utilization of ICT between the two groups.

The findings from the chi-square analysis are displayed in Table 3. The results ($\chi$ (4) = 2.20, p > .05, Cramer's V = .072 representing a weak effect size[1]) indicate that there are not any significant differences between English senior and junior students' use of ICT. Thus, the first null hypothesis, "there is not any difference between English juniors and seniors on their ICT use," is supported. Figure 1 shows the percentages discussed above.

**Table 3**

*Analysis of Chi-Square for ICT Use by English Majors*

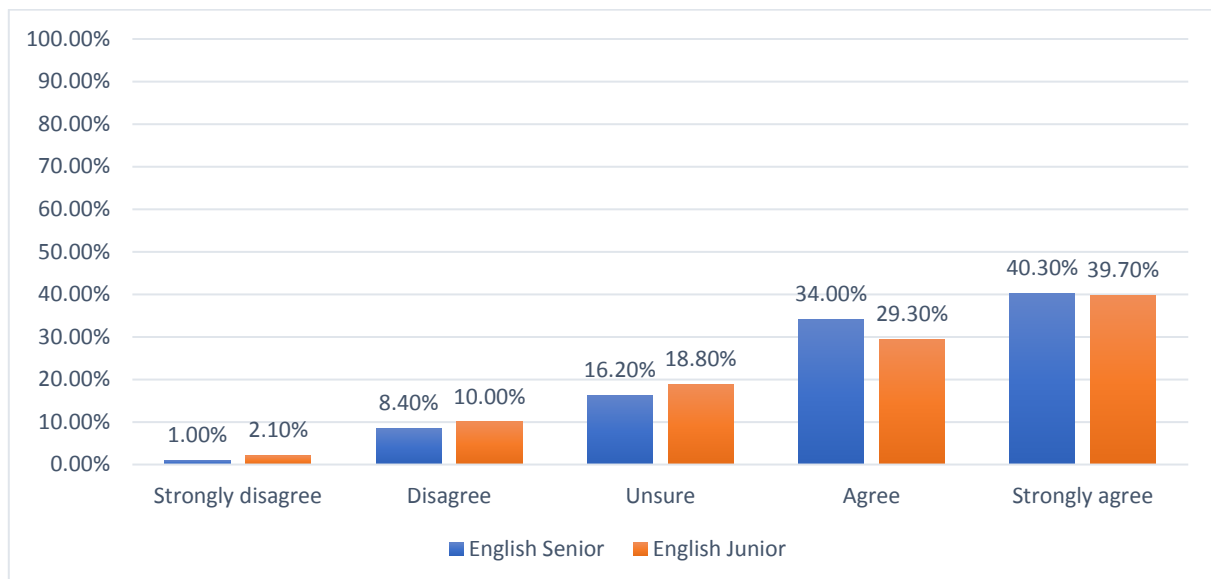|  | Value | df | Asymptotic significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 2.203[b] | 4 | .699 |
| Likelihood Ratio | 2.236 | 4 | .692 |
| Linear-by-Linear Association | .896 | 1 | .344 |
| N of Valid Cases | 430 |  |  |
| Cramer's V | .072 |  | .699 |

b. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 3.11.

$$V = \sqrt{\frac{\chi^2}{N(K-1)}}$$

**Figure 1**

*Percentages of ICT Use by English Majors*

**Are there any differences between English juniors and seniors in their frequency of using electronic devices?**

Table 4 shows the frequencies, percentages, and Std—residuals for the English senior and junior students' frequency of using electronic devices. The results show that a higher percentage of English senior students (28.9 %), compared with 19 percent of junior students, claimed they used electronic devices daily. Almost equal percentages of English seniors (19.3 %) and juniors (18.3 %) believed they often used electronic devices. A higher percentage of English senior students (10.5 %) than English junior students (5.6 %) thought they used electronic devices once a week.

**Table 4**

*Frequencies, Percentages, and Std. Residuals for Frequency of Use of Electronic Devices by English Majors*

| | | Choices | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | Never | Once sometimes | or Once month | a Once week | a Often | Every day | |
| English Senior | Count | 33 | 10 | 4 | 12 | 22 | 33 | 114 |
| | % | 28.9% | 8.8% | 3.5% | 10.5% | 19.3% | 28.9% | 100.0% |
| | Std. Residual | -.4 | -1.3 | -.7 | 1.0 | .1 | 1.1 | |
| English Junior | Count | 42 | 22 | 8 | 7 | 23 | 24 | 126 |
| | % | 33.3% | 17.5% | 6.3% | 5.6% | 18.3% | 19.0% | 100.0% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Std. Residual | .4 | 1.3 | .7 | -.9 | -.1 | -1.1 | |
| Total | Count | 75 | 32 | 12 | 19 | 45 | 57 | 240 |
| | % | 31.3% | 13.3% | 5.0% | 7.9% | 18.8% | 23.8% | 100.0% |

The results also show that a higher percentage of English junior students (6.3 %) compared with English senior students (3.5 %) claimed they used electronic devices at least once a month. The same pattern can be seen for the two groups' use of electronic devices once or sometimes. That is to say, a higher percentage of English junior students (17.5 %) than English senior students (8.8 %) claimed they used electronic devices just once or sometimes. Finally, a higher percentage of English junior students (33.3 %) than English senior students (28.9 %) claimed they never used electronic devices.

