Investigating the Moderating Effect of Demographic Variables on ICT Usage and Learning Process Quality of Higher Education in Medan, Indonesia

Andre Hasudungan Lubis¹, Syed Zulkarnain Syed Idrus², Asiah Sarji³, Zulkarnain Lubis⁴, Sutrisno⁵

¹,²Faculty of Engineering, Universitas Medan Area, Indonesia
³School of Human Development and Technocommunication, University Malaysia Perlis, Malaysia
⁴School of Creative Industry Management & Performing Arts, Universiti Utara Malaysia
⁵Professor of Economy, Universitas Medan Area, Indonesia

andrelubis2201@gmail.com

Abstract. ICT and education seem inseparable. To improving the quality of learning process, ICT become the medium to assist the lecturer to transfer the knowledge to the students with more interactive. The study examined the moderator effects of demographic variables to influencing the usage of ICT towards learning process. A total of 260 respondents were selected from 733 of lecturers in three largest private universities in Medan, Indonesia. Data were collected through a survey among the participants manually. The research employs the Pearson Correlation to determine the relationship between variables and to test the hypothesis, the study uses the Simple Linear Regression and Hierarchical Regression. Result reveals that gender and educational level have no significant moderation. In contrast, teaching experiences, age, and department origin yet significant and positively as the moderator. Moreover, ICT usage is significant to impacting learning process.

1. Introduction

ICT (Information and Communication Technology) brings a new opportunity to many aspects in our society [1]. For example, the implementation of ICT in education is a worthwhile contribution to increase the quality [2], especially improving the learning process quality in higher education [3]. Activity such as academic service learning, community-based research, and community engagement were developed through this technology [4]. ICT brings novel tools and medium in delivering learning materials from the educators to students to be technologically competent. Hence, ICT assist to develop an interactive knowledge transfer in teaching and learning process in a vast way [5].

Computer, phones, software applications, peripherals, and the Internet is the prevalent kind of ICT things to be employed in the learning process [6]. Lecturers play an essential role for the success of ICT utilization in the learning process [7]. This is due to the requirement from the universities to fulfill their customer (e.g., students) in producing educational services by the educators [8], and also they were charged to improve the quality of the learning process [9]. Thus, lecturers should be mastering or able to use any ICT tools to enhance the quality of teaching and learning activities [8].
Moreover, based on several studies, demographic variables (e.g. age, gender, educational level) are employed to predict the level usage of ICT with vary results [10]–[16]. Then, demographic variables are used as a moderating factor in determining the high or low level of ICT usage in the learning process [17]–[20]. Therefore, the purpose of this research is to discover the effect of demographic variables as the moderating variable on the contribution of ICT usage towards learning process quality.

2. Literature

2.1. Uses and Gratification Theory
The theory was first addressed by Jay Blumler and Elihu Katz which employed as the model to explain the people interests and benefits towards media. The theory explores how the media were used, then illustrates the gratification gained by users [21], [22]. The Uses and Gratification theory (UGT) describes that gratifications from the media are related to individual needs, for example education, entertainment, and information [22]. Media, as the tools to transferring data and information, is now has been evolving broadly and become faster [23]. The emergence of ICT shifting a new fashion of societies to communicate and interact with various forms and context [24].

Then, the term of new media become widely used as the media that related to Internet, computer, and other electronic tools as the means to transmit information [25], [26]. Hence, the UGT is a suitable theory to discover how is the media used [21]. The UGT starts with defining the type of media, measuring the level of its use and analyzing several factors that influenced the uses and lastly examine the gratification of the media by it users [27]. The factors that determine the media uses are attitude, community involvement, social support, demographics, the locus of control, and news credibility [28]. Thus, by reviewing to the theory this study employs the UGT as the underpinning theory to support the determination of research outcome.

