Motivational Factors for Choosing ICT as an Elective Subject in Mathematics Education

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Abstract

This is an era of information and communication technology. Many students are highly interested in Information and Communications Technology (ICT) all over the world. Mathematics is often viewed as a critical enabling course that's why ICT is necessary for higher level mathematics students. For this purpose, the curriculum of mathematics education of master's levelhas adjusted ICT subject in mathematics course and most of the students choose ICT as an elective subject. Therefore, this study intended to explore the motivational factors for choosing ICT as an elective subject in mathematics along with gender perspective. This is descriptive survey research standing on post-positivist paradigm. The central department of education, mathematics education at Tribhuvan University was taken as the study area. Sixty- five students (53 boys, 12 girls)*of master's degree 4th semester who had chosen ICT as an elective subject in mathematics education were selected as samples by simple random sampling method. The major tool of data collection was questionnaire and collected data were analyzed using simple descriptive statistics mean, percentage and inferential statistics t-test. The study found that the most popular motivational factor for choosing ICT as an elective subject in mathematics was their personal interest and the least popular reason was social factors for both boys and girls. This indicates that students were highly motivated towards ICT due to intrinsic motivation then after extrinsic motivation. In addition, there was no significant differencesexistbetween boys and girls motivation in choosing ICT as an elective subject. Therefore, we should equally treat and encourage both boys and girls to study ICT as an elective subject in mathematics on which ICT helps to concretize mathematical concepts from abstraction.*

Key Words: Motivation, Gender Differences, ICT, Mathematics Education

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Introduction

This is era of information and communication technology. Now a day, many students are highly interested in Information and Communications Technology (ICT) in all over the world. Mathematics is often viewed as a critical enabling course(Divjak, Ostroski, & Hains, 2010)that's why ICT is necessary for higher level mathematics students. For this purpose, the curriculum of mathematics education of master's levelhas adjusted ICT subject in mathematics course. In Nepal, most of students choose ICT as an elective subject of master's level in mathematics education atTribhuvan University(TU). Therefore, this study intends to explore the motivational factors for choosingICT as an elective subject in mathematics.

Students' performance isinfluenced by their motivation for entering in any particular subject's area. Most of the studies revealed that mathematics is a hard subject and is male dominated subject(Gunderson, Ramirez, Levine, & Beilock, 2012; Zhang, Wong, & Lam, 2013).Whereas, Castaño Collado and Webster (2011)expressed that ICT is also a male dominated sector. At secondary level, girls are less likely to concentrate on mathematics due to less positive attitude towards mathematics rather than boys. Teacher's believed that " boys are inherently better and therefore do better at mathematics while girls are well behaved and hardworking and so they succeed" (Halai, 2010, p. 54). Such stereotyped behave caused students less participation towards mathematics subject at college level. Since, students have developed their mathematical ability before they entering college level(Divjak et al. (2010).

Most of the female students were underrepresented in the field of mathematics and avoid the field due to the lack of motivation, lack of encouragement, lack of role models in this particular field (Tang, Pan, & Newmeyer, 2008). Female are themselves do not believe their own mathematical ability. Furthermore, teachers also do not believe towards girl's mathematical ability even though girls are equally talented with boys. They evaluate girls mathematical ability in a lower rate than boys, even they perform and show the same ability in mathematics (Dickhauser & Meyer, 2006) Teachers are not motivated to apply gender responsive pedagogy in their teaching learning process (Mlama et al., 2005) to initiate and motivate students especially girls in learning mathematics. In most of the countries, large number of student do not have interest to study science, technology, engineering and mathematics (STEM) related subjects even though STEM subjects are important for their future economic growth(Külli Kori et al., 2015). Moreover, in this

study, Kori et al. also stated that alternative scientific way would be the milestone to initiates student's interest to study STEM subject with the help of ICT. Since ICT courses "can play in enhancing student recruitment efforts" (Akbulut & Looney, 2009, p. 88). Since mathematics is vital for development of ICT and ICT is also necessary for enhancing mathematics teaching learning at higher level. In the Estonian higher ICT curricula, mathematics is also an important course for ICT that causes mathematical course becomes obstacles for ICT student's retention(Külli ,Kori, Altin, Pedaste, Palts, & Tõnisson, 2014).

