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*Article*

## **Factors Influencing Students' Choice for Science and Social Science Stream: A Case Study at Upper Secondary Schools**

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### **Abstract**

This research was conducted to explore the factors influencing science and social science stream choices at the upper secondary schools in Cambodia. The study uses semi-structured interview guide to gain the insightful understanding on the factor affecting the stream choices. There are 25 respondents participated in the study through phone interview including school principals, teachers and students in both science and social science stream. The results reveal that there are some critical factors influencing the stream choices such as student factor, family factor, school factor, and other factors including social, economic, friends, university subject and job market. However, there is a concern of failing the grade 12 examination which show the gap between the level of test and students' ability. This trend also indicated the noticeable decrease of science stream choice. Thus, it should be considered on the revision of curriculum design and national examination in both streams, strengthen the student achievement, and provide insightful orientation and motivation from all relevant stakeholders to the students in both streams.

**Keywords:** Cambodia, Science stream, social science stream, upper secondary schools, STEM

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## 1. Introduction

The Royal Government of Cambodia (RGC) has set the Industrial Development Policy (IDP) 2021-2025 which plays an important role to develop Cambodia from lower middle-income country to upper middle-income country by 2030 and to become a developed country by 2050 (Council of Ministers, 2015). Within this ambition, Cambodia has put its great efforts and commitment to shift the country from agriculture-based society to industrial based society. To achieve this vision, it has been placed a great emphasis on the education of Science, Technology, Engineering, and Mathematics (STEM) in promoting national economic as well as human resource development as mentioned in the National Strategic Development Plan (NSDP) 2019 (MoP, 2019). In line with the government's vision and goal, the Ministry of Education, Youth and Sport (MoEYS) has formulated the new generation school policy (NGS) and STEM in 2016 (MoEYS, 2016a, 2016b). These policies were created to promote the education quality in the field of science and to attract more and more students to choose science as a major in the upper secondary schools, especially to continue their study at higher education in STEM major related field. To support the national policy, the Asia Development Bank (ADB) established a five-year project entitled "Upper Secondary Education Sector Development Program II" (USESDP-II) which start from 2020 to 2024 to provide financial and technical support in order to promote education service at upper secondary schools. As mentioned earlier, although the RoGC, MoEYS and ADB have promoting STEM, it has been found that a large proportion of students have increasingly opted for the social science to science stream over the past years at the upper secondary level. The enrollment rate in science stream sharply fell from 94.30% in 2014 to only 38.60% in 2020, whereas the enrollment rate in social science stream significantly increased from 5.70% in 2014 to 61.40% in 2020 (MoEYS, 2020a). Due to a significant decrease of enrollment rate in science stream, the present study is deemed as a crucial mean to rigorously investigate and explain in-depth on what might be the main reasons pushing more students to choose social science stream at the upper secondary level.

Recently, several studies (Kinyota, 2013; Kao & Shimizu, 2019) have investigated factors affecting major choices at higher education. However, these studies focused on only students and the downtrend of STEM- related major choices at higher education. Additionally, only a quantitative approach was employed (see Kao, 2020; Kao & Shimizu, 2020; Sovansopha, 2019; Sovansopha & Kinya, 2020; Sovansopha & Shimizu, 2019). Meanwhile, the current study will specifically focus on factors leading students who choose social science stream

rather than science stream. The results will provide a clear insight into the root causes of a sharp decrease in science-stream enrollment rate to the RGC, MoEYS and especially ADB to find appropriate immediate and future interventions and policy options to attract more students to choose science stream. Moreover, this study aims to explore the factors influencing science and social science stream choices at the upper secondary schools in Cambodia from the different perspective and lead to the way forward to deal with those factors.

## 2. Literature review

The initiative of STEM promotion is the strong effort of the government in producing the human resources in the purpose of transforming Cambodia from agriculture-based country to industry-based country. This has made the flow of education in Cambodia particularly upper secondary education (grade 10 and 12) into two main streams– science stream and social science stream. The students are required to choose the science stream or social science stream in grade 10 and enroll in the class they choose in grade 11. However, they are allowed to change their stream choice when they are in grade 12. The students in both streams are required to study the same subjects. The difference between the two streams are the number of hours in each subject. The science stream students are required to study more hours on science subjects rather than social science subjects while social science stream students are required to study more hours on social science subjects rather than science subjects (MoEYS, 2010).