2.2. Demographic Factors
Demographic factors are commonly used to see more about the characteristics of the groups of individuals to be identified. The most common attributes used to classify individuals are gender, age, ethnicity, race, and socioeconomic status, although other demographic variables are also used [29]. Demographic variables in a research are act as the variable that contribute to make good representation of data result [30], [31]. Demographic variables also used to determine the relationship between independent variable and dependent variable [31]. The demographic factors have been studied by several researchers to determine the level of ICT usage. Gender differences of the lecturer is possibly influencing the utilization of ICT in their learning process [32]. This in line with the study conducted by researcher [33] that stated male and female lecturers have a different usage of ICT for teaching. Then, researcher [19] argued that gender is the factor that affect the use of ICT among lecturers. Moreover, a study by [34] also reported that man and woman lecturers have a difference use of ICT. Similarly, researcher [15] agreed that there are significant differences among gender on lecturers’ utilization of ICT into their teaching practice. Researcher [35] stated that teaching experiences affect the successful of ICT usage for lecturing activities. A study by researcher [36] reported that lecturers experiences could be shaped in a different use of ICT. Similarly, [34] reported that lecturers with higher teaching experiences are more confident to use the computer to teach. Thus, it is indicated that lecturers’ experiences in teaching are influencing the ICT usage on the learning process. Then, research by [37] stated that experience in teaching is influenced the competency of lecturer in using ICT. Complementary to this, [38] argued that lecturers’ experiences of using ICT have an impact on their teaching process. A different in age range of lecturer is affecting the usage of ICT [19]. Researcher [39] reported a study that supported age is the factor that influencing the ICT application among lecturers. According to [40], a high utilization of ICT is depend on several factors including educational level. Then, [19] also agreed that lecturers’ educational level give an impact towards their utilization of ICT.
Similarly, [11] stated that there exists a significant difference between lecturers’ education and use of ICT among the them. The distinguish of lecturers’ subject is yet resulting contrast usage of ICT in their teaching activity [41]. According to [42], department origin factor give a contribution to the ICT usage. Additionally, the application of ICT is significantly different among lecturers with different fields of study [43]. Based on the several studies, the demographic factors that used in the study are gender, teaching experiences, age, educational level, and department origin. The research framework is illustrated in Figure 1.

![Figure 1](image_url)

**Figure 1.** Research framework of the study.

As illustrated on Fig. 1, ICT usage is act as the independent variable whereas learning process is the dependent variable. Moreover, gender, teaching experiences, age, educational level, and department origin are act as the moderating variable. Moderating variable is a third variable that affects the strength of the relationship between a dependent and independent variable (Lubis & Osman, 2015). Based on Fig. 1, the research studies six hypotheses, namely:

- $H_1 = $ ICT usage has an impact on learning process.
- $H_2 = $ Gender factor is positively moderating the impact of ICT usage on learning process.
- $H_3 = $ Teaching experience of lecturer is positively moderating the impact of ICT usage on learning process.
- $H_4 = $ Age factor is positively moderating the impact of ICT usage on learning process.
- $H_5 = $ Educational level of lecturer is positively moderating the impact of ICT usage on learning process.
- $H_6 = $ Department origin of lecturer is positively moderating the impact of ICT usage on learning process.

**3. Materials and Method**

3.1. Population and Samples of Study

The study determines the largest private universities and largest number of students in Medan, Indonesia, namely: Universitas Muhammadiyah Sumatera Utara (UMSU), Universitas Pembangunan Panca Budi (UPPB), and Universitas Medan Area (UMA). The population of the study refers to [45] and [46], with the total population size as much as 733 respondents from 3 private universities in Medan, Indonesia. Then, by using instruction of [47], the total sample size of the study are 254 to 260 respondents. The study determines the total sample as much as 260 participants.
Stratified random samples method are applied from each private university by using strata based on their education level and experience as a lecturer, due to the greatest effect on the lecturers’ purposes of using ICT [48]. Lecturers’ education level goes into two parts, namely Master level and PhD level. Then, experience as a lecturer divided the amount of teaching experience into three levels: little experience/fresh ($\leq$ 5 years; notated as F), medium experience ($> 5$ but $\leq 10$ years; notated as M), and high experience/old ($> 10$ years; notated as O) [49]. Furthermore, after employing the stratified random sample method, sampling technique are taken from each private university are: UMSU (120 respondents), UPPB (65 respondents), UMA (75 respondents). Table 1 explains the total populations and samples for each stratum of respondents.