Table 5 shows the results of the analysis of chi-square. The results ($\chi$ (5) = 9.09, p > .05, Cramer's V = .195 representing a weak effect size) indicate that there are not any significant differences between English senior and junior students' use of electronic devices. Thus, the second null hypothesis, "there is not any difference between English juniors and seniors on their frequency of using electronic devices," is supported. Figure 2 shows the percentages discussed above.
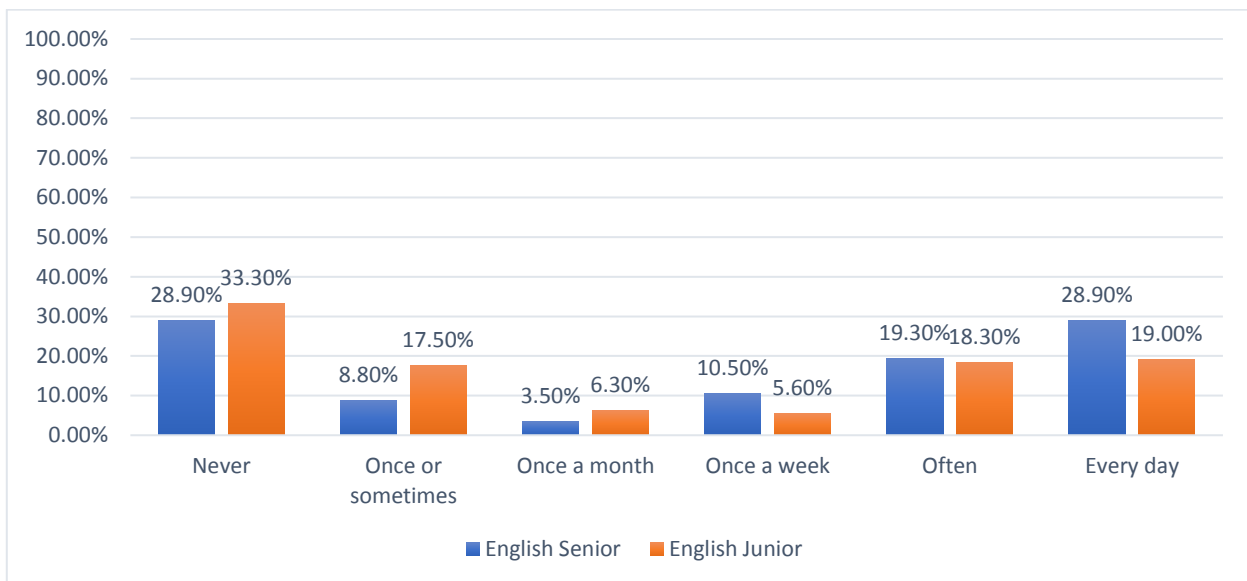
**Table 5**

*Analysis of Chi-Square for Frequency of Use of Electronic Devices by English Majors*

| | Value | df | Asymptotic significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 9.095[b] | 5 | .105 |
| Likelihood Ratio | 9.234 | 5 | .100 |
| Linear-by-Linear Association | 4.188 | 1 | .041 |
| N of Valid Cases | 240 | | |
| Cramer's V | .195 | | .105 |

b. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 5.70.

**Figure 2**

*Percentages of Frequency of Use of Electronic Devices by English Majors*

## Exploring Research Question 2

**Are there any differences between EFL students and students of other fields of study (computer sciences) in their ICT use and frequency of electronic device use?**

The results shown in Table 6 indicate that computer science students (58.2 %, Std. Residual = 2.7 > 1.96) significantly more than English students (40 %, Std. Residual = -2.2 > -1.96) strongly agree with the idea that they used ICT. Although English students (31.4 %) more than computer science students (23 %) agree that they use ICT, the difference was not significant because the Std. Residuals were lower than ±1.96.

**Table 6**

*Frequencies, Percentages, and Std. Residuals for ICT Use by Groups*

|  |  | Choices | | | | | |
|---|---|---|---|---|---|---|---|
|  |  | Strongly disagree | Disagree | Unsure | Agree | Strongly agree | Total |
| English | Count | 7 | 40 | 76 | 135 | 172 | 430 |
|  | % | 1.6% | 9.3% | 17.7% | 31.4% | 40.0% | 100.0% |
|  | Std. Residual | -1.3 | 2.5 | 1.0 | 1.3 | -2.2 |  |
| Computer Science | Count | 12 | 5 | 37 | 66 | 167 | 287 |
|  | % | 4.2% | 1.7% | 12.9% | 23.0% | 58.2% | 100.0% |
|  | Std. Residual | 1.6 | -3.1 | -1.2 | -1.6 | 2.7 |  |
| Total | Count | 19 | 45 | 113 | 201 | 339 | 717 |
|  | % | 2.6% | 6.3% | 15.8% | 28.0% | 47.3% | 100.0% |

The results shown in Table 6 also indicate that negligible percentages of the two groups, i.e., English majors (1.6 %) and computer science students (4.2 %), strongly disagreed with the idea that they used ICT, although a higher percentage of English students (9.3) compared with (1.7 %) computer science students disagreed that they used ICT. Finally, English students (17.7 %, Std. Residual = 2.5 > 1.96) significantly more than computer science students (12.9 %, Std. Residual = -3.1 > -1.96) were undecided on their use of ICT.

Table 7 shows the results of the analysis of chi-square. The results ($\chi$ (4) = 38.78, p < .05, Cramer's V = .233 representing a weak effect size) indicate that there are significant differences between EFL students and computer science students' use of ICT. Thus, the fourth null hypothesis, "there is not any difference between EFL students and students of other fields of study (computer sciences) on their ICT use," is rejected. However, the results should be interpreted cautiously due to the weak effect size value 0.233. Figure 3 shows the percentages discussed above.

**Table 7**

*Analysis of Chi-Square for ICT Use by Groups*

|  | Value | df | Asymptotic significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 38.781[b] | 4 | .000 |
| Likelihood Ratio | 41.597 | 4 | .000 |
| Linear-by-Linear Association | 14.368 | 1 | .000 |
| N of Valid Cases | 717 |  |  |
| Cramer's V | .233 |  | .000 |

b. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 7.61.