Social Cognitive Career Theory has been used to investigate career choice in Information Systems (IS) that is described by Bandura's Social Cognitive Theory (Kulli Kori, Pedaste, Altin, Tonisson, & Palts, 2016). Similarly, Akbulut and Looney (2009)found that self-efficacy, outcome expectations, interest and Information Technology (IT) sophistication was a learning experience that could influence students' choice to study IS as their major. However, they also added that IT's sophistication did not directly influence student interest whereas self-efficacy and outcome expectations encourage student interest in the IS discipline.The theory suggests that students' career choice is influenced by their learning experiences, outcome expectations, career interests, and career self-efficacy(Tang et al., 2008).

Different factors influence mathematics students to choose ICT subject as their elective subject in mathematics. Divjak et al. (2010)used a questionnairebased on Likert Scale including various items to measure ICT students' motivational factors for choosing ICT in Croatia. Then, they distinguished four motivational factors for choosing ICT. They were: 1) employment opportunities; 2) curriculum attractiveness; 3) Social factors; and 4) other reasons. Similarly, Külli Kori et al. (2015) found 14 different reasons students choose ICT related subject. They were interest, prior experience, personal development, importance of the IT field in the future, opportunities in the labor market, IT field development, likeability, self-realization, continuing IT studies, suitability, salaries in the IT field, need for IT competences at work, scholarship, and other reasons (p. 2870). Among these factors, they expressed that the most popular factor to study ICT was interest, which can be explained by a high intrinsic motivation of candidates. Moreover, salary and scholarship were the least popular factors for choosing ICT careers.The motivational factors for starting IT related course were 1) Personal contact with IT; 2) Reputation of the IT field; 3)Development; 4) Continuing IT related studies; and 5) Learning environment.Among these factors "personal contact had a bigger effect on students' motivation during their studies than at the start" (Kulli Kori et al., 2016, p. 5).

Motivation is important at the time of subject choice in study and during study because it activates students and gives direction of the study. Motivation helps students to increase their performance and achievement in mathematics. Students with high motivation on mathematics tend to have fun in doing mathematics, prefer to do more challenging tasks, exhibit greater creativity, searching different ideas to solve different problems, and intensely engage in mathematical activities (Galbraith & Haines, 1998). Though, academic achievementof students depend upon motivation(Divjak et al., 2010). ICT helps explained higher motivation results in higher academic achievement (Bruinsma, 2004). According to Self-Determination Theory (Edward L. Deci & Ryan, 1985; Edward L Deci & Ryan, 2008)motivation can be divided into two as intrinsic motivation and extrinsic motivation, according to an action. According to Deci and Ryan, intrinsic motivation means the person who does something because it is inherently interesting or enjoyable, and extrinsic motivation means the person who does something because it leads to a separable outcome.Student's motivation related to student's beliefs about how hard they work in mathematics(Abidin, Mathrani, & Hunter, 2018). The technology use in mathematics classroom led to increase the motivation of students(Torff & Tirotta, 2010).

Several factors influencing motivation at the higher education level in generalfound in the literature. The first factor is student's prior experience and the second general factor is interest in the subject to be study. Interest has been considered extremely important for students majoring in computer-related subjects(Alexander et al., 2011; Külli Kori et al., 2014). The students who enter higher education have more confidence in using technology than before (Külli Kori et al., 2014). That's why ICT in learning mathematics increases students' interest and joy in mathematics(Tossavainen & Faarinen, 2019). The students who have high computer motivation they found computers make learning more enjoyable (Galbraith & Haines, 1998).

Most of the research studies have shown that there are gender differences related to motivation for studying ICT(Divjak et al., 2010).Furthermore, Divjak et al. expressed that "female students are slightly more satisfied with the content, teaching methods, computer availability at the Faculty and range of literature available at the faculty library, but less satisfied with the level of communication with teachers" (p. 306). There is gender differences between boys and girls in their motivation on which mean differences between them was statistically significant (Tossavainen & Faarinen, 2019). Similarly in European Union, there is gender gap in ICT professions has increased over

time(Castaño Collado & Webster, 2011). Girl students choose ICT for employment purposes(Divjak et al., 2010). On the other hand boy students are more competitive and have extrinsic motivation(Shaw & Marlow, 1999)towards ICT.Most of female choose ICT career for a job of future, job availability, an interesting job, real life problem solving and team work(Georgiadou et al., 2009). There is peer pressure on girls to conform to traditionally female learning and career choices (Sainz, 2011).

