# INTERACTION EFFECTS OF GENDER AND MOTIVATIONAL BELIEFS ON SELF-REGULATED LEARNING: A STUDY AT ICT-INTEGRATED SCHOOLS

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## ABSTRACT

**Purpose –** This study aimed to examine the interaction effects of gender and motivational beliefs on students' self-regulated learning. Specifically, three types of motivational beliefs under the Expectancy-Value Model were examined, namely self-efficacy, control beliefs and anxiety.

**Methodology –** A quantitative correlational research design was used to achieve the research objectives. Data were collected through the questionnaire survey method from 322 secondary school students (166 males; 156 females). The samples were taken from two ICT-integrated schools located in Peninsular Malaysia. The learning environment in these schools was conducive for self-regulated learning. The Learning Strategies Scale and the Motivation Scale, taken from the Motivated Strategies for Learning Questionnaire (MSLQ) were used to measure the variables of the study.

**Findings –** The findings showed that self-efficacy and control beliefs were posistively related to students'self-regulated learning. Anxiety, however, was found to be negatively related to self-regulated learning. The interactions between gender and levels of motivational beliefs on self-regulated learning were also explored in this study. The relationships between self-efficacy and self-regulated learning differed according to gender. However, there were no significant interaction effects between gender and internal

control beliefs on self-regulated learning. This implies that gender differences in self-regulated learning were not due to the differences in control beliefs and anxiety.

**Significance –** This study offers insights on the interaction effects between motivational beliefs, and gender and self-regulated learning. It may helps to develop effective intructional strategies to enhance students' self-regulated learning skill in ICT-related learning environments.

**Keywords:** Self-regulated learning, gender differences, self-efficacy, international control beliefs, anxiety.

## INTRODUCTION

Self-regulated learning is an active process whereby students set goals for learning, monitor and control their cognitive processes, get motivated and act to achieve the targeted goals. Self-regulated learning has garnered attention from educators, researchers and policy-makers because it realizes one of the most important goals of education which is to promote students' ability to learn (Cheng, 2011; Kramarski, Desoete, Bannet, Narciss & Perry, 2013; Saks & Leijen, 2014). With the advancement of Information and Communication Technology (ICT) in teaching and learning, it is even more critical for students to be equipped with self-regulated learning skills. Use of ICT is expected to support self-regulated learning processes by assisting students in monitoring, integrating, and evaluating their learning as they engage in tasks (Bernacki & Aguilar, 2011; Mooij, Steffens & Andrade, 2014;). Meta-analytic studies show that female students have higher motivation and ability to engage in behavior regulation than male students (e.g. Cross, Copping & Campbell, 2011; Weis, Heikamp & Trommsdorff, 2013). They also enjoyed learning more, had higher level of learning skills and achievement compared to their male counterparts (Boulton, 2008; Pardamean & Suparyanto, 2014). However, few studies have explored the interaction effects of gender and motivational beliefs on self-regulated learning, particularly in technology integrated schools. This study aims to fill in the gaps in the literature.

Motivational beliefs refer to the opinions, judgments and values that students hold about objects, events or subject matter domains. They act as a frame of reference that guides students' thinking, feelings and actions (Ongowo & Hungi, 2014). According to the Expectancy-Value Model, motivational beliefs include self-efficacy, control beliefs and anxiety. Self-efficacy and control beliefs are classified under the expectancy component of motivation (Printrich & De Groot, 1990). Students who judge themselves as efficacious tend to challenge themselves with difficult tasks and are more willing to put forth efforts in meeting own academic commitments (Bandura, 1995; Joo, Bong & Choi, 2000). Control beliefs are expectancies regarding the extent to which certain causes or means lead to successful goal attainment, which include effort, ability, luck, fate and some other unknown factors (Martin, 2002). Students with internal control beliefs are characterized by expectancies, the consequences of which, are the results of their own behavior (Sayid Dabbagh & Milad Khajehpour, 2011). Anxiety, on the other hand, falls under the affective component as it concerns students' affective or emotional reactions to academic tasks (Printrich & De Groot, 1990). Students exhibiting high levels of test anxiety are less efficacious and use fewer cognitive learning strategies than students who experience lower levels of anxiety (Bembenutty, 2008). Research also found that male and females students experienced different levels of anxiety in the learning processes (Hong, Neil & Feldon, 2005). Hence, this study is aimed to take into account the gender effect when examining the interaction effects between motivational beliefs and self-regulated learning.