**Figure 3**

*Percentages of ICT Use by Groups*
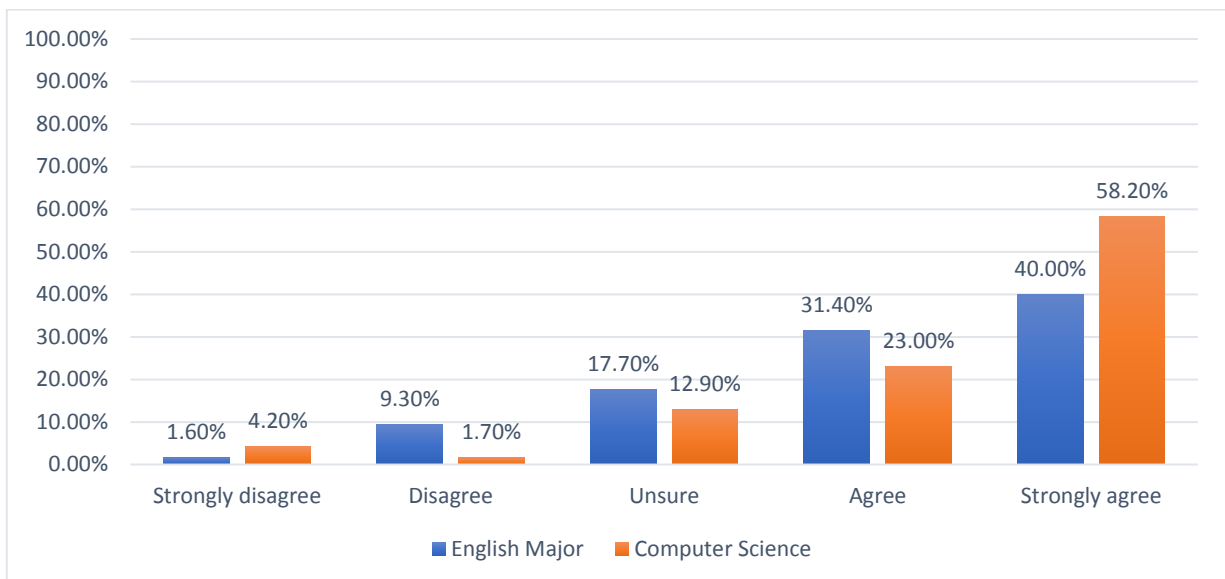
Are there any differences between EFL and computer science students in their frequency of using electronic devices?

Table 8 shows the frequencies, percentages, and Std—residuals for the English and computer science students' frequency of using electronic devices. The results show that a higher percentage of computer science students (36.3 %), compared with 23.8 percent of junior students, claimed they used electronic devices daily. Almost equal percentages of English (18.8 %) and computer science students (16.9 %) believe they often use electronic devices. Almost an equal percentage of English students (7.9 %) compared with computer science students (6.9 %) think they use electronic devices once a week.

**Table 8**

*Frequencies, Percentages, and Std. Residuals for Frequency of Use of Electronic Devices by Groups*

| | | Choices | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | Never | Once or sometimes | Once a month | Once a week | Often | Every day | |
| English Major | Count | 75 | 32 | 12 | 19 | 45 | 57 | 240 |
| | % | 31.3% | 13.3% | 5.0% | 7.9% | 18.8% | 23.8% | 100.0% |
| | Std. Residual | 1.1 | .4 | -.5 | .2 | .3 | -1.4 | |
| Computer Science | Count | 35 | 18 | 11 | 11 | 27 | 58 | 160 |
| | % | 21.9% | 11.3% | 6.9% | 6.9% | 16.9% | 36.3% | 100.0% |
| | Std. Residual | -1.4 | -.4 | .6 | -.3 | -.3 | 1.8 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Total | Count | 110 | 50 | 23 | 30 | 72 | 115 | 400 |
| | % | 27.5% | 12.5% | 5.8% | 7.5% | 18.0% | 28.7% | 100.0% |

The results also showed that a negligibly higher percentage of computer science students (6.9 %) compared with English students (5 %) claimed they used electronic devices at least once a month. The reverse pattern can be seen for the two groups' use of electronic devices once or sometimes. That is to say, a higher percentage of English students (13.3 %) compared with computer science students (11.3 %) claimed that they used electronic devices just once or sometimes. And finally, a higher percentage of English students (31.3 %) compared with computer science students (21.9 %) claimed they never used electronic devices. Despite these differences, none of the Std. Residuals were higher than ±1.96.

Table 9 shows the results of the analysis of chi-square. The results ($\chi$ (5) = 9.56, p > .05, Cramer's V = .14 representing a weak effect size) indicate that there are not any significant differences between English and computer science students' use of electronic devices. Thus, the fifth null hypothesis, "there is not any difference between EFL and computer science student on their frequency of using electronic devices," is supported. Figure 4 shows the percentages discussed above.

**Table 9**

*Analysis of Chi-Square for Frequency of Use of Electronic Devices by Groups*

| | Value | df | Asymptotic significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 9.532[b] | 5 | .090 |
| Likelihood Ratio | 9.508 | 5 | .090 |
| Linear-by-Linear Association | 6.505 | 1 | .011 |
| N of Valid Cases | 400 | | |
| Cramer's V | .154 | | .090 |

b. 0 cells (0.0%) have expected count of less than 5. The minimum expected count is 9.20.