Table 1. Total populations and samples for each stratum

| University | Education Level | Total Population | Stratum  | Total Population per Stratum | Total Sample |
|------------|----------------|------------------|----------|-----------------------------|--------------|
| UMSU       | Master         | 302              | Master_F | 86                          | 31           |
|            |                |                  | Master_M | 48                          | 17           |
|            |                |                  | Master_O | 168                         | 57           |
|            | PhD            | 37               | PhD_F    | 2                           | 2            |
|            |                |                  | PhD_M    | 11                          | 4            |
|            |                |                  | PhD_O    | 24                          | 9            |
|            | Master         | 172              | Master_F | 69                          | 24           |
|            |                |                  | Master_M | 68                          | 24           |
|            |                |                  | Master_O | 35                          | 12           |
| UPPB       | PhD            | 12               | PhD_F    | 6                           | 2            |
|            |                |                  | PhD_M    | 5                           | 2            |
|            |                |                  | PhD_O    | 1                           | 1            |
|            | Master         | 180              | Master_F | 57                          | 20           |
|            |                |                  | Master_M | 20                          | 7            |
|            |                |                  | Master_O | 103                         | 36           |
| UMA        | PhD            | 31               | PhD_F    | 13                          | 5            |
|            |                |                  | PhD_M    | 1                           | 1            |
|            |                |                  | PhD_O    | 17                          | 6            |

3.2. Research Instrument

The instrument in the study divided into three section. Section I of the questionnaire is including demographic features of respondents including: gender, year of teaching experience, age, educational level, and department origin. Section II regarding the intensity of respondents in using ICT for their teaching process. A total of 11 items in Section II are adapted from 2nd Revision of OECD Model Survey on ICT Access and Usage by Households and Individuals [50] with reformulation. Then, questions in Section III are proposed by referring to [51], which regarding learning process quality with total 26 questions. The questions in Section II and Section III were responded using 5 point Likert scale, and the data collection process is performed by distributing the questionnaire directly to respondents.

The reliability and validity of the measurement is tested both for questions in Section I and Section II. Reliability of the instrument is tested by using Cronbach Alpha and the validity is tested for the content validity by using Spearman’s coefficient correlation between the value of each item and value
of the total item. Table 2 shows the resume of the research instrument, including total items, reliability, and content validity for each variable.

Table 2. Summary of research instrument.

| Section | Variables               | Total Items | Reliability (Cronbach Alpha) | Content Validity (Spearman’s coefficient correlation) |
|---------|-------------------------|-------------|------------------------------|---------------------------------------------------|
| I       | Demographic features    | 5           | -                            | -                                                 |
| II      | ICT usage               | 11          | 0.910                        | 0.644 – 0.788 (positive relationship)              |
| III     | Learning Process        | 26          | 0.951                        | 0.620 – 0.755 (positive relationship)              |

3.3. Technique of Analysis

The technique of the analysis that employs in this study involved four ways. Firstly, descriptive analysis is used to determine the magnitude of variance of all variables through the mean score to measure the level of variables. Secondly, Pearson’s correlation is used to determine the relationship between variables. Then, a simple linear regression is utilized to test the hypothesis 1 ($H_1$). Lastly, to test the hypothesis 2 to hypothesis 6 ($H_2$, $H_3$, $H_4$, $H_5$, $H_6$), Hierarchical Regression is employed as the mean to comparing which one of the variables has the higher effect towards the primary model [52]. In hierarchical regression models, the changes of $R^2$ value gives the information on how much demographic regressor affecting the variable. The research analysis divide into three steps. As the first step, the study determines the sample characteristic of respondents by examines the frequencies of respondents’ demographic information. Then, by evaluating the mean scores, the research explains the level of ICT usage from of each demographic variable. Also, Pearson correlation is applied to provides how the relationship of the demographic variable towards ICT usage and learning process.

The second step, a simple linear regression is used to determines the impact of ICT usage towards learning process. Correlation, $R^2$ value, and $p$ value are checked to confirm and test the hypothesis 1($H_1$). Then, the third step of the analysis is uses the Hierarchical Regression to test the hypothesis 2 to hypothesis 6 through the changes of $R^2$ value, and $p$ value.

4. Results

4.1. Characteristic of respondents.

In the first step, the study examines the frequencies of demographic features of respondents. A total 56.5% of respondents are male and 43.5% of them are female. Then, in teaching experience factor, the majority of participants have been taught more than 10 years with total 46.5%. Next, a total 32.3% of them are fresh with less than 5 years of experience, and 5-10 years of experience as much 21.2%. In age of the participants is classified into five groups, in which 12.3% are in between 21-30 years, 34.2% of those are in between 31-40 years, 31.5% are in between 41-50 years, 18.8% are in between 51-60 years, and respondents with age over 60 years old with percentage rate 3.1%. In terms of educational level, 87.7% from total respondents hold a Master degree, and only 12.3% hold a PhD. Furthermore, for the department origin, there are 24.6% specialized in economy department, and then followed by 15.8% were taught in engineering faculty. Next followed by law department has as much as 12.7%, and 11.5% respondents were listed in agriculture, then social and political 10.8%. Moreover, 8.1% were listed in education department and psychology as much as 5.4%. Other department involved the medical, biology, and Islamic religion department as much as 11.2%. The mean score of ICT usage of the respondents shows a vary outcomes.

