សង្ខិត្តន័យ—Abstract

អត្ថបទទី១៖ ប្រភពនៃភាពជឿជាក់លើសមត្ថភាពនៃមុខវិជ្ជាវិទ្យាសាស្ត្ររបស់និស្សិតកម្ពុជា៖ និន្នាការ និងលំនាំ

សង្ខិត្តន័យ

ការលើកកម្ពស់ការអប់រំលើមុខវិជ្ជាវិទ្យាសាស្ត្រ បច្ចេកវិទ្យា វិស្វកម្ម និងគណិតវិទ្យា (ស្ទែម) គឺជារបៀបវារៈមួយក្នុងចំនោមរបៀបវារៈអាទិភាពរបស់រាជរដ្ឋាភិបាលកម្ពុជា ក្នុងការអភិវឌ្ឍធនធានមនុស្ស។ ទោះបីជាយ៉ាងណាក៏ដោយ ប្រទេសកម្ពុជាកំពុងប្រឈមនឹងការធ្លាក់ចុះគួរឱ្យព្រួយបារម្ភនៃការជ្រើសរើសមុខវិជ្ជាវិទ្យាសាស្ត្រនៅកម្រិតមធ្យមសិក្សាទុតិយភូមិ ដែលបណ្តាលឱ្យចំនួននិស្សិតចូលរៀនជំនាញស្ទែមធ្លាក់ចុះនៅកម្រិតឧត្តមសិក្សា។ ដូច្នេះ ការសិក្សានេះមានគោលបំណងឈ្វេងយល់ពីនិន្នាការ និងលំនាំនៃប្រភពភាពជឿជាក់លើសមត្ថភាពរបស់និស្សិតកម្ពុជាលើមុខវិជ្ជាវិទ្យាសាស្ត្រ។ អ្នកស្រាវជ្រាវបានជ្រើសរើសនិស្សិតឆ្នាំទី១ចំនួន ៨១៩នាក់ពីសាកលវិទ្យាល័យរដ្ឋចំនួន៤ និងឯកជនចំនួន២ ដើម្បីបំពេញកម្រងសំណួរដោយប្រើប្រាស់វិធីសាស្ត្រជ្រើសរើសដោយចៃដន្យ។ ការសិក្សានេះប្រើប្រាស់ស្ថិតិបែបពិពណ៌នាដើម្បីពិនិត្យលើកម្រិតនិន្នាការនៃប្រភពភាពជឿជាក់ក្នុងមុខវិជ្ជាវិទ្យាសាស្ត្រ និងស្ថិតិបែបសន្និដ្ឋានសម្រាប់វិភាគលើភាពខុសគ្នានៃលំនាំតាមរយៈវិធីសាស្ត្រ Independent Sample *t*-test និងOne-way ANOVA។ លទ្ធផលបានបង្ហាញថា បទពិសោធន៍ដែលទទួលបានពីអ្នកជុំវិញខ្លួនមានកម្រិតខ្ពស់ជាងគេ ហើយប្រភពនៃភាពជឿជាក់៣ផ្សេងទៀតដូចជា បទពិសោធន៍ផ្ទាល់ខ្លួនពីអតីតកាល ពាក្យសំដីរបស់អ្នកនៅជុំវិញខ្លួន និងស្ថានភាពផ្លូវអារម្មណ៍ មានកម្រិតទាប។ ចំណែកឯការវិភាគអំពីភាពខុសគ្នាពីលំនាំនៃប្រភពនៃភាពជឿជាក់បានបង្ហាញឱ្យឃើញថា អាយុនិស្សិត ផ្នែកសិក្សានៅមធ្យមសិក្សាទុតិយភូមិ ឯកទេសសិក្សានៅឧត្តមសិក្សា ស្ថានភាពសេដ្ឋកិច្ចគ្រួសារ កម្រិតនៃការអប់រំ និងមុខរបរឪពុកម្តាយដែលធ្វើឱ្យប្រភពទាំង៤នៃភាពជឿជាក់លើសមត្ថភាពរបស់និស្សិតក្នុងមុខវិជ្ជាវិទ្យាសាស្ត្រមានភាពខុសគ្នា ចំណែកឯ ភេទ និងទីកន្លែងកំណើតរបស់និស្សិតមិនធ្វើឱ្យមានភាពខុសគ្នាទេ។