**Figure 4**

*Percentages of Frequency of Use of Electronic Devices by Groups*
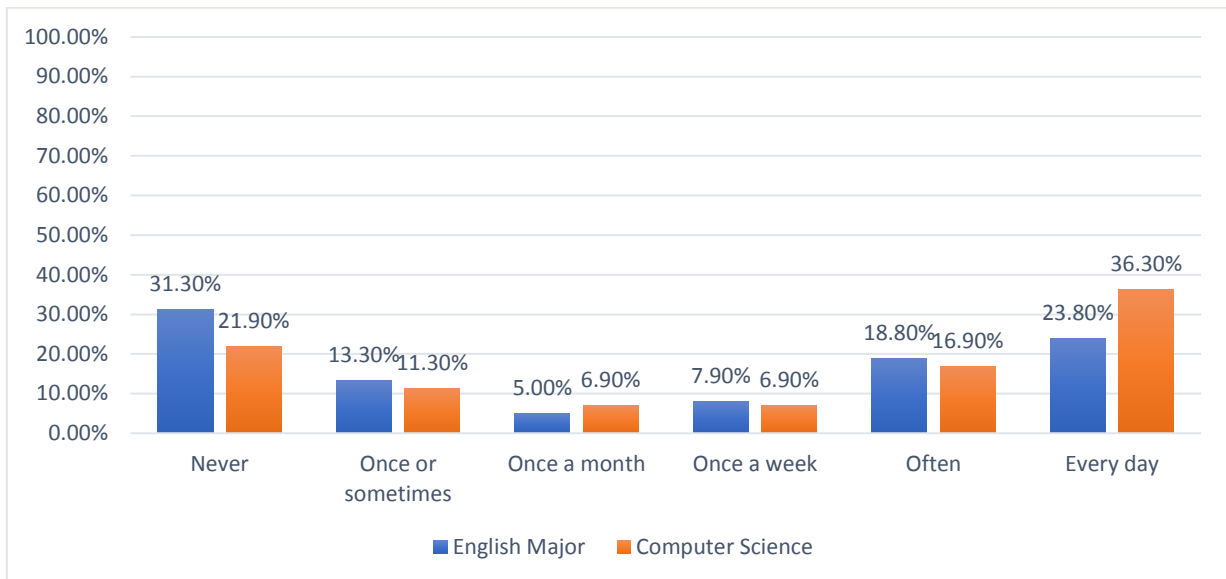
## Exploring Research Question 3
## What are the students' perceptions of their digital literacy?

The third research question was descriptive, exploring the English and computer science students' perceptions of their digital literacy. As shown in Table 10, almost an equal percentage of English (24.1 %) and computer science students (24.4 %) believe their digital literacy is high. Moreover, 35.4 percent of computer science students and 32.1 percent of English students estimated their digital literacy as good. Almost an equal percentage of English (28.1 %) and computer science students (29.9 %) believe their digital literacy is good. The results also show that almost an equal percentage of English (8.8 %) and computer science students (8.5 %) digital literacy was low. Finally, a higher percentage of English students (6.8 %), more than computer science students (1.8 %), rated their digital literacy as very low. Despite these differences, none of the Std. Residuals were higher than ±1.96. That is to say, there were not any significant differences between the two groups' perceptions of their digital literacy. Figure 5 shows the percentages discussed above.

**Table 10**

*Frequencies, Percentages, and Std. Residuals for Digital Literacy by Groups*

|  |  | Choices | | | | | Total |
|---|---|---|---|---|---|---|---|
|  |  | Very low | Low | Well | Good | High |  |
| English | Count | 17 | 22 | 70 | 80 | 60 | 249 |
|  | % | 6.8% | 8.8% | 28.1% | 32.1% | 24.1% | 100.0% |
|  | Std. Residual | 1.4 | .1 | -.2 | -.4 | .0 |  |
| Computer Science | Count | 3 | 14 | 49 | 58 | 40 | 164 |

| | | 1.8% | 8.5% | 29.9% | 35.4% | 24.4% | 100.0% |
|---|---|---|---|---|---|---|---|
| | % | 1.8% | 8.5% | 29.9% | 35.4% | 24.4% | 100.0% |
| | Std. Residual | -1.8 | -.1 | .3 | .4 | .0 | |
| Total | Count | 20 | 36 | 119 | 138 | 100 | 413 |
| | % | 4.8% | 8.7% | 28.8% | 33.4% | 24.2% | 100.0% |

**Figure 5**

*Percentages of Digital Literacy by Groups*
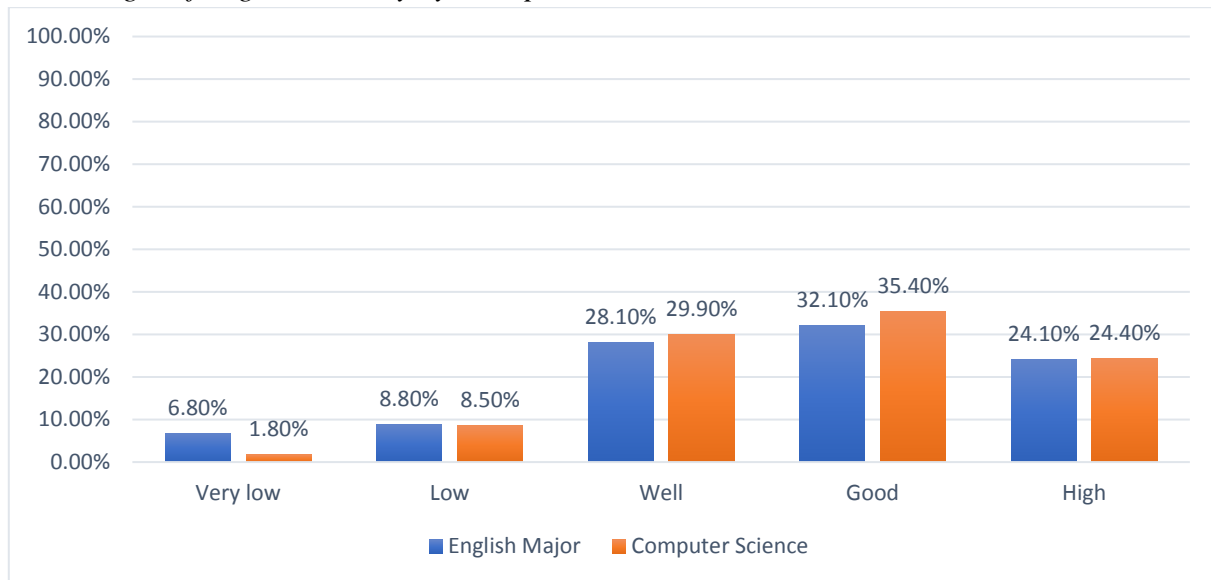


**Exploring Research Question 4**

**How do students perceive ICT use in online and face-to-face classes?**

The fourth open-ended question asked students' perceptions of the difference between their technology use in online vs. face-to-face class environments. A frequency analysis was run to find the most common terms.