In term of gender, male and female lecturers have a closer score. However, the result pointed out that lecturers with a longer year experience of teaching have the lowest score (3.3817) compared to the little (3.6851) and medium experiences (3.8545). This is in line with the age, which is the younger respondents have a higher score (3.7813) rather than the older one (2.2727). Nevertheless, educational level of lecturers is not have any significant differencies. Furthermore, based on their department
origin, respondents from Engineering faculty have the highest score of the ICT usage with total 3.7672. On the contrary, lecturers from Education sector is the lowest score of all department (3.0000). The strength of the relationship between demographic variable on the relationship towards ICT usage and learning process is determined by Pearson correlation. A low value of correlation occurs with the value of 0.1, the medium proportion correlation indicates if the value is 0.3, and values of 0.5 is indicating a large Pearson product moment correlation [29]. The result of Pearson correlation analysis pointed out that gender has the largest correlation between ICT usage and learning process with value of 0.455, followed by teaching experiences (0.309), department origin (0.299), and age (0.293). Moreover, educational level has the lowest correlation with the value of 0.071. Table 3 shows the summary of the first results from the study.

### Table 3. Sample characteristics.

| Demographic features          | Percentage | Average ICT Usage Rating | Correlation between ICT usage and Learning Process |
|-------------------------------|------------|--------------------------|--------------------------------------------------|
| Gender                        |            |                          |                                                  |
| Male                          | 56.5       | 3.5380                   | .455                                             |
| Female                        | 43.5       | 3.6340                   |                                                  |
| Teaching Experiences          |            |                          |                                                  |
| < 5 years                     | 32.3       | 3.6851                   | .309                                             |
| 5-10 years                    | 21.2       | 3.8545                   |                                                  |
| > 10 years                    | 46.5       | 3.3817                   |                                                  |
| Age                           |            |                          |                                                  |
| 20-30                         | 12.3       | 3.7813                   |                                                  |
| 31-40                         | 34.2       | 3.7344                   |                                                  |
| 41-50                         | 31.5       | 3.6729                   | .293                                             |
| 51-60                         | 18.8       | 3.2245                   |                                                  |
| > 60                          | 3.1        | 2.2727                   |                                                  |
| Educational Level             |            |                          |                                                  |
| Master                        | 87.7       | 3.5550                   | .071                                             |
| PhD                           | 12.3       | 3.7557                   |                                                  |
| Department Origin             |            |                          |                                                  |
| Agriculture                   | 11.5       | 3.6788                   |                                                  |
| Psychology                    | 5.4        | 3.6169                   |                                                  |
| Engineering                   | 15.8       | 3.7672                   | .299                                             |
| Social                        | 10.8       | 3.5325                   |                                                  |
| Law                           | 12.7       | 3.3223                   |                                                  |
| Economy                       | 24.6       | 3.6960                   |                                                  |
| Education                     | 8.1        | 3.0000                   |                                                  |
| Other                         | 11.2       | 3.6959                   |                                                  |

4.2. **Simple linear regression.**

The simple linear regression of the study reveals that a large correlation between ICT usage and learning process with the value of 0.799. Then, value of $R^2 = 0.638$ indicates that ICT usage explain 63.8% of the variance in learning process. Then, the result presents the Beta value as much as $B = 0.676$. It is illustrated that ICT usage has a great impact in learning process quality. Other than that, the probability value of ICT usage variable is at 0.000. Hence, the value is lower than significance level ($\alpha=0.05$). Therefore, it can be concluded that ICT usage gives a great contribution to learning process quality. Table 4 summarizes the output of the regression.
Table 4. Simple linear regression-model summary.

| Model          | Pearson correlation | Sig. | R Square | Unstandardized Coefficients | p value |
|----------------|---------------------|------|----------|-----------------------------|---------|
| ICT usage      | .799                | .000 | .638     | 0.676                       | 0.032   |

Dependent Variable: learning process
Predictors: (Constant), ICT usage

4.3. Hierarchical regression.

In hierarchical regression, the R Square ($R^2$) Change shows how much the improvement in R square as compare to previous model [29]. The result identifies that Age factor has the highest $R^2$ change value with 0.016 and the p value as much as 0.001 which is lower than significance level ($\alpha=0.05$). Hence, age factor has a moderation towards ICT usage on learning process.