ពាក្យគន្លឹះ៖ ភាពជឿជាក់លើសមត្ថភាពក្នុងមុខវិជ្ជាវិទ្យាសាស្ត្រ និស្សិតកម្ពុជា ស្ទែម ផ្នែកវិទ្យាសាស្ត្រ នៅកម្រិតមធ្យមសិក្សាទុតិយភូមិ គ្រឹះស្ថានឧត្តមសិក្សា

Sources of Cambodian Students' Science Self-Efficacy: Trends and Patterns

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Abstract

Promoting science, technology, engineering and mathematics (STEM) education is one of the top agendas of the Royal Government of Cambodia for human resource development. However, Cambodia is facing a worrisome decline in enrolment in the high school science track, which may result in less proportion of students who choose to major in STEM-related fields in higher education. Thus, the current study seeks to identify the trends and patterns of the sources of Cambodian university students' science self-efficacy. By utilizing a multi-phase random sampling method, the researcher selected 819 first-year students from four public and two private higher education institutions (HEIs) to participate in a survey. The descriptive statistics was used to examine the trends of the sources of science self-efficacy and inferential statistics was employed to investigate the patterns of science self-efficacy by using the independent sample t-test and one-way ANOVA to determine the significant differences between students' characteristics and the sources of science self-efficacy. The results showed that vicarious experience was rated the highest while the other three sources (mastery experience, social persuasion, and physiological state) were low. With respect to the patterns of the sources, age, high school tracks, university major choices, family socioeconomic status (SES), and parental education and occupations made a significant difference to students' science self-efficacy, while gender and place of origin did not.

Keywords: Science self-efficacy; Cambodian students; STEM; High school science track; Higher education institutions

1. Introduction

The Royal Government of Cambodia (RGC) acknowledges that promoting human resources in STEM-related fields can help the country to realize its vision to achieve an upper-middle-income status by 2030 and a high-income status by 2050 (MoEYS, 2016). As a result, promoting quality human resources in the fields of STEM is on top of the agenda of the RGC. The agenda is clearly stated and emphasized in the National Strategic Development Plan (NSDP) 2019–2023 and Education Strategic Plan (ESP) 2019–2023.

To support and ensure the realization of the government's vision, the Ministry of Education, Youth and Sport (MoEYS) plays a critical role in promoting the quality of education, and more importantly, in producing a skilled and competent workforce in the STEM-related fields because these will be in high demand in the future. As a result, in 2016, MoEYS formulated a policy on Science, Technology, Engineering, and Mathematics education. The vision of the policy is to promote human resources in terms of quality and equity with specific regard to STEM fields to contribute to sustainable economic development in alignment with the Industrial Development Policy (IDP) 2015–2025 (MoEYS, 2016). Furthermore, the policy points out that to achieve the stated vision, some key strategies need to be implemented, such as providing professional development opportunities in STEM- related fields to faculty staff, promoting teaching, nurturing learning, and upgrading infrastructure to support STEM majors in higher education (MoEYS, 2016).

However, there is a worrisome declining trend in students' choice of science track in upper secondary schools. Unambiguously, it is observed that the number of students choosing science track in upper secondary schools has gradually decreased during the last six academic years 2013–2019, while there has been a gradual increase in the social science track (MoEYS, 2020). Although the government has not officially claimed whether this trend is positive or negative, students' choice of science track in upper secondary school was empirically found to affect their choice of STEM-related majors in higher education. Thus, the declining trend in the science track needs to be investigated. Unarguably, this scenario will sooner or later cause concern for the government and policymakers to tackle this issue promptly. As clearly stated in the NSDP 2029–2023, IDP 2015–2025, ESP 2019–2023, and Policy on STEM education, the vision of the government is to promote highly skilled workforce in STEM- related fields to respond to the future demand of the nation to transition itself from the current status of being a middle-income nation to an upper-middle-income nation by 2030 and a high-income nation by 2050. According to the enrollment trends in high schools, the policies and the demand of human resource development are not in agreement. This issue cannot be ignored, and relevant stakeholders need to pay great attention to it.