In most of the countries, large research studies have shown that girls have negative attitude and higher level of anxiety towards computersin comparison with boys(e.g.Divjak et al., 2010).One of the meta-analysis indicated that using ICT in teaching learning must have some positive effect also on motivation that has affected positively on learning results (Biagi & Loi, 2013). Moreover, boys have positive attitude and better technology skills on computers, due to the reasons that they spend more time on home with computers(Divjak et al., 2010; Hargittai & Shafer, 2006; Imhof, Vollmeyer, & Beierlein, 2007).In the study Abidin et al. (2018) reported that attitudinal differences had been associated with technology usage in mathematics classroom. The result of this study indicated that boys had positive beliefs and attitudes towards using ICT in studying mathematics in comparison togirls. The differences between boys and girls cause due to intrinsic values and self-efficacy. According to these research studies, “using technology helps boys to find motivation in mathematics “ (Tossavainen & Faarinen, 2019, p. 4). Moreover, students’ motivation to study mathematics is mostly influenced throughtheir extrinsic motivation than intrinsic. Tossavainen and Faarinen also found that students studying mathematics with the help of ICT makes learning better. It is the caused that large number of mathematics students motivated towards ICT.

Moreover, students have positive attitude towards on-line teaching and learning techniques combining with conventional approaches. Female ICT students’ level of satisfaction is lower using virtual learning environments than that of their male peers, even though, they both are satisfied (Divjak et al., 2010). The level of negative attitude and higher anxiety, girls do not motivate for taking ICT related subject as their elective subject in their learning process.Boys were more benefited learning mathematics with the help of ICT whereas girls need more and a different kind of encouragement and support than boys to learn mathematics education meaningful with the help of ICT (Tossavainen & Faarinen, 2019).

On the other hand, inverse results have been found that girls are more expert in the use of ICT (Ritzhaupt, Liu, Dawson, & Barron, 2013). Therefore, girls who choose to

apply to ICT- related curricula may be more motivated than boys and this helps to increase their probability for taking ICT in mathematics course. The encouraging or discouraging of girls' and boys' sex towards engaging ICT depends upon teacher's gender, their competence in the subject, and the coverage of the curriculum (Palmen, 2011). Generally boys are self-confident towards computers whereas girls have low confident and have low perceptions on their own computing abilities (Palmen, 2011; Sainz, 2011). Large numbers of girl students are underrepresented on ICT related subjects even though girls numbers have been increasing day to day at higher education level (Divjak et al., 2010).

But studies have also shown that a strong relationship exists between the students' attitude towards the use of technology in the teaching and learning of mathematics and the academic achievement of the student(Olson & Zanna, 1993). This is due to evidence showing that effective, innovative and challenging uses of ICT, in the teaching and learning of mathematics, stimulates and sustains the engagement levels of students(Sharma & Bhaumik, 2013).Entering into the field of mathematical, technological, and scientific careers, self-efficacy play critical role (Tang et al., 2008). Moreover, career self-efficacy plays crucial role for female student's career development into the traditional male dominated areas such as mathematics. In addition, this study also reported that female students had lower self-efficacy for male dominated areas rather than male students. CT is useful to understand basic concept of mathematics, it is useful in teaching and learning process. According toKeong, Horani, and Daniel (2005) ICT encourages communication, sharing of knowledge, and collaboration among students. In addition, it gives rapid and accurate feedbacks to students that help them to motivate towards mathematics. It also allows them to focus on strategies and interpretations of answers rather than computational calculations taking more time. Keong et al. also expressed that student use technology to explore and reach an understanding of mathematical concepts and hence ICT supports constructivist pedagogy. Likewise, they also reported that ICT helps mathematics student to concentrate on problem solving processes rather than on calculations of the problems.

Gender difference in mathematics had found between boys and girls in their career choices in ICT that one is influence by different factors.Papastergiou (2008) found that more boys than girls study computer sciences. It is due to the extrinsic reasons rather than personal interest that mostly affectgirls. A study of Georgiadou et al. (2009) found

that intrinsic motivators play major parts to encourage female to choose a career in computing ICT. Where as in China extrinsic motivators like as career information influences to encourage female but in UK and Greece extrinsic motivators play low importance to choose ICT as career.