Similar to age factor, department origin also has a good value of $R^2$ change with 0.009 and has a lower of p value (0.012) than $\alpha$ value. Thus, a different department origin of lecturers has a different result of how ICT usage impacting the learning process. Furthermore, lecturers’ teaching experiences has the $R^2$ change value as much as 0.007. Moreover, teaching experiences has the p value of 0.030 and yet is lower than $\alpha$. Therefore, the impact of ICT usage on learning process is moderated the variable of teaching experiences. In conversely, gender factor has a low value of $R^2$ change (0.003) and has a not significant p value (0.135 > $\alpha$ | $\alpha=0.05$). It is indicates that the impact of ICT usage on learning process is not moderated by lecturers’ gender. In the same way, respondents’ educational level also has no moderation towards ICT usage on learning process. The variable has the lowest value of $R^2$ change as much as 0.000 and a larger p value (0.736) than $\alpha$ value. The summary of hierarchical regression result is demonstrated in Table 5.

Table 5. Summary of Hierarchical Regression result.

| Demographic features | Unstandardized Coefficients | R Square | R Square Change | p value |
|----------------------|-----------------------------|----------|-----------------|---------|
| Gender               | -.098                       | .065     | .643            | .003    | .135   |
| Teaching Experiences | .086                        | .039     | .640            | .007    | .030   |
| Age                  | .092                        | .027     | .654            | .016    | .001   |
| Educational Level    | -.036                       | .106     | .638            | .000    | .736   |
| Department Origin    | .038                        | .015     | .648            | .009    | .012   |

5. Discussions

The utilization of ICT in education is crucial. A collaborative leaning, skill improvement, and also provide a motivation to both lecturers and students in learning process [53]. Several studies have been agreed that using ICT as a tools to enhance the learning process quality [54]–[57]. This in line with the outcome of the study regarding the impact of ICT usage towards learning process. Based on the Table 4, the significance value is 0.000 which is lower than $\alpha$ value, it is indicates that the Hypothesis1 (H1) is well accepted.

Based on the result of hierarchical regression, gender factor has a low of $R^2$ change value (0.003) and has the higher value of p (0.135) than $\alpha$. As illustrates in Table 3, there is an identical mean score of ICT usage among respondents by their gender. Male and female lecturer has no different use of ICT for learning process purposes. Even though there is a good correlation between gender, ICT usage, and learning process (0.455), the result of regression reveals that there is no significance of gender in moderating the impact of ICT usage on learning process, hence Hypothesis 2 (H2) is rejected. This is in line with previous studies [13], [42], [58] which is stated that gender factor is not moderating ICT usage in learning process by lecturers.
Then, the hierarchical regression analysis reveals that the teaching experiences factor has the $R^2$ change value as much as 0.007, and lower $p$ (0.030) than $\alpha$ (0.05). Hence, Hypothesis 3 ($H_3$) is well accepted and linear with previous studies [34]–[37]. Furthermore, a different age resulting a different impact of ICT usage in learning process. According the hierarchical regression analysis in Table 5, age factor has the highest $R^2$ change value (0.016), also the lowest $p$ value (0.001). Hypothesis 4 ($H_4$) is accepted and yet supported by other researches [19], [38], [39]. Moreover, age and teaching experiences has a linear result. As showed in Table 3, a fresh experience has the mean score as 3.6851, middle experience has the highest score of mean as much as 3.8545. Then, Table 3 also shows that the younger respondents have a higher mean score (3.7813) rather than the older one (2.2727). So, it can be concluded that a young lecturers have a high level of ICT usage in their learning process. Conversely, senior lecturers have a low level of ICT usage in learning process. Still, Hypothesis 3 ($H_3$) and Hypothesis 4 ($H_4$) are accepted.