The most common term in this part was "Face," with 116 times occurrence. The next terms are as follows: Class (n=90), Online (n=77), technology (n=43), class (n=21), education (n=14), Time (n=14), learning (n=11), Internet (n=10), learn (n=10).

Table 11

*The Most Commonly Used Terms To Differentiate Technology Use In Online vs. face-to-face Classes*

|  | FREQUENCY | % SHOWN | %PROCESSED | % TOTAL |
|---|---|---|---|---|
| Face | 116 | 28.57% | 12.26% | 5.02% |
| Classes | 90 | 22.17% | 9.51% | 3.90% |
| Online | 77 | 18.97% | 8.14% | 3.33% |
| Technology | 43 | 10.59% | 4.55% | 1.86% |
| Class | 21 | 5.17% | 2.22% | 0.91% |
| Education | 14 | 3.45% | 1.48% | 0.61% |
| Time | 14 | 3.45% | 1.48% | 0.61% |
| Learning | 11 | 2.71% | 1.16% | 0.48% |
| Internet | 10 | 2.46% | 1.06% | 0.43% |
| Learn | 10 | 2.46% | 1.06% | 0.43% |
| Students | 9 | 1.74% | 0.95% | 0.39% |
| Training | 9 | 1.74% | 0.95% | 0.39% |
| Main | 8 | 1.54% | 0.85% | 0.35% |
| Difference | 7 | 1.35% | 0.74% | 0.30% |
| Problems | 7 | 1.35% | 0.74% | 0.30% |
| Opinion | 6 | 1.16% | 0.63% | 0.26% |
| Advantages | 5 | 0.97% | 0.53% | 0.22% |
| Connection | 5 | 0.97% | 0.53% | 0.22% |
| Easier | 5 | 0.97% | 0.53% | 0.22% |
| Efficient | 5 | 0.97% | 0.53% | 0.22% |

The top 20 most commonly used terms for answering the differences between technology use in online vs. face-to-face class environments are shown in Table 11 and Figure 6:

**Figure 6**
*Frequency of difference between technology use in online vs face-to-face classes*

**Distribution of keywords (Frequency)**
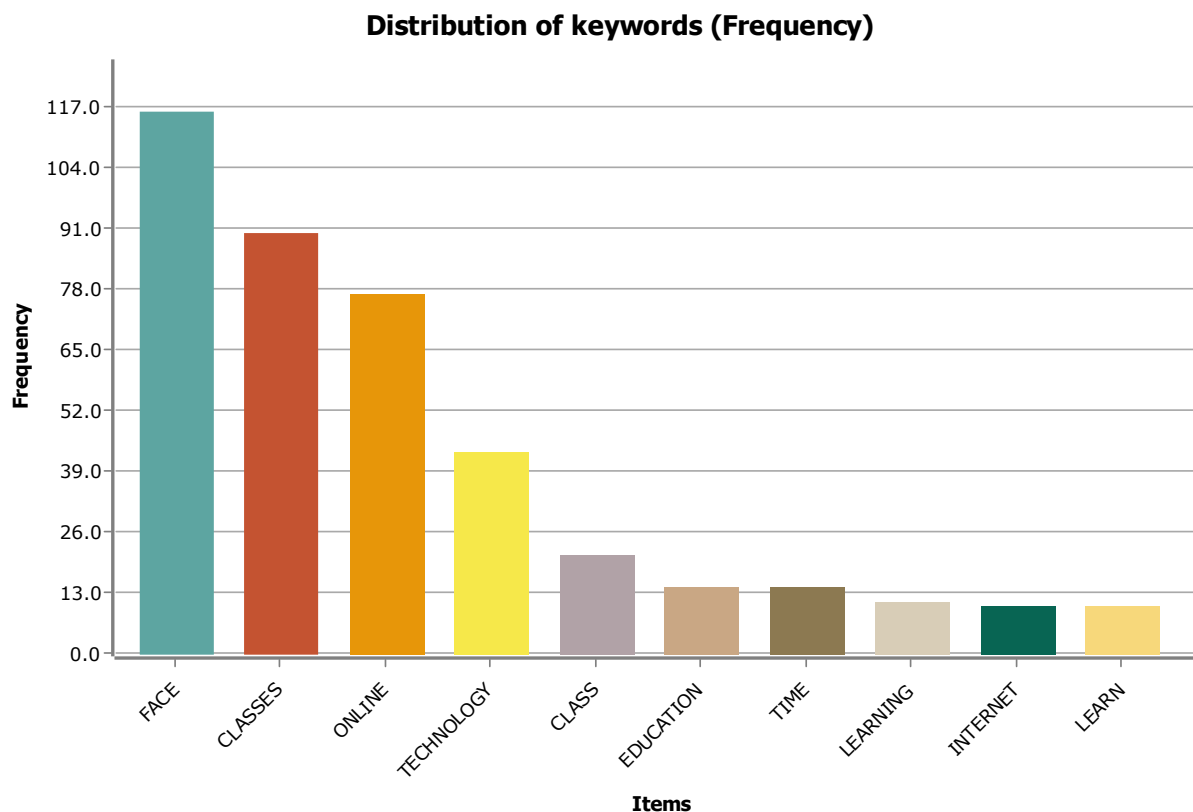


The most commonly used phrases for answering the differences between technology use in online vs. face-to-face class environments are shown in Table 12 and Figure 7:

**Table 12**

*The Most Commonly Used Phrases To Identify the Difference Between Technology Use In Online Vs. Face-To-Face Classes*

|  | FREQUENCY | NO. CASES | % CASES | LENGTH |
|---|---|---|---|---|
| Face-To-Face | 58 | 1 | 100.00% | 3 |
| Online Classes | 41 | 1 | 100.00% | 2 |
| Face-To-Face Classes | 35 | 1 | 100.00% | 4 |
| Face-To-Face Training | 6 | 1 | 100.00% | 4 |
| Online Classes Technology | 5 | 1 | 100.00% | 3 |
| Normal Classes | 4 | 1 | 100.00% | 2 |
| Online Class | 4 | 1 | 100.00% | 2 |

| | | | | |
|---|---|---|---|---|
| Online Education | 4 | 1 | 100.00% | 2 |
| Virtual Education | 3 | 1 | 100.00% | 2 |

**Figure 7**

*Frequency Of Mostly Used Phrases On Difference Between Technology Use In Online Vs Face-To-Face Classes*
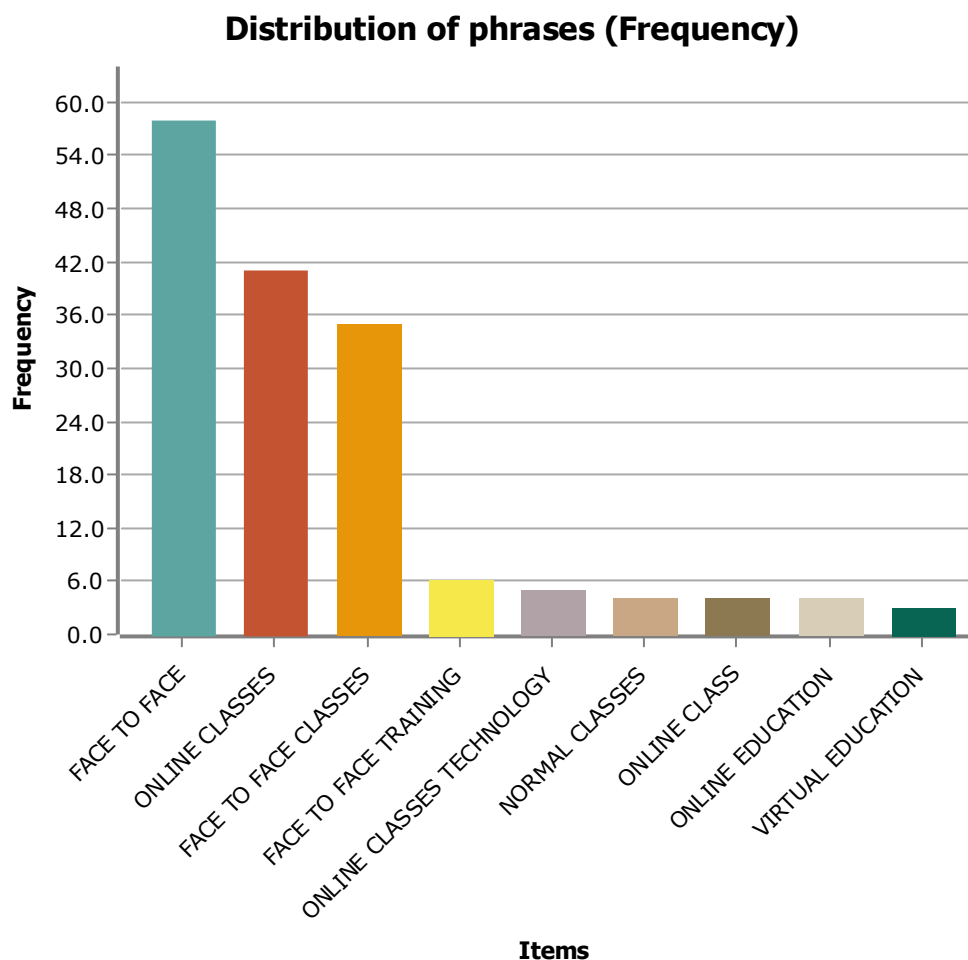


The themes were extracted with the help of software known as Wordstats 7.0.11, which first extracts the frequently used phrases and the frequently used terms that have been extracted from those phrases. After that, a T-unit analysis is conducted to determine the actual themes. Four themes emerged that demonstrate the difference between technology use in online vs face-to-face classes: 1) Easier learning, 2) Efficient training, 3) Time management, and 4) Internet and connection statuses.

The first theme discusses how technology helps students and eases learning. This phrase was one of the most commonly used terms among the participants. One of the students responded, "The existence of an online class with the required facilities makes the content more understandable and makes teaching easier. For example, the presence of a pdf file in the meeting and its download can help to learn more, but in the face-to-face class, it is only possible to write the material manually." The other participant says, "Being in an online class is much easier for less confident people, but you can learn better in face-to-face classes. Besides, you are forced to speak instead of typing, which will help you improve your speaking ability and confidence." Several other participants agreed, describing the ease of their learning process by technology: "Online classes depend 100% on technology; however, in normal face-to-face classes, using the Internet is only a small or medium part of the learning process. Even though it makes everything easier, it's not essential." "In online classes, we have to use technology; otherwise, we cannot use the benefits of being in the class, but in other classes, we use technology to help us and make our learning easier and more interesting."

The second theme points to efficient training, which mainly discusses how students think technology can help with training. One participant stated, "In online classes, technology is more efficient, and in face-to-face training, it is better to be used after the class." Another student mentioned, "In online classes, the need for technology is felt more abundantly, and even in face-to-face classes, it is very efficient in using the required applications." Several other participants did not have the same idea. One stated, "I think face-to-face classes are more efficient." The other claimed, "Online training is less effective than face-to-face training, and I think face-to-face training is much better, but in face-to-face training, we also need technology for training, which is very helpful and useful."