There is gender differences found between ICT use and learning of students. It was found that girls behaved better during ICT activities than did boys(Ong & Lai, 2006). However, in terms of the relationship between ICT use and student achievement, there is no statistically significant difference between male and female students(Gumus & Atalmis, 2011; Luu & Freeman, 2011).

Based on the literature review, I concluded that different factor initiates students' career choice and motivation during studies at the higher education level. But there has little investigation specific to the ICT elective subject choose in mathematics education field as to which factors motivate mathematics students to take ICT subject in higher level and in addition to gender wise. To address the problem, two research questions were formulated:

- What are motivation factors for choosing ICT as an elective subject in mathematicseducation at Master's level?
- Do girls share the same motivation for choosing ICT as their boys peers in mathematics education?

Methods and Procedures

In view of the fact that the major purposes of the study aimed to find motivational factors for choosing ICT as an elective subject in 4th semester mathematics students of Master's level. This study was depended upon the philosophical assumptions of post positivist paradigm(Taylor & Medina, 2013). In this study, descriptivesurvey design (Creswell, 2015)was employed. It isan appropriate method for the researcher, which enables them to determine the motivational factors for choosing ICT as an elective subject in mathematics education.

The central department of education, mathematics education fourth semester, TU is taken as study area. It is one of the biggest college of education faculty from all over the country. On which the large number of students are enrolled from all over the country who are interesting to study mathematics in master's level. The curriculum

of mathematics education designedon which one of the ICT course ischosen as an elective subject in the 4th semester. All students who had chosen ICT as an elective subject in mathematics education at master's degree were taken as the population. Among them 65 students (53 boys, 12 girls) were chosen as sample respondents of the study by simple random sampling method.

The main tools for the study were questionnaire. To gather the required information from the respondents, the researcher developed the survey questionnaires in relation to motivational factors for choosing ICT. For reliability, the Cronbach Alpha was employed to measure internal consistency whereas for validity questionnaire were verified and approved by the experts of this area. The items of questionnaire were closed ended types. On which statements were constructed considering two options as Agreed and Disagreed. Twenty-four items were constructed based on previous research studies and then administered with respondents. Theobtained data were analyzed under different themes using descriptive statistical tools as mean and percentage and inferential statistics t-test.

Results

- **Factors that influence student motivation towards ICT in mathematics.** The aim of this study was to determine the motivational factors for choosing ICT as an elective subject in mathematics. I conducted the survey with mathematics students to find the motivational factors for choosing ICT as an elective subject in higher level mathematics. The M Ed 4th semester mathematics students have the option to select one of the ICT subject as an elective subject. The survey questionnaire were divided into different four themes with the help of the literature Divjak et al. (2010)based on the characteristicsof questionnaire as follows:

  - Personal Interest
  - Employment Opportunity
  - Social Factors
  - Applicability of ICT

  - ***Personal interest.*** One of the motivational factors for choosing ICT as an elective subject to mathematics students is their personal interest. To do something on any particular field or area, each people must have an interest. Interest is one of the intrinsic motivational factors(Külli Kori et al., 2015). If a person has interest on any subject area, then they are inherently motivated and

encouraged towards this area. In this study, there were six statements related to mathematics student's personal interest. Among these items the item as "I wish to work in this particular profession" was found to have highly influencing items to boy students to choose ICT as elective subject in mathematics. The data on table 1 assures that 98.11% boys are agreed whereas only 91.67% girls are agreed on this item. This statement shows that most of the students are interested towards ICT to choose profession in ICT in the future. Likewise, 100% girls are agreed towards the item as "Computer technologies help me to learn mathematics better" related to their personal interest whereas 94.34% boys were agreed towards this item.

According to the statistical data, there is no significant difference exists (0.042 at 5% level) between boys and girls on the factors as personal interest on choosing ICT as an elective subject. Therefore, both boys and girls of master's level are equally motivated to choose ICT as an elective subject in mathematics education due to their personal interest.