In term of educational level, both Master-level and PhD-level of respondents have a similarity for the average of ICT usage rating. Then, the output of Pearson’s correlation analysis reveals a low correlation score (0.071) between educational level, ICT usage, and learning process. Furthermore, based on the regression analysis, $p$ value (0.736) of educational level is much higher than $\alpha$ value. So, it can be identified that lecturers’ educational level has not moderating the impact of ICT usage towards learning process and Hypothesis 5 ($H_5$) is not accepted.

Lastly, lecturers from different department are have a different use of ICT. The hierarchical regression analysis pointed out that the variable has the $R^2$ change value as much as 0.009, and the lower value of $p$ than $\alpha$ (0.012 < 0.005). Thus, its indicates that Hypothesis 6 ($H_6$) is accepted and the result is following to latest studies [13], [42], [43] which is stated that department origin is moderating the impact of ICT usage to the learning process.

6. Conclusions
A hierarchical regression is usually used to determines how the demographic variables affecting linear relationship between independent and dependent variable [29]. By the means of this analysis, the study reveals a surprising result regarding the demographic variables of lecturer, ICT usage and learning process. According to the findings, there are four hypothesis are still defended which are $H_1$; $H_2$; $H_3$; and $H_4$. Despite this, $H_5$ and $H_6$ are rejected. As the conclusion, age, teaching experiences, and departmen origin of lecturers are moderating the ICT usage impacting learning process quality. In contrast, gender and their educational level are not significant. The research result of six hypotheses as summarizes in Table 6.

| Hypothesis | Statement of hypothesis | Remarks |
|------------|-------------------------|---------|
| $H_1$      | ICT usage has an impact on learning process. | Accepted |
| $H_2$      | Gender factor is positively moderating the impact of ICT usage on learning process. | Rejected |
| $H_3$      | Teaching experience of lecturer is positively moderating the impact of ICT usage on learning process. | Accepted |
| $H_4$      | Age factor is positively moderating the impact of ICT usage on learning process. | Accepted |
| $H_5$      | Educational level of lecturer is positively moderating the impact of ICT usage on learning process. | Rejected |
| $H_6$      | Department origin of lecturer is positively moderating the impact of ICT usage on learning process. | Accepted |

References
[1] M. Bala, “Use of ICT in higher education,” Multidiscip. High. Educ. Res. Dyn. Concepts Oppor. Challenges Sustain. Dev. (ISBN 978-93-87662-12-4), vol. 1, no. 1, pp. 368–376, 2018.
[2] A. K. Agrawal and G. K. Mittal, “The Role of ICT in Higher Education for the 21st Century: ICT as A Change Agent for Education,” *Multidiscip. High. Educ. Res. Dyn. Concepts Oppor. Challenges Sustain. Dev.* (ISBN 978-93-87662-12-4), vol. 1, no. 1, pp. 76–83, 2018.

[3] R. Schulz, G. M. Isabwe, and F. Reichert, “Investigating teachers motivation to use ICT tools in higher education,” in *Internet Technologies and Applications (ITA)*, 2015, pp. 62–67.

[4] M. D. Lytras, P. Papadopoulou, C. Marouli, and A. Misseyanni, “Higher education out-of-the-box: Technology-driven learning innovation in higher education,” in *Engaged scholarship and civic responsibility in higher education*, IGI Global, 2018, pp. 67–100.

[5] M. Jamian, H. Ab Jalil, and S. E. Krauss, “Ecological Perspectives of ICT Affordances in Malaysian Higher Education Learning Environment,” *Asian J. Environ. Stud.*, vol. 3, no. 7, pp. 71–79, 2018.

[6] G. Bulman and R. W. Fairlie, “Technology and education: Computers, software, and the internet,” in *Handbook of the Economics of Education*, vol. 5, Elsevier, 2016, pp. 239–280.

[7] S. Fathima, “Challenges of ICT in teaching learning process,” *Int. J. Eng. Sci.*, vol. 2, pp. 52–54, 2013.

[8] V. Venkatesh, T. A. Sykes, and S. Venkatraman, “Understanding e-Government portal use in rural India: role of demographic and personality characteristics,” *Inf. Syst. J.*, vol. 24, no. 3, pp. 249–269, 2014.

[9] K. A. Aramide, S. O. Ladipo, and I. Adebayo, “Demographic Variables And Ict Access As Predictors Of Information Communication Technologies’ Usage Among Science Teachers In Federal Unity Schools In Nigeria,” *Libr. Philos. Pract.*, p. 1, 2015.