## METHODOLOGY

This study used the quantitative correlational research design to achieve its research objectives. As it is critical for students to be equipped with self-regulated learning skills in a technology-enhanced learning environment (Mooij, Steffens & Andrade, 2014), samples for this study were chosen from two secondary schools with high levels of ICT integration. These schools were classified by the Ministry of Education (MoE) as smart schools. Three hundred and twenty-two Form Four students were sampled from the two schools.

There were 166 male and 156 female students, with the mean age of 16.4 years. Two main instruments, namely the Learning Strategies Scale and the Motivation Scale were employed to measure the variables. Both scales were taken from the Motivated Strategies for Learning Questionnaire (MSLQ), developed by Pintrich, Smith, Gracia and McKeachie in 1991. The MSLQ is a valid and highly reliable instrument (Pintrich et al., 1993). This scale comprises two sections, namely a motivational section and a learning strategies section. The Learning Strategies Scale is taken from the learning strategies section. It has 50 items which measure students' usage of various self-regulated learning strategies. The Learning Strategies Scale was modified before it could be applied in this study. The items were first adapted to the Malaysian context then were translated into the Malay Language by language experts who were competent in both English and Malay languages. Six extra items were also added to make the scale more comprehensive. A panel of experts in educational psychology verified the content validity of the scale. The revised instrument comprised 56 self-rating items concerning cognitive, metacognitive, and resource management self-regulated learning strategies. It was a 7-point Likert instrument, where responses may ranged from 1 (not at all true of me) to 7 (very true of me). Scale scores were determined by summing the items and taking an average. The researchers conducted an analysis to check its reliability. The result showed that the scale was highly reliable, with Cronbach's alpha coefficient of $\alpha$=.92.

Students' motivational beliefs were measured by the Self-Efficacy Subscale, Control Beliefs Subscale, and Anxiety Subscale that were taken from the Motivation Instrument developed by Pintrich et al. (1991). A Malay version of the three scales was used in this study. Similar to the Learning Strategies Scale, it was also a 7-point Likert scale. The Self-Efficacy Subscale measures students' beliefs about their own capabilities in academic settings. Specifically, it focuses on students' perceptions of their abilities to carry out learning activities, and their expectations for success. Self-efficacy is an important factor in self-regulated learning (Pintrich & De Groot, 1990; Bandura, 1986). There were eight items measuring this variable. The reliability analysis revealed that the subscale had an alpha coefficient of $\alpha$=.84. The internal Control Beliefs Scale, on

the other hand, measures students' perceptions of the locus of control for their learning behaviors and academic outcomes. Students with internal control beliefs feel that they have considerable control over the outcomes of their learning activities. This scale is made up of four items. It was found to be a reliable scale, with an alpha coefficient of $\alpha$=.73. The anxiety Subscale measures students' nervous and worried feelings towards examination. This scale has six items concerning the cognitive and affective dimensions of anxiety. It was found to be a reliable instrument. Cronbach's alpha analysis showed that it had an alpha coefficient of .$\alpha$=.77.

The quantitative data collected through a questionnaire survey were analyzed with Two-way Analysis of Variance (ANOVA). Through this statistical analysis, the influence of two different categorical independent variables (gender and levels of motivational beliefs) on one continuous dependent variable (self-regulated learning) were examined. The analysis not only aimed at assessing the main effect of each independent variable but also assessed if there was any interaction between them.

## RESULTS AND DISCUSSION

### The Relationships between Self-Efficacy, Control Beliefs and Anxiety with Self-regulated Learning

The relationships between the three motivational beliefs, self-efficacy, control beliefs and anxiety, and self-regulated learning were examined through the Pearson product moment correlational analyses. The interpretation on the strength of correlation was based on the guidelines proposed by Cohen (1988). Based on these guidelines the strength of the strength of any coefficient greater than .29 was considered as small, while coefficients, which ranged from .30 to .49, were considered as moderate and those greater than .49 were considered as large. Table 1 shows the results of the correlational analyses between the variables.