Table 1: *Boys' and girls' agreed percentage on their personal interest*

S. N	Statements	Boy's agreed %	Girl's agreed%
1	I wish to work in this particular profession.	98.11	91.67
2	I find satisfaction in learning mathematics using ICT	88.67	91.67
3	I am interested in mathematics using technology	96.23	91.67
4	Computer technologies help me to learn mathematics better	94.34	100
5	I feel confident in the process of learning using computers	73.58	8B33
6	I enjoy using technologies for my studies specially in mathematics	88.68	83.33
A mean average%	t-value at 5% = 0.042	89.95	90.28

- ***Employment opportunity.*** Employment opportunity is one of the motivational factors for choosing ICT as an elective subject in mathematics. It refers to the opportunities for advancement, a good income and additional jobs (Divjak et al., 2010). In this factor, six items were included according to their identical nature and related to employment. It is an extrinsic motivational factor (Külli Kori et al., 2015). External factors are equally important for any persons to select any particular area.In average, both boys and girls are similarly motivated to choose ICT as elective subject in mathematics shown in table 2. This indicates the percentage of both boys and girls on the factors employment opportunity are similar on which girlsslightlyexceed boys.There is item wise differences found between boys and girls.Among these six items, highly motivating items for boys is "I think that IT field is developing very fast so global market needed ICT"; on this item 96.23% boy are agreed whereas only 91.67% girls are agreed on this item. This result indicates boys are motivated towards ICT due to the demand of global context. Moreover, girls are equally motivated on three items on which their agreed percentage 91.67%. These items are "It is an opportunity for a good income", "There are possibilities for additional part-time jobs", and "I think that IT field is developing very fast so global market needed ICT". It is the case that girls were motivated towards ICT due to secure their income, job and to meet the need of Global market. One of the item as "It is an opportunity for promotion and a managerial position" is the least motivating item for boys for choosing ICT on their elective subject in mathematics. Likewise, the least motivating item for girls is "I think that IT field offers the possibility of achieving self- realization (the chance to do something big)". But this data shows that large number of students who were studying mathematics in M Ed level were motivating towards ICT subject due to the opportunity of employment after completing the course.

  By observing the t-value in table 2, there is no statistically significant difference exists (0.045 at 5%) between boys and girls on the factor employment opportunity for choosing ICT as an elective subject. Both boys and girls who were choosing ICT as an elective subject in mathematics education are equally motivated due to the factor employment opportunities. There is no difference found between them. They have similar level of motivation towards the factor employment opportunities.

Table 2: *Boys and girls agreed percentage on employment opportunities*

S.N	Statements	Boy's agreed %	Girl's agreed %
1.	It is easy to find employment.	75.47	83.33
2.	It is an opportunity for a good income.	83.02	91.67
3.	There are possibilities for additional part-time jobs	77.36	91.67
4.	It is an opportunity for promotion and a managerial position	73.58	75
5.	I think that IT field offers the possibility of achieving self- realization (the chance to do something big)	83.02	58.33
6.	I think that IT field is developing very fast so global market needed ICT.	96.23	91.67
Average %	t-value at 5% = 0.045	81.45	81.95

- ***Social factors.*** Social factors is the another factors for choosing ICT course in Mathematics as an elective subject. People live in society and follow cultural traditions, rules, and norms of this society. Moreover, social factors' includes claims that students' choice of their study was influenced by their relatives, parents, friends, role models in the society etc (Divjak et al., 2010). It is the extrinsic motivational factors for choosing ICT in mathematics. In this factor, there were six items were selected according to their similarity and related to social factors. In comparison of both boys and girls average percentage, it is found that girls have highly motivated due to social factors rather than boys in ICT course as elective subject in mathematics. But there are similarity in items choice between boys and girls. Among the six items, both boys and girls were highly agreed on the item "I think that IT field is promising and necessary in different fields" on which (boys 94.34% and girls 91.67%).However,both boys and girls student had chosen ICT as an elective subject in mathematics primarily because of the possibility of the area of ICT to promise and necessary in different field even more in the future.Moreover, both boys and girls assigned the lowest ranking to the item "I was persuaded by my parents" on which (boys 26.42% and girls 33.33%). This indicates that both boys and girls had not guided by their parents in choosing ICT as an elective subject in mathematics.

  By observing the data of t-value, it is found that there is no significant difference exists (0.234 at 5%) between boys and girls as the social factors for choosing

ICT as an elective subject. Though mathematic students both boys and girls are motivated to choose and study ICT due to the social factor. There is no gender differencefound on the social factor. Both boys and girls have similar motivation about the choice of ICT subject in mathematics education.