Previous studies in the context of Cambodia revealed a strong relationship between students' choices of STEM-related majors and their science self-efficacy. It has been found that students who had higher science and mathematics self-efficacy tended to favor STEM fields (Eam, Keo, Leng, Song, & Khieng, 2019; Kao & Shimizu, 2019). However, sources of students' science self-efficacy remain unidentified. Therefore, to fill this knowledge gap and to promote students' enrollment in STEM education, the current study was designed to investigate the trends and patterns of the sources of Cambodian university students' science self-efficacy. Two research questions guided the current study:

1. What is the level of the sources of students' science self-efficacy?
2. Are there any significant differences between students' sources of science self-efficacy and their demographic characteristics?

2. Review of literature

2.1 What is self-efficacy?

Over the last few decades, the self-efficacy theory has attracted the attention of many researchers and scholars (Gwénaëlle, Ellen & Pascal, 2011). Self-efficacy is defined as "beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations" (Bandura, 1995, p. 2). Kumar and Lal (2006) stated that the way an individual perceives and works is influenced by their self-efficacy. Self-efficacy plays an influential role in the way people perform activities and the choices they make. People who perceive low personal efficacy toward tasks tend to escape or quit, while those who feel more efficacious are likely to attempt to put their effort in the jobs with positive personal judgement on their capability (Schunk, 1985).

2.2 Studies on relationship between self-efficacy and academic and career choices

Numerous studies on self-efficacy asserted that self-efficacy plays a vital role in students' academic and career choices (Eam et al., 2019; Hackett, 1985, 1995; Hackett & Betz, 1981; Kao & Shimizu, 2019; Kolo, Jaafar, & Ahmad, 2017; Lent, Brown, & Larkin, 1986; Zeldin, Britner, & Pajares, 2008). In the context of Cambodia, Eam et al.'s (2019) study on factors affecting freshmen's choice between STEM and non-STEM majors revealed that there was a significant relation between students' science self-efficacy and science related majors and students who showed higher science self-efficacy tended to select STEM-related majors at universities. Regarding the relation between self-efficacy and career choices, Zeldin et al. (2008) employing a qualitative study to investigate the self-efficacy beliefs of men in mathematics, science and technology careers found that the selection of these mentioned occupations was significantly influenced by self-efficacy. Similarly, Zeldin and Pajares (2000) who conducted an interview study to explore the self-efficacy beliefs of women in mathematics, science, and technology found that the participants' self-efficacy was the crucial factor contributing to the selection of the mentioned careers. Another study on the role of mathematics self-efficacy in choosing the mathematics-related majors at colleges indicated that science- and mathematics-related college major choices were directly predicted by mathematics self-efficacy (Hackett, 1985). Regarding the role of self-efficacy in career choices, Lent, Lopez, and Bieschke (1991) conducted a study with 138 university students in America to investigate the relationship between mathematics self-efficacy and science-related career choice .They found that the choices related to science careers were significantly predicted by the mathematics self-efficacy. Lent et al. (1986) conducted a study to explore the relationship between self-efficacy and academic and career choices of undergraduate students. Results obtained from linear regression revealed that self-efficacy significantly predicted the perceived career options in technical and scientific areas. According to the empirical evidence drawn from these previous studies, it is clear that self-efficacy influences how students make their future academic and career choices.

2.3 Mastery experience

Bandura (1977) pointed out that an individual's self-efficacy is influenced by four main sources: mastery experience, social persuasion, vicarious experience, and physiological state. Dinther, Dochy, and Segers (2011) stated that mastery experience, considered an influential factor in self-efficacy expectations, refers to an individual's past success in performing certain previous tasks. By completing a job or overcoming a tricky situation, an individual tends to possess positive self-efficacy expectations toward similar tasks in the present. Moreover, even while facing harder tasks, an individual tends to persist when his/her self-efficacy has been increased by past achievements.