In addition, various studies (Kinyota, 2013; Kao & Shimizu, 2019) both in the globe and region were found that there are many factors influencing science and social science stream choice in upper secondary education. The study found that male students and female students tend to choose different jobs in their life. The exiting studies (Paik & Shim, 2012, Kinyato, 2013, Li & Kuan, 2018, Buser, Peter & Wolter, 2017) indicates that the gender of the students affected between science stream choice and social science stream choice. In contrast, Paik & Shim (2012) shows that stream choice in upper secondary school revealed that there are 51.1% chances of female students choosing social science stream compared to male students. Similarly, Kinyato (2013) found female students in general did not get a good grade in national examination leading most of them choosing the social science stream compare to male students. In contrast, the study in Cambodia revealed that gender does not affect to the science stream choice. The study indicated that choosing science stream does not have a strong relation with their skill and job in the future (Kao & Shimizu, 2020). Moreover, the study in Taiwan show that female students tend to study science stream and they decided to choose science because they are good at mathematic (Li& Kuan, 2018).

Furthermore, the student's preference also affected to the stream choice in upper secondary school. The study indicated that the students who like to study language and social studies tend to choose social science stream while the students who like to study math and science tend to choose science stream (Paik & Shim, 2012). This was shown similarly to Cambodian context where the students who are interested in science subjects tend to choose science stream (Kao & Shimizu, 2020).

In addition to the student factor, family factors such as parents' qualification (Arslan, 2016; Dustmann, 2004), socio-economic status of the family (Arslan, 2016; Vallejo; 2019, Resh, 1998), motivation and encouragement from family (Kao & Shimizu, 2019) influenced to the student stream choice. Moreover, school factor such as school location (Kao & Shimizu, 2020; Paik & Shim, 2012), school size (Paik & Shim, 2012), and school resources are also found to have an effect on student stream choice.

### **3. Research method**

To deeply understand the reasons behind the decreasing of science stream choice, the insightful information from students of the two streams, teachers, and school principals are very important in finding out the reasons why the students choose each stream for their national examination of grade 12 in upper secondary school in Cambodia. Therefore, this study was conducted using a qualitative case study to have an in-depth understanding with the key informants such as school principals, teachers, and students from both science and social science stream. According to Creswell and Poth (2018), a qualitative case study can develop an in-depth description and analysis of a case. Therefore, it is suitable to use this study approach in this research.

The study was conducted at five different provinces such as Batambang, Koh Kong, Kampong Cham, Mondulkiri, and Preah Vihear. The samples were purposively selected from those provinces which located in the geographical scope of the mountainous area, central plain area, coastal area and highland area of the country. One upper secondary school from each province was purposively selected to be a sample size. In total, there are five upper secondary schools selected for this study.

In each school, there were one school principal, two teachers—one science teacher and one social science teacher, two students (one from science class and another from social science class) participated in the interview. Therefore, there are five participants from each school and 25 participants in total participated in this study.

This study employed semi-structured interview guide which divided into different categories. The open-ended questions are used differently among school principals, teachers, and students. There are 7, 10, and 12 open-ended questions for school principals, teachers, and students respectively which mainly focus on the support, perspective and action to promote science stream choice. All the questions were developed based on the document analysis particularly the decrease in science-stream enrollment which lead to understand on the support, reasons, and perspective as a whole from relevant stakeholders. Moreover, all the questions were piloted in one province where students, teachers, and school principal participated to check whether they were understandable and valid for the study. After piloting, the questions were checked and modified to get fully understanding and be applicable.

The school principals were interviewed to understand deeply about their perspective and support on students' stream choices while teachers were asked about their support, perspective, and their action to promote science stream choice. In addition, in the interview, students were asked to give the reasons why they choose each stream, their understanding on the two streams, and support from relevant stakeholders in choosing the stream. The answers from the three different group of participants were transcribed and analyzed using thematic analysis.