Table 3: *Boys' and girls' agreed percentage on personal interest*

S.N	Statements	Boy's Agreed%	Girl's Agreed %
1	I respect people working in this area.	84.91	83.33
2	I have a relative/friend studying here.	50.94	66.67
3	I think that IT field is promising and necessary in different fields.	94.34	91.67
4	Lecturer who teaches me at the higher education level used ICT in teaching was very interesting so I felt to use ICT in mathematics	86.79	75
5	My learning atmosphere (other students' and lecturers' attitudes) is the main motivation	66.04	83.33
6	I was persuaded by my parents.	26.42	33.33
Average %	t-value at 5% = 0.234	68.24	73.56

- ***Applicability of ICT.*** Applicability of ICT is another influencing factor for choosing ICT as an elective subject in mathematics in higher education. Students are motivated towards any particular subject according to this subject's application in the near future. Most of the mathematics students have chosen ICT as an elective subject due to it's application.There are six items are included on this factor according to similarity on each items. In comparison between boys and girls, girls were highly motivated towards ICT due to influencing by applicability of ICT rather than boys. In table 4, it is seen that both girls and boys had ranked these two items "Mathematics is more interesting when using technology" and " I believe that technologies/online help to acquire new knowledge" due to the fact that mathematics becomes interesting using technology and helps to acquire new knowledge. There are slight differences between boys and girls. On both items, girls are 100% agreed but only 94.34% boys agreed on these items. However, both boys and girls assigned the lowest ranking to the item "I enrolled by chance" on which 39.62% boys and 66.67% girls are agreed. Both boys and girls not enrolled towards ICT due to chance.

By observing the data of t-value, there is no significant difference exists (0.493 at 5%) between boys and girls as on the applicability of ICT factor for choosing ICT as an elective subject. Though mathematic students both boys and girls are motivated to choose and study ICT due to its applicability in global market. This indicates that both boys and girls students have similar level of motivation towards ICT due to the factor applicability of ICT in mathematics education.

Table 4: *Boys and girls agreed percentage on applicability of ICT*

S.N	Questionnaire	Boy's Agreed%	Girl's Agreed%
1	I enrolled by chance.	39.62	66.67
2	Mathematics is more interesting when using technology	94.34	100
3	Using computers in learning mathematics is worth the extra effort	62.26	83.33
4	Adopting learning with technology/online increases student satisfaction	84.90	75
5	Technology/online increases the quality of learning because it integrates all Learning form	86.79	91.67
6	I believe that technologies/online help to acquire new knowledge.	94.34	100
Average%	t-value at 5%= 0.493	77.04	86

- **Comparison of boys and girls motivational factors.** The four factors and boy's average percentage and girl's average percentage on these four factors are included in table 5. These all factors have effect on student's motivation towards ICT and mathematics as an elective subject. Among these four factors, the average percentage of both boys and girls is higher on personal interest. Personal interest is the most prominent factors among all factors, for both boys and girls for choosing ICT as an elective subject. Both boys and girls are highly motivated to study ICT subject due to their personal interest on this subject. They both boys and girls are least motivating to choose ICT due to social factors. On the other hand, both boys and girls equally motivated due to employmentopportunity in ICT in mathematics.

  By observing the overall statistical value, there is no significance differences exists between boys and girls on different factors as personal interest (0.042), employment opportunities (0.045), social factors (0.234), and applicability of

ICT (0.493) for choosing ICT as an elective subject in mathematics education. From the table, I also observed thatthe t-test is not statistically significant on the overall statistical value (0.46). Therefore, I can conclude that there are no significance differences between boys and girls in motivation for choosing ICT subject on mathematics. This indicates that both boys and girls have similar lever of motivation at the choice of ICT course as an elective subject in mathematics education at masters' level.That'swhy each factors equally impact both boys and girls at selection of ICT in mathematics education.