2.4 Social persuasion

Social persuasion is another source of personal efficacy in which a person is motivated by others. Although this source is not as influential as the mastery experience, encouragement can help an individual gain more confidence and self-trust to execute a difficult task. However, the persuaders must be careful while giving encouragement because false praise may lead to negative perceived self-efficacy. More importantly, the persuaders should keep in mind that verbal persuasion alone is not effective enough; providing more support to enhance an individual's performance needs to be considered as well (Bandura, 1977).

2.5 Vicarious experience

Bandura (1977) further elaborates that self-efficacy expectations are also influenced by vicarious experience. People not only depend on mastery experience and social persuasion alone to enhance their self-efficacy, but they also depend on learning and observing from others. This means that, through social comparison, people tend to compare their abilities to someone else's in performing a task. By seeing other people's performance, people judge their own abilities and put their efforts on the task. Therefore, modelling can change people's behavior toward performing a task (Bandura, 1977).

2.6 Physiological state

The last source of personal efficacy is physiological state. People who experience fear, stress, and anxiety toward a particular situation tend to perceive their self-efficacy negatively. While facing a threatening situation, such people find it hard and challenging to handle the situation because of the stress. Conversely, individuals who react to situations with positive emotional arousal tend to put in their efforts to the tasks, even though those tasks are challenging (Bandura, 1977).

Overall, according to Bandura (1977), there are four main sources of self-efficacy. However, in the Cambodian context, there is a lack of study exploring details of those sources of self-efficacy although self-efficacy has been found to affect students' choice of STEM majors in higher education (Eam et al., 2019; Kao & Shimizu, 2019).

3. Methodology

3.1 Research sample and sampling

This study employed a quantitative method. A total sample of 819 first-year students were selected through a multi-phase random sampling technique to participate in a survey. There were two steps in the sampling process. In the first step, six HEIs were purposively selected based on the enrolment statistics of foundation year 2017-2018 provided by the Department of Higher Education, MoEYS. In this stage, the researcher selected only the institutions where STEM and non-STEM-related majors were offered. It should be noted that only institutions that offer at least two STEM majors with an enrollment of 40 students or more were considered for the study., There were two reasons for this. First, the researcher attempted to diversify the participants' fields of STEM. Second, it was to secure the sufficient sample size in the study as in reality, some institutions offer fields in STEM, but the number of students is few which might be another concern if those institutions were included in the study. With respect to the non-STEM majors, there were no specific criteria because there are a variety of non-STEM fields offered by each institution, so it is not necessary to set any criteria for inclusion.

In the second stage, the researcher employed random sampling in order to select STEM and non-STEM classes from the six selected HEIs. In this process, firstly, the researcher requested the lists of all classes in each institution and then grouped those classes into STEM and non-STEM accordingly. With these two groups, the researcher started to randomly select two classes from each group. As a result, a total of four classes were selected from each institution.

3.2 Instrument

To measure the four sources of Cambodian university students' science self-efficacy, the study adapted Ellen and Pajares' (2009) measurement which has twenty-four six-point-Likert-scale items (1: definitely false, 2: false, 3: slightly false, 4: slightly true, 5: true and 6: definitely true). The measurement was originally used to measure the sources of mathematics self-efficacy, so all the items were reworded for science domain. After conducting the Factor Analysis, the researcher finally retained 22 items for this study. For mastery experience, one item was removed due to low loading value, so there are five items to measure this subconstruct. Next, like the case of the first subconstruct, one item was also removed from the vicarious experience while six items were retained for social persuasion physiological state, respectively. The Cronbach's alpha value was .883 for mastery experience, .750 for vicarious experience, .934 for social persuasion and .843 for physiological state. The value for the four sources construct was .926, suggesting that the construct was suitable and reliable for the current study.

The researcher translated the questionnaire from English into Khmer language, the native language of the participants, to avoid any misunderstanding and language barrier when the participants filled the questionnaire. To gain a reliable instrument for the data collection prior to the actual data collection, the questionnaire was piloted with 237 students from two private universities located in Phnom Penh and one public university in Battambang province. The result from the pilot showed that the instrument was reliable, with Cronbach's alpha of .850

and from the actual data collection, the value of Cronbach's alpha was .929, showing very high reliability of the instrument for the study (Leech, Barrett, & Morgan, 2005).