[10] R. Seherer and F. Siddiq, “Revisiting teachers’ computer self-efficacy: A differentiated view on gender differences,” *Comput. Human Behav.*, vol. 53, pp. 45–57, 2015.

[11] A. P. Matos, J. J. Costa, M. R. Pinheiro, M. C. Salvador, M. L. Vale-Dias, and M. Zenha-Rela, “Anxiety and dependence to Media and Technology Use: media technology use and attitudes, and personality variables in Portuguese adolescents,” 2016.

[12] A. Aslan and C. Zhu, “Investigating variables predicting Turkish pre-service teachers’ integration of ICT into teaching practices,” *Br. J. Educ. Technol.*, vol. 48, no. 2, pp. 552–570, 2017.

[13] S. Allahawiah and S. Tarawneh, “Factors affecting information and communication technology (ICT) use by southern colleges teachers in Balqa applied university,” in *Proceedings of the West East Institute international academic conference on education, humanities and social sciences*, 2015, pp. 138–145.

[14] A. Tarhini, T. Elyas, M. A. Akour, and Z. Al-Salti, “Technology, Demographic Characteristics and E-Learning Acceptance: A Conceptual Model Based on Extended Technology Acceptance Model,” *High. Educ. Stud.*, vol. 6, no. 3, pp. 72–89, 2016.
[21] E. Katz, J. G. Blumler, and M. Gurevitch, “Uses and gratifications research,” *public Opin. Q.*, vol. 37, no. 4, pp. 509–523, 1973.
[22] N. M. Cummings, “The uses and gratifications of communication in virtual spaces: media depictions of Second Life, 2002-2008,” University Of Oregon, 2008.
[23] M. Danesi, *Dictionary of media and communications*. Routledge, 2014.
[24] D. Li, *Why do you blog: A uses-and-gratifications inquiry into bloggers’ motivations*, vol. 17. Citeseer, 2005.
[25] M. Lister, S. Giddings, J. Dovey, I. Grant, and K. Kelly, *New media: A critical introduction*. Routledge, 2008.
[26] L. Manovich, “What is new media,” *Lang. new media*, pp. 18–41, 2001.
[27] R. LaRose, D. Mastro, and M. S. Eastin, “Understanding Internet usage: A social-cognitive approach to uses and gratifications,” *Soc. Sci. Comput. Rev.*, vol. 19, no. 4, pp. 395–413, 2001.
[28] K. Lim, “Internet control and anti-control: An examination of public deliberation through networked media on civil sovereignty in China,” State University of New York at Buffalo, 2009.
[29] T. D. Little, *The Oxford handbook of quantitative methods, volume 1: Foundations*. Oxford University Press, 2013.
[30] S. W. VanderStoep and D. D. Johnson, *Research methods for everyday life: Blending qualitative and quantitative approaches*, vol. 32. John Wiley & Sons, 2008.
[31] J. W. Creswell and J. D. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications, 2017.
[32] G. Serin, “The effect of gender and professional development in information and communication technology (ICT) on science teachers’ use of classroom practices,” *Anadolu J. Educ. Sci. Int.*, vol. 5, no. 1, pp. 20–37, 2015.
[33] S. Wilson, N. Lydiah, and W. Pachomius, “Gender Differences in Pedagogical Interaction of Information Communication Technology Among Science and Mathematics Teachers in Public Secondary Schools in Kieni West Subcounty, Nyeri County, Kenya,” *Int. J. Educ. Res.*, vol. 3, no. 1, pp. 443–462, 2015.
[34] K. Nikolopoulou and V. Gialamas, “Barriers to ICT use in high schools: Greek teachers’ perceptions,” *J. Comput. Educ.*, vol. 3, no. 1, pp. 59–75, 2016.
[35] J. H. L. Koh, C. S. Chai, and C.-C. Tsai, “Demographic Factors, TPACK Constructs, and Teachers’ Perceptions of Constructivist-Oriented TPACK,” *J. Educ. Technol. Soc.*, vol. 17, no. 1, 2014.
[36] E. Szeto, “Community of Inquiry as an instructional approach: What effects of teaching, social and cognitive presences are there in blended synchronous learning and teaching?,” *Comput. Educ.*, vol. 81, pp. 191–201, 2015.
[37] F. M. Røkenes and R. J. Krumsvik, “Prepared to teach ESL with ICT? A study of digital competence in Norwegian teacher education,” *Comput. Educ.*, vol. 97, pp. 1–20, 2016.
[38] M. S. H. Khan and L. Markauskaite, “Approaches to ICT-enhanced teaching in technical and vocational education: a phenomenographic perspective,” *High. Educ.*, vol. 73, no. 5, pp. 691–707, 2017.
[39] M. Hammond and N. Gamlo, “How and why do language teachers use ICT in a University in Saudi Arabia?,” in *Global Learn*, 2015, pp. 248–257.
[40] J. B. Pick, A. Sarkar, and J. Johnson, “United States digital divide: State level analysis of spatial clustering and multivariate determinants of ICT utilization,” *Socioecon. Plann. Sci.*, vol. 49, pp. 16–32, 2015.
[41] F. Siddiq, R. Scherer, and J. Tondeur, “Teachers’ emphasis on developing students’ digital information and communication skills (TEDDICS): A new construct in 21st century education,” *Comput. Educ.*, vol. 92, pp. 1–14, 2016.
[42] O. Baydas and Y. Goktas, “Influential factors on preservice teachers’ intentions to use ICT in future lessons,” *Comput. Human Behav.*, vol. 56, pp. 170–178, 2016.