Due to the spread of Covid-19, the data collection was not be able to conduct on face-to-face and instead it was conducted via one-on-one phone interview which took around 30 minutes for each participant. The researcher got the ethical approval from MoEYS before data collection. It took five days to complete the data collection process which started from 20<sup>th</sup> to 24<sup>th</sup> of September, 2021. During the interview, the researcher also asked the permission from the participants to record the answer in the purpose of rechecking and transcribing the data.

According to Creswell and Poth (2018), the data analysis and representation are different among the study approaches. So, for this study, the researcher recorded the data from each participant, transcribed, and put it in the categories. The data were organized in the text form, make a marginal note and using the note to form the codes. The codes were made from the content of the questions in each category and use the categorical codes to establish the themes and finally made a direct interpretation.

## **4. Results and findings**

### **4.1 Student factors influencing choice for science and social science streams**

According to the interview result with students, it indicates that the students from both science and social science class decided to choose the science stream or social science stream

based on their preference and capacity. In this sense, the science students choose the science stream because they like and they are good at those science subject such as mathematics, physics, chemistry, biology and so on. They do not really like the subjects which required them to read a lot or memorize such as geography, history etc. On the other hand, social science student decided to choose social science stream because they love those subjects and they are not good at mathematics. In fact, they clearly show in the following comments:

*I choose science stream because I love those subjects and easy to learn than social science subjects. (SS 01,02, &05)*

*I choose social science stream not because of my friends or others but based on my preference and my ability and avoiding wrong decision, wasting time and could not catch up the lesson. (SSS 02)*

Additionally, the finding from the teachers of the two streams reveal the similarity with the students' answer. They focus on the support and some advices for choosing the stream based on the students' ability, preference and their future goal. Moreover, a few science teachers also mention about the students' decision. In the past, there were some students change their class from science stream to social science stream because of their ability. They afraid that they could not pass the national exam [Pers.Comm. SST]

*Before making the decision on which stream they choose, the students should consider on their ability, preference, and their goal by focusing on their future career. (ST 03&05, SST 05)*

*There are a few students who ask for changing from science to social science class due to afraid of failing the exam and the poor ability. (ST 03)*

Meanwhile, most of the school principals show their support by giving instruction, advice as well as consultation with the students before they make a decision on choosing each stream. From the school principals' perspective, students choose whether science or social science stream based on their tendency, preference, ability, and knowledge of each student on the subjects [Pers. Comm. SP]

*[...] Before choosing the streams, the school principal gives an instruction, orientation, information sheet which approved by parents and giving additional explanation to students. (SP 02 &05)*

*The students choose science or social science stream depending on themselves, their tendency, preference and their own ability. (SP 01&03)*

#### **4.2 Family factors influencing students' choice for science and social science streams**

The interview results with students reveal that both students from science and social science class decided to choose science or social science stream because they got some advices and encouragement from their parents and other relatives in their family. However, most of the parents did not make a decision for their children instead they agree and follow their children's decision. They want their children learn by their own and using their ability because they are so busy with their work. Nonetheless, there are a few parents pay more attention on their children's study through communicating with teachers and school principal [Pers.Comm. SS].

*I choose science stream because my parents want me to be a doctor in the future. Moreover, studying science give me more opportunities to find jobs. They also encourage me to study science due to I am good at science rather than memorized subject. (SS 02 &04).*

Related to this matter, the teachers also mention as following:

*The students choose science stream by discussing with their parents as well as supporting from their family. (ST 02 &03)*

*The students choose social science stream because of their family income which they cannot support them for private class. (SST 02 &03)*

*The students choose social science stream because their parents want them to have a skill and have a job as they want their children do. (SST 04)*

The school principals also mention similarly with the teachers. They said that students choose either science class or social science class by filling the information form which acknowledge by their parents. Students choose social science class because of the encouragement from their parents. The students change their class because of their parents and relatives.