3.3 Data collection procedures

Within the scope of the study, two private universities located in Phnom Penh and four public universities—One located in Battambang province and the other three located in Phnom Penh—were considered for data collection. Freshmen pursuing STEM and non-STEM-related majors were the target participants of the study. During the fieldwork, the researcher met the participants in the classroom, and before handing the questionnaire, the participants were introduced to the researcher and were clearly explained about the purpose of the study. More importantly, the researcher read out loud the informed consent to seek for their approval to fill in the five-page questionnaire which had been translated into the Khmer language. Based on the consent form, the unwilling participants could withdraw; willing participants were asked to sign the consent form before filling out the questionnaire. To ensure that the participants clearly understood all the items in the questionnaire, the researcher clearly explained each item to them and stayed in the room until the participants had finished and submitted the questionnaires.

3.4 Data analysis

Statistical Package for Social Sciences (SPSS) Version 23 was used for data analysis. Technically, to obtain the reliable results from the data analysis, the researcher undertook two important steps. Firstly, the scores of the seven items were reversed because of their negative statements. Next, the Exploratory Factor Analysis (EFA) was conducted to test the construct validity of the items that were used to measure the four primary sources. Besides the EFA, Cronbach's alpha was also conducted to confirm the instrument's reliability.

Regarding the analysis methods used, both descriptive and inferential statistics were employed in the study. The descriptive statistics, including frequency, percentage, and means, was used to analyze answers for research question 1 which attempted to identify the trends of the sources of science self-efficacy. To answer the research question 2, inferential statistics was utilized. Specifically, an Independent sample t-test and one-way ANOVA were conducted to identify the patterns of the sources of self-efficacy in relation to students' demographic information.

4. Results and discussions

As shown in Figure 1 below, the results indicated a low to moderate level of students' sources of science self-efficacy. This result suggested that the sources of science self-efficacy did not reflect the realities of Cambodian students, except the vicarious experience which demonstrated a moderate level (M=4.21, SD=.81). This was followed by physiological state (M=3.98, SD=1.04), mastery experience (M=3.77, SD=.1.01) and social persuasion (M=3.47, SD=1.13). In this sense, it could be interpreted that on average, modelling in learning science tended to be one of the good sources of Cambodian students' science self-efficacy. However, according to the mean score of mastery experience, Cambodian students did not perform well in science. In addition, students may not receive praise from surrounding people such as peers,

teachers and parents. With the mean score of physiological state, students' emotional reaction and anxiety toward science learning is another concern. Bandura (1977) hypothesized that mastery experience is the most powerful source of self-efficacy. This hypothesis is not confirmed by the results of the current study as vicarious experience was found the most powerful one.