Table 1

*Correlation between Self-efficacy, Internal Control Beliefs and Anxiety and Self-regulated Learning*

| Variables | Self-regulated Learning | |
|---|---|---|
| | r | $r^2$ |
| Self-efficacy | .56** | .31 |
| Internal Control Beliefs | .33** | .10 |
| Anxiety | -.17** | .02 |

** Correlation is significant at .01 level (2-tailed).

Self-efficacy (r=.56, p<.01) and control beliefs (r=.33, p<.01) were positively and significantly related to self-regulated learning. The strength of correlation between self-efficacy and self-regulated learning was large, based on Cohen's (1988) guidelines. The squared correlation coefficient ($r^2$) shown in Table 1 is known as the coefficient of determination. It is one of the best means for evaluating the strength of a relationship (Stockburger, 2001). The coefficient of determination makes interpreting correlation easier. It provides an estimate of the proportion of the overlapping variance between two sets of numbers (Brown, 2003). The strength of the relationships is expressed by squaring the correlation coefficient and then multiplying it by 100%. The resulting statistics is known as variance explained. The coefficient of determination between self-efficacy and self-regulated learning was $r^2$=.31 which suggested that there were 31% of shared common variance between the two variables. Internal control beliefs had a medium-strength association with self-regulated learning and recorded a coefficient determination of $r^2$=.10, indicating that there were 10% shared common variance between international control beliefs and self-regulated learning. Anxiety, on the other hand, was negatively related to self-regulated learning (r=.-17, p<.01) with a small strength association and a coefficient of determination of $r^2$=.02. There were only 2% shared common variance between anxiety and self-regulated learning.

## The Effect of Gender and Levels of Self-efficacy on Self-regulated Learning

The effect between gender and levels of self-efficacy on self-regulated learning was analysed by Two-way between-groups ANOVA. Table 2 shows the descriptive statistics for the analysis.

Respondents with high levels of self-efficacy recorded the highest mean value in self-regulated learning for both male (M=5.29; S.D.=0.70) and female students (M=5.34; S.D.=0.93).

Table 2

*Self-regulated Learning according to Gender and Levels of Self-efficacy*

| Gender | Self-efficacy | SRL | |
|---|---|---|---|
| | | Mean | Standard Deviation |
| Male (n=166) | High | 5.29 | 0.70 |
| | Moderate | 4.53 | 0.88 |
| | Low | 4.92 | 1.30 |
| Female (n=156) | High | 5.34 | 0.93 |
| | Moderate | 4.28 | 0.93 |
| | Low | 4.07 | 0.72 |

Note: High ≥4.00; Moderate =4.00; Low ≤4.00; SRL=self-regulated learning; S.D=Standard Deviation

Table 3 shows that gender [F (1, 316) =6.37, p=0.01, eta squared = 0.02] and levels of self-efficacy [F (2, 316) =30.32, p<0.01, eta squared =0.16] have significant main effects on self-regulated learning. The effect size of self-efficacy was larger than that of gender. The analysis also revealed that there was a significant interaction effect between gender and levels of self-efficacy on self-regulated learning [F (2, 316) =3.44, p<.05, eta squared = .02]. The interaction effect is shown in Figure 1. The results suggest that the effect of gender on self-regulated learning changes depending on the level of self-efficacy.

Table 3

*Effects of Gender and Levels of Self-efficacy on Self-regulated Learning*

| Source | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Gender | 4.31 | 1 | 4.31 | 6.37 | 0.01** | 0.02 |
| Levelse | 40.99 | 2 | 20.49 | 30.32 | 0.00** | 0.16 |
| Gender*Levelse | 4.65 | 2 | 2.32 | 3.44 | 0.03* | 0.02 |

(continued)

| Source | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Error | 213.55 | 316 | 0.67 | | | |
| Total | 7791.73 | 322 | | | | |
| Corrected Total | 309.82 | 321 | | | | |

* Correlation is significant at .05 level
** Correlation is significant at .01 level
Levelse = Level of self-efficacy