The third theme revolves around time management**.** It goes on to talk about students' thoughts on time-saving. One of the students described their opinion on this matter as "Online is better in every way due to saving time and lower costs." The other says, "Online has become very easy for people, is time-saving, and is not energy-consuming." According to Participant Number 21, "There is no waste of time and energy coming to class in person if the education is virtual." Some participants comparing online classes with face-to-face classes stated, "Online classes can save time and energy; however, face-to-face ones may engage students more in learning and giving feedback to the teacher."

The last theme checks the students' statements concerning their Internet and connection status. One student stated: "In face-to-face classes, there is interaction between students and professors, but in online classes, the quality of interaction decreases due to the connection and disconnection of the Internet." The other student described the situation: "Technology and Internet connection have the main effect in online classes." Student number 15 expressed

her opinion: "The main advantage if we do not face Internet disconnections is through online classes. They can be great if the connection isn't poor."

## Discussion

Further analysis and commentary are provided on the results obtained in this section, and additional comments are given on the results obtained.

Question (1). Are there any differences between English juniors and seniors in their ICT use and frequency of using electronic devices?

To discuss the findings of this study, it can be said that although there exists a difference between English juniors and seniors in their ICT use, overall, the difference is not meaningful and is only marginally significant. The frequency of the students' choices on the agreement between their rating of their ICT use is equal. The data suggests that English students were more likely to choose "agree" (34%) than younger students (29.3%). This difference, although considered smaller than expected, can be interpreted and may be attributed to seniors completing their previous semester in an online environment. Although juniors had studied online in their last school year, they are not familiar with the system and format of the university environment.

In a recently conducted study, Eger et al. (2020), who wanted to investigate students' social communication services and new smartphone integration in their education, observed the positive relationship between the use of ICT and self-efficacy among first-year university students from three different countries. According to Table 4, the frequencies and percentages suggest that technology use between English major juniors and seniors was not significant to be counted. Therefore, the result contradicts the hypothesis that there is a difference between English juniors and seniors in their frequency of using electronic devices.

As the results of other studies indicate, there should be differences between English juniors and seniors in their ICT use. The insignificant differences in the Table 2 and Table 4 indicate the research findings. However, the study's results imply that the variation is not perceivable, leading to the finding that both juniors and seniors at university are similar in their ICT usage. This is primarily because, during the Covid-19 pandemic, Both juniors and seniors completed part of their education online.

Question (2). Are there any differences between EFL students and students of other fields of study (computer sciences) in their ICT use and frequency of electronic device use?

The data from this study demonstrate significant differences between the two groups with different majors in their ICT use. Based on the results of the chi-square analysis in Table 6, more computer science students than EFL students strongly agree on using ICT for their courses. These results may be because their field of study is related to technology.

The study that Basri et al. (2018) conducted had the same context as our study investigating the influence of gender, GPA, and student majors on the correlation between ICT use and academic performance. This study's findings contradicted our hypothesis, stating

that students' choice of major did not affect their academic performance. The dissimilarity may arise from the studies being conducted in diverse counties, each offering unique facilities and resources. The findings of this study are in line with similar studies. Selwyn (2008) determined that students' Internet use for educational reasons differed across subject areas.

Referring back to the results of this study, even though chi-square results indicated no significant difference between English and computer science students on their frequency of using electronic devices, The analysis presented in Table 8 indicates that the frequency of ICT usage among computer science students generally surpasses that of junior students in English. This means that science students, more than English students, both freshmen, have rated the highest frequency of ICT use for educational purposes.

There were mixed results when it came to the ICT use. Several studies analyzed the variations in students' uses of the technology based on their educational level, gender, field of study, and years of study (Selwyn, 2008; Smith, Caruso & Kim, 2010; Dahlstrom & Bichsel, 2014).

Question (3). What are the students' perceptions of their digital literacy?

Eshet (2004) considered digital literacy a "survival skill in the digital era" and proposed that it is frequently utilized in formal academic settings. In this regard, paying attention to the people playing a part in education and understanding their view will also be as vital as it is in its single term. Based on Table 10, the results addressing question 3 exposed equality between the English and computer science students' perceptions of their digital literacy. This means that both English and computer science students perceive themselves as digitally literate. The digital devices mentioned in the questionnaire were computers/laptops/tablets and other digital devices commonly available among students. The percentage derived from the results on students rating themselves from high to very low shows that students believe in literacy on the mentioned devices.

Digital literacy of university students has also been critical to Nguyen and Habók. Their study similarly focused on assessing the digital literacy levels of EFL learners at universities in Vietnam, which resulted in the conclusion that university students' digital literacy is at an adequate level. Son et al. (2017) conducted research examining the digital literacy skills of university students studying English for academic purposes (EAP) and English as a Foreign Language (EFL) in Canada and Japan. The results indicate that EAP students generally had a more positive perception of their digital knowledge than EFL participants, who had a more moderate assessment of their digital literacy level. A study conducted by Dashtestani and Hojatpanah (2022) in the same area yielded different results. It revealed that Iranian students' digital literacy is low and do not use various computer programs and software. The inconsistent result perhaps is due to the difference between the focused society in their study and this study. While the previous research delved into the

digital literacy of EFL students in a junior high school, our research is specifically geared toward university students and their digital literacy levels.

Question (4). How do students perceive ICT use in online and face-to-face classes?

An open-ended question was deployed at the end of the questionnaire to answer the last research question. The participants were requested to articulate their comprehension of the disparity in their utilization of technology in online and face-to-face classroom settings.