[43] A. Ashrafzadeh and S. Sayadian, “University instructors’ concerns and perceptions of technology integration,” *Comput. Human Behav.*, vol. 49, pp. 62–73, 2015.

[44] Z. Lubis and A. Osman, *Statistik dalam Penyelidikan Sains Sosial: Aplikasi dan Falsafah*. Penerbit Universiti Malaysia Perlis, 2015.

[45] A. H. Lubis, S. Z. S. Idrus, and A. Sarji, “The Use of ICT among University’s Lecturers in Medan, Indonesia: A Comparative Study,” *J. Hum. Dev. Commun.*, vol. 6, no. 1, pp. 63–76, 2017.

[46] A. H. Lubis, S. Z. S. Idrus, and A. Sarji, “ICT Usage Amongst Lecturers and Its Impact Towards Learning Process Quality,” vol. 34, no. 1, pp. 284–299, 2018.

[47] U. Sekaran and R. Bougie, *Research methods for business: A skill building approach*. John Wiley & Sons, 2016.

[48] K. Mumcu and others, “ICT in Vocational and Technical Schools: Teachers’ Instructional, Managerial and Personal Use Matters,” *Turkish Online J. Educ. Technol.*, vol. 9, no. 1, pp. 98–106, 2010.

[49] A. Stes, *Impact of instructional development in higher education*. Academia Press, 2008.

[50] OECD, “ICT Access and Usage by Households and Individuals (Edition 2017),” 2018.

[51] A. S. Koorts, “Performance indicators in higher education teaching and learning: Imperatives for lecturers,” *J. New Gener. Sci.*, vol. 3, no. 2, pp. 75–85, 2005.

[52] T. Teo, *Handbook of quantitative methods for educational research*. Springer Science & Business Media, 2014.

[53] N. Duţă and O. Martínez-Rivera, “Between theory and practice: the importance of ICT in Higher Education as a tool for collaborative learning,” *Procedia-Social Behav. Sci.*, vol. 180, pp. 1466–1473, 2015.

[54] D. Glušac, V. Makitan, D. Karuović, D. Radosav, and D. Milanov, “Adolescents’ informal computer usage and their expectations of ICT in teaching--Case study: Serbia,” *Comput. Educ.*, vol. 81, pp. 133–142, 2015.

[55] T. Keane, W. F. Keane, and A. S. Blicblau, “Beyond traditional literacy: Learning and transformative practices using ICT,” *Educ. Inf. Technol.*, vol. 21, no. 4, pp. 769–781, 2016.

[56] J. E. Lawrence and U. A. Tar, “Factors that influence teachers’ adoption and integration of ICT in teaching/learning process,” *EMI. Educ. Media Int.*, vol. 55, no. 1, pp. 79–105, 2018.

[57] M.-C. Vega-Hernández, M.-C. Patino-Alonso, and M.-P. Galindo-Villardón, “Multivariate characterization of university students using the ICT for learning,” *Comput. Educ.*, vol. 121, pp. 124–130, 2018.

[58] S. Narasuman, “An Analysis of the Effect of Demographic Factors on the Level of ICT Integration,” in *7th International Conference on University Learning and Teaching (InCULT 2014) Proceedings*, 2016, pp. 1–15.