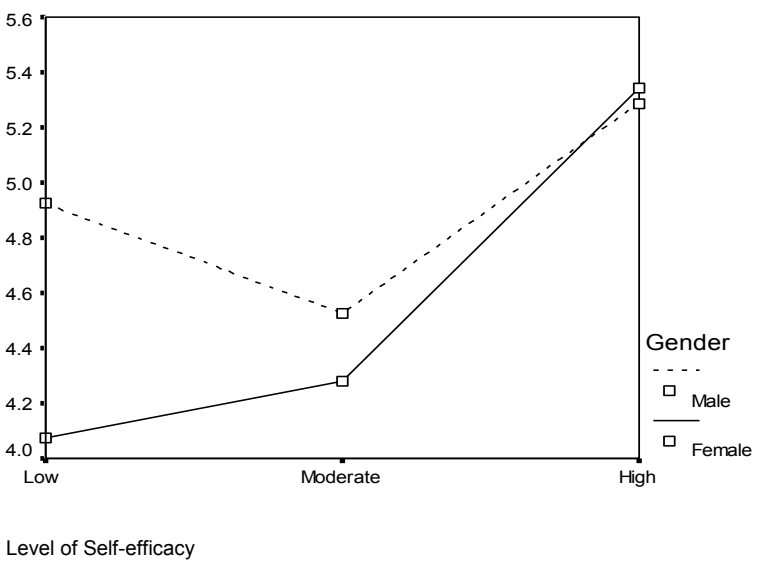


*Figure 1.* Interaction Effect of Gender and Levels of Self efficacy on Self-regulated Learning.

## The Effect of Gender and Levels of Internal Control Beliefs on Self-regulated Learning

Table 4 shows the descriptive statistics for self-regulated learning according to gender and levels of control beliefs. Respondents with high levels of internal control beliefs recorded the highest mean value in self-regulated learning for both male (M =5.24; S.D. = 0.86) and female students (M=4.58; S.D.=1.01).

Table 4

*Self-regulated Learning according to Gender and Levels of Internal Control Beliefs*

| Gender | Internal Control Beliefs | SRL | |
|---|---|---|---|
| | | Mean | Standard Deviation |
| Male | High | 5.24 | 0.86 |
| (n=166) | Moderate | 4.90 | 0.72 |
| | Low | 4.23 | 0.77 |
| Female (n=156) | High | 4.58 | 1.01 |
| | Moderate | 4.48 | 0.96 |
| | Low | 4.28 | 1.14 |

Note: High ≥4.00; Moderate =4.00; Low ≤4.00; SRL=self-regulated learning; S.D=Standard Deviation

The main effects of gender and levels of internal control beliefs are shown in Table 5. Only gender had a significant main effect on self-regulated learning [F (1, 316) =40.12, p<.01, eta squared = .11]. The main effect of internal control beliefs were not statistically significant [F (2, 316) =1.86, p>.05, eta squared = .01]. Similarly, the interaction effect between gender and levels of internal control beliefs [F (2, 316) =1.74, p>.05, eta squared = .01] was not statistically significant (Figure 2). The results suggest that the effect of gender on self-regulated learning does not depend on changes in control beliefs.

Table 5

*Effects of Gender and Levels of Internal Control Beliefs on Self-regulated Learning*

| Source | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Gender | 34.16 | 1 | 34.16 | 40.12 | 0.00** | 0.11 |
| Levelcon | 3.16 | 2 | 1.58 | 1.86 | 0.15 | 0.01 |
| Gender*Levelcon | 2.96 | 2 | 1.48 | 1.74 | 0.17 | 0.01 |
| Error | 269.02 | 316 | 0.85 | | | |
| Total | 7791.73 | 322 | | | | |
| Corrected Total | 309.82 | 321 | | | | |