Table 5: *Comparison table of motivational factors between boys and girls towards ICT*

S.N	Factors	Boy's Average%	Girl's Average%	t- value
1	Personal Interest	89.95	90.28	0.042
2	Employment Opportunity	81.45	81.95	0.045
3	Social Factors	68.24	73.56	0.234
4	Applicability of ICT	77.04	86	0.493
Total	t-value			0.46

Discussion

The results of the survey indicate that students have positive towards technology use in mathematics education. I constructed different questionnaire related to factors of motivation of student towards ICT from different literature as before. In the survey, I researched about the motivational factors for choosing ICT in mathematics education as an elective subject. From this study, I identified different factors which influence students to choose ICT as an elective subject in mathematics. According to item's similar nature, they were shaped into four different themes such as: personal interest, employment opportunities, social factors, and applicability of ICT. Additionally, I tried to determine gender differences in motivation for choosing ICT related subject as an elective subject.

From this study, I found that the most popular factor for choosing ICT as an elective subject is student's own personal interest. This finding is consistent with a previous study conducted by (Külli Kori et al., 2015) in which interest is the most popular factors for choosing ICT. According to self - Determination Theory, Interest is the intrinsic motivational factors(Edward L. Deci & Ryan, 1985) for choosing ICT as an elective subject in mathematics education. In this study, both boys and girls were highly motivated towards ICT related subject in mathematics education due to their personal

interest. This indicates that students study any particular subject more if they learn this inherently taking interest and enjoy. The least motivating factors is social factors for them, based on extrinsic motivation. The Self- Determination Theory also explained social factors is based on extrinsic motivational factors (Edward L. Deci & Ryan, 1985). There are differences found between boys' and girls' motivation to study mathematics using ICT whereas girls need more and a different kind of encouragement to study mathematics with the help of ICT (Tossavainen & Hirsto, 2018). Hence it is vital for higher level mathematics students to know and apply ICT in their teaching learning process.

This study found that there is no significance difference found between boys and girls in each motivational factors (personal interest (0.042), employment opportunities (0.045), social factors (0.234), and applicability of ICT (0.493) in choosing ICT. There is no significance difference found on overall statistical t-value between boys and girls motivation on choosing ICT as elective subject in mathematics. Similar result have been found by (Divjak et al., 2010)and supports the findings of this study but inverse result is found in another study as there is gender differences between boys and girls motivation towards ICT in mathematics (Tossavainen & Faarinen, 2019). We concluded that students motivations for entering an ICT area do not depend statistically significantly vary with gender.

Conclusion

Students in the current study showed highly motivated towards ICT course as an elective subject in mathematics education. There are many factors motivated them to choose ICT as an elective subject. From results, they had increased motivation towards technology in mathematics education. Technology helps them to concretize mathematical content from the abstraction. It makes mathematics joyful, enjoyable, motivating and understandable.

However, the most popular reason for choosing ICT as an elective subject was their personal interest. This result indicates that students are intrinsically motivated to choose ICT related subject in mathematics. It was the most prominent factor for both boys and girls. Theleast popular reasons for choosing ICT as elective subject is due to social factors which is seen as evidence of extrinsic motivation. It is known that if learning begins with intrinsic motivation then definitely it will guide to be in destination but individual interest is not a construct itself. But, it basically guided by the circumstances like as global market. Hence, the choice is observed as same, individual interest and

employment opportunity seems the sign of success of learner.Thus, the result of a survey into motivation factors for choosing ICT as an elective subject in mathematics show higher influence by intrinsic motivation rather than extrinsic motivation.

I found there is no significance difference between boys and girls as a whole and also factor wise in choosing ICT as an elective subject in mathematics. This indicates that both boys and girls have similar motivation to study ICT as an elective subject in mathematics. Different research expressed mathematics and ICT are male dominated subject but in the case of ICT as elective in mathematics, girls are equally motivated in choosing ICT. Accordingly, this study concludes that the results of t-value between boys and girls in choosing ICT in mathematics show equal influence by each factors separately and as a whole.

Therefore, we should equally treat and encourage both boys and girls to study ICT, girls equally enable towards ICT as elective subject in mathematics. ICT will help to concretize mathematical concept from abstraction. Then mathematics will become more enjoyable, joyful, understandable, funning, and increase student's motivation towards mathematics. Since traditionally dominated students enjoy to study mathematics by traditional approach but today's 21st century students are familiar with technology and enjoy to study mathematics with the help of ICT. Thus, they are highly motivated intrinsically and extrinsically towards ICT in mathematics. Hence, we have to create such type of platform for the mathematics students in the upcoming future.

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