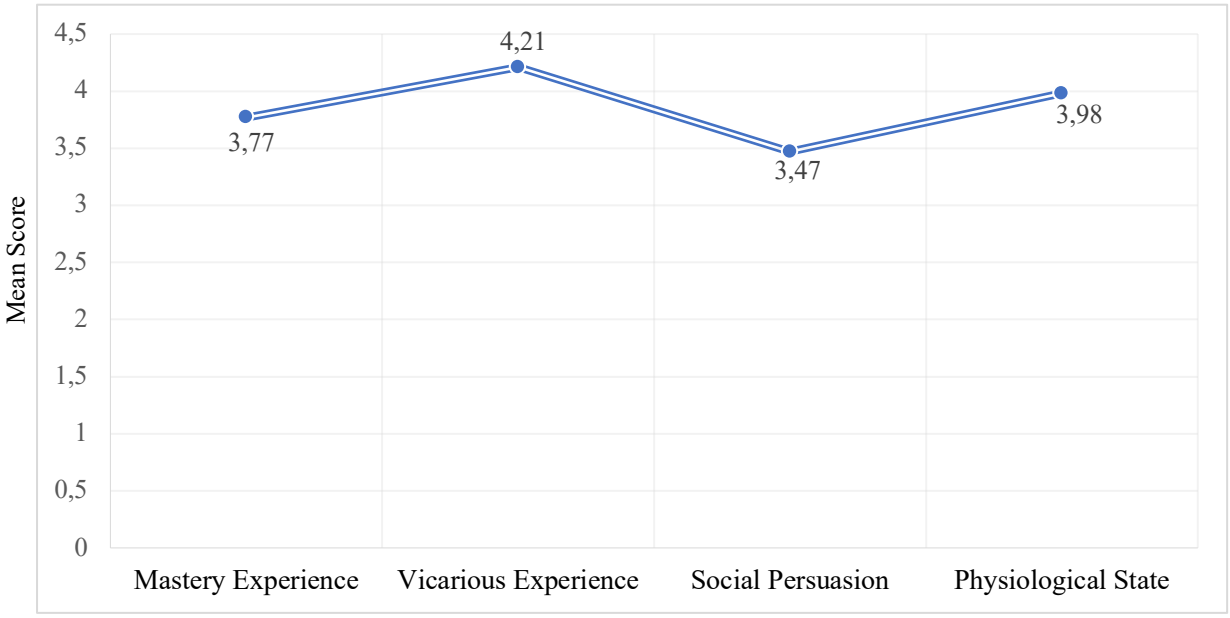

Figure 1. Trends of the sources of Cambodian students' science self-efficacy

The current study also investigated the patterns of the four sources of self-efficacy and its relationship with students' demographic information. The following results focus on the significant differences between each demographic variable and the four sources of self-efficacy, namely mastery experience, vicarious experience, social persuasion and physiological state.

4.1 Gender

According to the result generated from the independent sample t-test, gender did not make a significant difference in the four sources of self-efficacy. Thus, it does not matter whether the students are male or female when considering the sources of their science self-efficacy. The result of the current study was partly inconsistent with a study by Kiran and Sungur (2012) which revealed that gender difference was found in physiological state.

4.2 High school tracks

The result indicated that high school tracks made a significant difference in the four sources. All the students in science track rated the four sources to be true about them. The mean scores of the four sources were (M=4.17, t (453.03) =18.54, p=.000 for mastery experience; M= 4.45, t (459.81) =12.28, p=.000 for social persuasion; M=4.29, t (479.37) =12.46, p=.000 for vicarious experience; and M=4.29, t (479.37) =12.46, p=.000 for physiological state) respectively. Remarkably, the results showed that the social science track students did not think that the four sources of science self-efficacy were true about them because all the mean scores

were under 4. With these findings from the independent sample t-test, it could be interpreted that students who chose science track received good achievement in science, learned from others who performed better, took those people as role models in learning science and lastly did not feel stressed or scared of attending science classes.

4.3 Place of origin

In this study, place of origin refers to students' place of birth which was classified into Phnom Penh (capital city) and provinces. The independent sample t-test revealed that this variable did not make a significant difference in students' sources of science self-efficacy.

4.4 Majors at higher education

The results demonstrated that students who majored in STEM-related fields perceived that the sources were true about them, except social persuasion (for mastery experience, M=4.06, t (804.91) =8.64, p=.000; vicarious experience, M=4.37, t (795.81) =5.58, p=.000; social persuasion, M=3.82, t (817) =9.27, p=.000; and physiological state, M=4.27, t (795.81) =7.24, p=.000). In each source, except social persuasion, the mean scores were above 4 which indicated that three sources were true about them regarding their science self-efficacy. This finding could clearly show that students who decided to take one of the STEM-related fields experienced good performance in science subjects, enjoyed learning the ways of other people learned, and liked science classes.

4.5 Family SES

The result generated from the one-way ANOVA revealed that students who came from the high family SES (monthly income > 600$) rated the four sources true (F=7.85, p=.000 for mastery experience; and F=7.35, p=.000 for social persuasion), except for vicarious experience and physiological state. From this result, it could be interpreted that students may have received a lot of care and encouragement from their parents who had better economic status in learning science. In this sense, perhaps, students received more support in terms of money and study materials from their family whereas the parents who had low family SES could not sufficiently provide similar kinds of support. The result partly concurred with the study by Arslan (2013) which found that students from high family SES rated the items measuring mastery experience highly.

4.6 Age

Age could make a significant difference only in vicarious experience (F=5.09, p=.002). With this respect, students who were in the category of under 18 and between 18-21 groups rated true while the other groups did not. This result is interesting because young students could learn science better when surrounded by others, especially their peers who could be their role models.