Based on the answers, participants have mixed feelings about ICT use in online and face-to-face classes. The results of the first theme, mentioning the ease of learning in online courses, can be explained by referring to the participants' answers and analyzing their reports. According to their comments, online learning is considered more accessible. A study by Warnecke and Pearson (2011) supports the idea that e-learning is a valuable tool. The results of a survey conducted by Kopinska (2020) also revealed that the students' perspectives on technology were favorable, reinforcing the arguments advocating for incorporating ICT in EFL instruction. The results of this study also support earlier research in the area, indicating that students valued the practical application of technology in the classroom (Doiz et al., 2014; Liu, 2009) and held a favorable view of their experiences with information and communication technology (ICT). (Czekman, 2018; Siragusa & Dixon, 2009).

The second theme is efficient training**.** In this case, efficient training is applied in different ways. Efficient training from the perspective of some of the participants was through online classes. On the other hand, some participants felt that face-to-face lessons were more effective. The results for this theme, efficient training, also showed mixed results. This could be because each participant shows distinct opinions on this matter based on their different experiences and preferences.   One study supporting the idea that online classes are efficient for training is Dalgaly's (2020) research. According to him, the courses of such form of education, online courses, can be accessed at any time, regardless of location, and they also can provide effective and efficient training aids.

On the other hand, some researchers express opposing views. For example, a study by Wuensch et al. (2006) indicates that face-to-face learning is more effective, immediate, and dynamic than online learning. Khan et al. (2017) also hold the same opinion.

The third theme is time management**.** The students tend to think a lot about their time, which is one factor affecting their evaluation. Based on the results, it can be said that currently, in terms of time management, most answers are shifted to online classes. The time-saving effect of online courses was considered essential and discussed by most of the students. As an example, compared to our study conducted by Nambiar (2020), it was found that most students consider online classes to be efficient regarding time management. They also believe that studying could be done from home, which saves time for traveling and is superior because students don't have to rush to university for online classes. Although one participant in our study stated that the engagement level and feedback are higher in face-to-

face courses, contrary to our study, the results of research by Sari (2020) showed that most students responded positively toward their online engagement level. As noted by the researchers of this study, the difference could be due to the small sample size range or probably to the fact that the target community is different for each survey.

The last theme is Internet and connection status**.** The Internet and connection status becoming a theme is not far from expectation. According to Kim (2020), online learning is conducted online. Thus, the COVID-19 pandemic has highlighted the significance of online education and its role in facilitating learning through virtual classes. The results on the Internet and connection status were mixed. For example, some participants stated the benefits of the Internet for their learning.

In contrast, others mentioned the Internet's difficulty and discussed its effect in face-to-face classes. The advantages and disadvantages that the participants faced in online and face-to-face classes due to the Internet are obvious factors that the mixed results revealed. In this regard, several researchers have worked on the advantages and disadvantages (Al Rawashdeh et al., 2021; Sadeghi, 2019; Shatri, 2020) of technology and Internet use in education. These divided results could be caused depending on each individual, their Internet access, the government's capability to provide Internet, and most importantly, the extent to which each person can cope with what is available. These may be the reasons that caused changes in their feelings toward Internet connection. Overall, as far as the data suggest, the students have different opinions about online and face-to-face classes. The students' perspectives indicated they perceive online and face-to-face courses as beneficial or valuable. Gherheş et al. (2021) investigated the perceptions regarding face-to-face and e-learning and the inclination to return to conventional education regarding post-COVID-19. In specific cases, the present study's results were contradictory**;** in others, they were confirmative. Gherheş et al. (2021) concluded that face-to-face learning is preferred to e-learning. The research further highlighted that those who exclusively utilized e-learning showed a higher preference level than those who had exposure to both learning environments. This could be the reason to call upon blended learning, which is the best option.

## Conclusions, Implications, Limitations, and Future Works

A comprehensive analysis of qualitative and quantitative data in this study enabled us to profoundly comprehend the psychological role of ICT use in online and face-to-face classes for Iranian EFL students at the University of Tabriz. This study has implications for teachers, students, and other educational stakeholders. Consequently, this paper can be a valuable resource for language teacher educators and trainers, awakening them to incorporate positive psychology and its benefits in using ICT into their educational programs and even the teacher education programs, workshops, and courses. Moreover, given the strong connection between the utilization of technology, perceptions of technology-assisted education, and the acceptance of technology, as indicated in the study, it is essential to focus

on enhancing the ICT competence of university students and teachers. It is also crucial to comprehend the factors that influence the effectiveness of technology in education to guarantee that educational systems provide high-quality instruction and equitable access for all students.

Additionally, university students need access to technology to enhance their academic performance. The effectiveness of these students tends to increase when they are encouraged to gain experience with technological tools. Consequently, the research emphasized that integrating technology is crucial for university students to advance their educational outcomes. Ultimately, by incorporating digital applications and positive psychology into English instruction, students are expected to enhance their digital and English skills by leveraging the various learning opportunities provided by modern technological resources.

Despite the best efforts made by the researcher, some of the limitations should be acknowledged. Firstly, only two facilities of the University of Tabriz students have been examined. Thus, the sample was somewhat limited. Furthermore, the questionnaire may bear some weaknesses, as the developers mentioned, stating that their future research aims include performing additional factorial analysis to corroborate the validity and reliability of the questionnaire. Lastly, the data analyses may be limited due to some participants' low English literacy levels.

For future development of the ongoing research project, it is advised that the sample size and context be expanded. The study's sample comprises students from the University of Tabriz in Iran; other researchers may conduct a similar study in different universities or other countries. Further research could also examine influencing variables other than field of study or level; for example, gender differences could be focused. Studies that use an experimental research design and consider an in-depth analysis of each topic under investigation are critical. Thus, applying experimental design to examine the relationship between ICT usage and students' self-assessment is not uncommon. The same study could examine different variables influencing students' ICT use in their classes. A comparative study on the same case from previous studies can show the changes in students' opinions after COVID-19.

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