** Correlation is significant at 0.01; Levelcon=Level of internal control beliefs

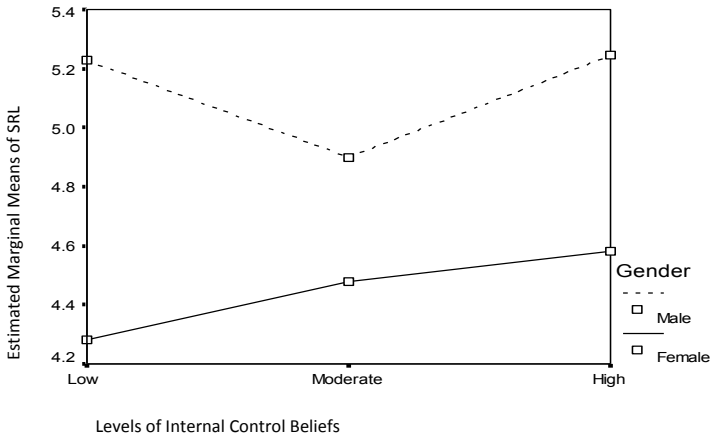


*Figure 2.* Interaction effect of gender and levels of internal control beliefs on self-regulated learning.

## The Effect of Gender and Levels of Anxiety on Self-regulated Learning

The means and standard deviation for self-regulated learning according to gender and levels of anxiety are shown in Table 6. The statistics revealed that female respondents with low levels of anxiety have the highest mean value (M=4.59; S.D.=0.72) in self-regulated learning. The opposite result however, was obtained for the male respondents, in which a higher anxiety score was commensurated with a higher mean in self-regulated learning (M=5.40; S.D.=0.70).

Table 6

*Self-regulated Learning according to Gender and Levels of Anxiety*

| Gender | Anxiety Level | SRL | |
|---|---|---|---|
| | | Mean | Standard Deviation |
| Male (n=166) | High | 5.40 | 0.70 |
| | Moderate | 5.18 | 0.88 |
| | Low | 5.02 | 1.30 |
| Female (n=156) | High | 4.46 | 0.93 |
| | Moderate | 4.36 | 0.93 |
| | Low | 4.59 | 0.72 |

Note: High ≥4.00; Moderate =4.00; Low ≤4.00; SRL=self-regulated learning; S.D=Standard Deviation

Table 7 shows that among the two independent variables, gender and levels of anxiety, only the former [F (1, 316) =45.45, p< 0.01, eta squared = .12] has a significant main effect. According to Cohen (1988), the effect size was considered moderate (eta squared value =0.12). The results also revealed that there was no significant interaction effect from gender and levels of anxiety on self-regulated learning [F (2, 316) = 2.25, p> 0.05, eta squared = 0.01] (Figure 3). The results suggest that the effect of gender on self-regulated learning does not depend on changes in levels of anxiety.

Table 7

*Effects of Gender and Levels of Anxiety on Self-regulated Learning*

| Source | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Gender | 38.90 | 1 | 38.90 | 45.45 | 0.00** | 0.12 |
| Levelanx | 1.13 | 2 | 0.56 | 0.66 | 0.51 | 0.00 |
| Gender*Levelanx | 3.86 | 2 | 1.93 | 2.25 | 0.10 | 0.01 |
| Error | 270.48 | 316 | 0.85 | | | |
| Total | 7791.73 | 322 | | | | |
| Corrected Total | 309.82 | 321 | | | | |

** Correlation is significant at 0.01 level; Levelanx=Level of anxiety

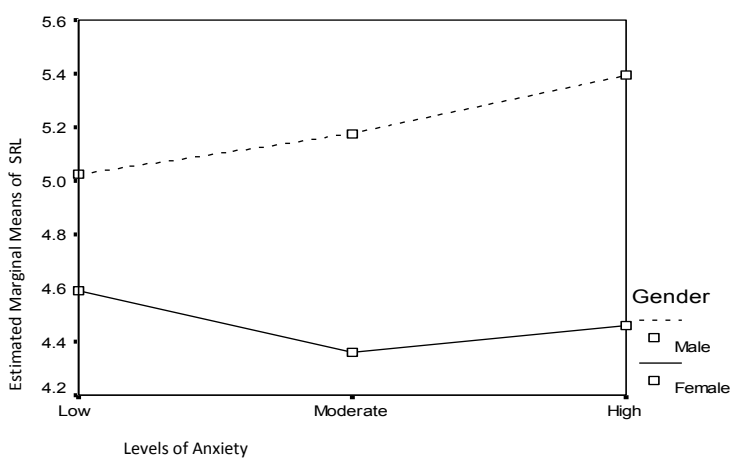


*Figure 3.* Interaction effect of gender and levels of anxiety on self-regulated learning.