4.7 Father's education

The result from One-Way ANOVA indicated that father's level of education contributed to significant differences in their children's sources of science self-efficacy as two of the sources were rated true by the participants (F=4.97, p=.001 for mastery experience; and F=5.64, p=001 for social persuasion), except vicarious experience and physiological state. Students whose parents received higher education chose the answer above *slightly true*. The finding could suggest that father who received higher education tended to help and support their children's learning as well as provide good physical and mental support; as a result, their children performed better in science. The mean scores from the participants could be interpreted that students whose parents received higher education rated the items above *slightly true*. Thus, father's level of education played a critical role in nurturing the sources of students' science self-efficacy.

4.8 Mother's education

Like father's education, mother's education differed significantly in two of the sources (F=6.34, p=.000 for mastery experience; and F=4.08, p=.003 for social persuasion), except vicarious experience and physiological state. The result showed that students whose mother received higher education acknowledged that the three sources, namely mastery experience, vicarious experience and social persuasion were true in their science self-efficacy with the mean scores 4.13 for mastery experience, 4.50 for vicarious experience and 3.81 (almost reached 4 which represents *slightly true*) for social persuasion with the respective levels of significance at .000, .003 and .004, respectively. Like the case of father's education, mother's level of education really mattered in improving students' sources of science self-efficacy.

4.9 Father's occupation

Father's occupation also contributed a significant difference to two of the sources (F=3.55, p=.000 for mastery experience; F=2.80, p=.005 for social persuasion), except the vicarious experience and physiological state. Students whose father worked in non-government organization (NGO) respectively rated mastery experience (M=4.31), vicarious experience (M=4.42) and social persuasion (M=3.92) true in relation to their science self-efficacy at .000, .022 and .012 levels of significance. Thus, the type of job that fathers hold plays a crucial role in enhancing students' sources of science self-efficacy.

4.10 Mother's occupation

Students' mother occupation could make a significant difference in only mastery experience (F=3.38, p=.001) as students whose mother worked in NGOs perceived that mastery experience contributed to their science self-efficacy (M=4.80). This was followed by students whose mother retired from work (M=4.10) for social persuasion at .001 and .009 respectively. Here, mother's employment status was also a major contributor to improving the sources of science self-efficacy, especially regarding students' mastery experience.

5. Conclusions

Based on the findings, the following conclusion can be drawn. Firstly, Cambodian university students' performance is not good from their previous grades. Answers to the questions about mastery experience which asked students to reflect on their past performance in science clearly indicated that students did not receive good science achievements. Secondly, items related to vicarious experience which is about students' observation and learning from surrounding people seems to be one of the good sources of science self-efficacy as the mean score was 4.21. Thus, modelling and learning from other people seem to be a good source of science self-efficacy. Thirdly, given the low mean score, social persuasion seems to help enhance Cambodian university students' science self-efficacy. The result related to physiological state, the last source of science self-efficacy suggests that Cambodian students seem to have negative attitudes toward learning science because their responses indicated their fear and negative emotional reactions to science classes.

With respect to the significant differences between the four sources of science self-efficacy and students' demographic characteristics, in general, there is no gender gap in the sources of science self-efficacy. Moreover, where the students come from, either the capital city or provinces, does not make any difference to their science self-efficacy. These two variables did not differ significantly in the four sources of Cambodian students' science self-efficacy, yet their age, family SES, parental occupations and parental education did. Young students whose ages were under 18 years old and between 18 to 21 tended to follow their role model in learning science which could help them improve their science self-efficacy. With respect to age, students did better in science from the previous grades, learned from surrounding people on how to learn well, felt positive in receiving encouragement and needed emotional support. Last but not least, the result regarding the economic status of students' family and parental educations showed that the higher the income as well as the higher level of education parents received could help contribute to improving students' sources of science self-efficacy.

For further investigation of this issue, future research should consider the students who are in tenth grade since in this grade students do not decide yet between the science and social science tracks. Moreover, future research may explore other key factors beyond the scope of this study. For example, future studies may examine the relationship between science self-efficacy and students' perception toward their classroom teachers as well as teachers' interaction with the students.

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