## CONCLUSION

Self-regulated learning skills and motivation play important roles in students' performance and are perceived as proximal factors that could lead to academic success (Chandra Shekhar & Rachna Devi, 2012; Cleary, Gubi & Prescott, 2010; Cleary & Platten, 2013; Saleh Ahmed Al Khatib, 2010). Early conceptualizations of self-regulation focused on cognitive and meta-cognitive features and in recent years, motivational beliefs have been integrated into self-regulated learning as prerequisites of strategic learning behaviors, more so in an ICT integrated environment (Lau & Ho, 2015). A number of studies have shown that having learning strategies to improve academic performance is inadequate; students must be motivated to use these strategies (Al-Baddaren, Ghaith & Akour, 2014; Mofrad & Pourghaz, 2015). The findings of this study have reinstated the importance of motivational beliefs on self-regulated learning. The results of the correlational analyses showed that self-regulated learning was positively related to self-efficacy and internal control beliefs but negatively correlated with anxiety. Such findings lend further support to both the Expectancy Value Theory and the Social Cognitive Theory, which propose that motivational beliefs are the underlying premise of self-regulated learning (Cosnefroy, 2008; Perry, Phillips & Hutchinson, 2006; Pintrich, 2000). Consistent with past studies, self-efficacy was found to be the most important motivational belief associated with self-regulated learning (Zimmerman, 1989; Kwon, 2001; Pintrich & Roeser, 1994). The results of the two-way ANOVA further demonstrated significant interaction effects of gender and levels of self-efficacy on self-regulated learning [$\underline{F}$ (2, 316) =3.44, $p<0.05$, eta squared = 0.02]. This suggests that the effect of gender on self-regulated learning depends on the level of self-efficacy. Female and male students' differences in self-regulated learning were due to their differences in the level of self-efficacy. Female students with high levels of self-efficacy engaged more in self-regulated learning as they are more efficacious in managing their own learning activities.

Research shows that teaching methods can improve students' self-efficacy (Frencl & Scheel, 2005). Teachers should encourage active participation of students in the learning processes by establishing

specific, short-term goals that are challenging yet attainable (Schunk & Pajeres, 2002). Specific self-regulated learning strategies such as time management strategy can also be taught to male students to enable them to complete their learning tasks on time and more efficiently. Successful tasks-completion experiences and effective usage of strategies could enhance male students' self-efficacy and self-regulated learning and in turn narrow the gender gap in performance.

This study also found that internal control beliefs have positive and significant relationships with self-regulated learning, with a moderate strength association. Students who believe that they are in control of the learning outcomes are more prone to use learning strategies. This study also found that gender differences in self-regulated learning were not due to differences in levels of internal control beliefs, as revealed by the findings of the two-way ANOVA. This suggests that the effects of internal control beliefs on self-regulated learning is the same for both male and female students. Students have to believe that they have considerable control over their own learning outcomes, and efforts can make a difference. On the other hand, the negative association between anxiety and self-regulated learning indicates that as test anxiety increases, students' self-regulated learning decreases. This is not surprising as anxiety can be a debilitative factor, which causes distraction and disorientation. Students with high levels of anxiety are always worried and not confident about their academic performances, thus, it is a lack of motivation to employ self-regulated learning strategies. These findings are relevant for both male and female students, as found by the two-way ANOVA analysis. The results suggest that in the examination-oriented learning culture such as in most Malaysian schools, regardless of gender, anxiety is a debilitating factor of students' learning. Overall, this study offers insights on the interaction effects between selected motivational beliefs (self-efficacy, internal control beliefs and anxiety), and gender, and self-regulated learning. It may help to develop effective instructional strategies to enhance students' self-regulated learning skills in ICT integrated learning environment and narrow the achievement gap between male and female students in Malaysia (Stoet & Geary, 2015).

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