### **4.3 School factors influencing students' choice for science and social science streams**

After getting the answer from the students, both science students and social science students have many opportunities to receive the thorough information on choosing the streams based on their preferences. They also receive that information before making a decision [Pers.comm. SSS]

*[...] the school provide the information to students related each stream with the number of study hour. (SSS & SS 01,02, 03, 04, &05)*

There are similar answers between teachers and school principals which show the information provided by school. The school principals broadly disseminated the information related the division of the two main streams. The teachers also encourage and explain the students to choose the stream and avoid the feeling of failing the exam [Pers.Comm. SP]

*[...] the school principals explain about the importance of each subject before making a decision and check the students' examination result with clearly explanation on the opportunity of finding a good job. (SP02 &03)*

#### **4.4 Other factors influencing students' choice for science and social science streams**

In addition to student, family, and school factor, it has been found that other factors such as future goal, job opportunities, and social factor also affect to the students' choices in choosing the two streams. In fact, according to the interview result, both students from science and social science class choose the stream because of the relevance between the subject they are studying with the subject they want to study in the university. Those subjects are civil engineering, electric engineering, doctor, biology teacher and so on. They choose the stream because there are many job opportunities related the subject, high salary, and the needs of those subjects in the society. Similarly, to the social science students, they choose the stream because they want to continue their study the field, they love in the university within the good opportunity in finding job as well as to deal with social problem they have faced in the present day [Pers. Comm. SS, SSS]

*I choose science class because it is relevant to the skill that I want to continue in the university, I can earn a lot of money, the job I love need science subjects, and the people in my village need someone who has high knowledge in science. (SS 01, 02, 03 &04)*

*I choose social science class because I want to promote our nation, help society, protect poor people and the ones who are vulnerable. (SSS 01, 03 &04)*

Another finding from teachers' perspective, they think that students choose either science or social science stream because of their friend and job market. They also change their class because of their friends.

*The students choose either science or social science stream due to they see the opportunity of job market through observation on their relatives' job and also follow their friends. (SST 02, 04, 05 and ST 01, 02, 03 &05)*

*Some students change their stream based on their friends and they think that passing grade 12 exam is important no matter science or social science. It easy to find a job and continue their study in the private university. (ST 02, 04 and SST 02)*

The school principals also agree that the factors influencing on students' decision are social factor, economic factor and friends.

*The students choose either science or social science due to social factor, economic, and follow their friend because they do not know which subject, they are good at. (SP 01 & 02)*

## **5. Discussions and conclusion**

This study has clearly shown the factors influencing student science stream choice and social science stream choice through having an in-dept interview from the relevant stakeholders. Based on the interview result, the social science students often come from the group of weak learning students, they are afraid of failing the national exam so they tend to choose social science stream which offer them a good opportunity to pass the national examination. They also do not need to spend much money on private tutoring like science stream student. Moreover, the students choose the stream based on their own preference. This result is consistent with the study done by Kao & Shimizu (2020).

Moreover, family factors such as providing an advice to children on their stream choice, family expectation and family standard of living are also driving force for students to choose social science stream. This result intertwines with previous studies such as Kao & Shimizu (2020) and Kinyota (2013).

The result of school factor reveals that teacher's explanation on each subject and stream, and the school guideline before student making a decision also influence the stream choice. Teachers are the ones who stay very closed to students, know their students' performance very well and always stay connected with students to push them to understand the guideline, importance of each stream and help orient them to their dream job by motivate them to choose stream they are interested. This result is in line with the result indicated by Kao and Shimizu (2019).

Promoting national economic and human resource development is the goal of national development agenda which required all relevant stakeholders to pay more attention on education system particularly on STEM education. When the students have a strong basic related STEM major, there will be an increase of possibilities in industrial activities which is a

crucial part of country development. The result of the study indicated that the individual student, family, school and other factors are the driving force to encourage students to enroll in science stream. Therefore, the study has some reflections and suggestions for policy implication as follows.

**Curriculum design and national examination.** MoEYS should consider on revision of curriculum design between science and social science stream especially the national examination. MoEYS should consider on adding some subjects to the national examination and strengthen the test level in order to encourage students to keep studying and working hard on all subjects.

**Strengthening student achievement.** The individual factor refers to the capacity, self-confident and attitude in science and mathematics are very intertwined in science stream choice. Thus, the student achievement strengthening on mathematics and sciences should be included in the priority action plan to increase the science stream participation. Based on teacher interview, the student self-confident reinforcement on their science abilities should be given more attention by all relevant stakeholders because some students show their positive attitude toward science subjects but they are not confident on their ability that is the reason motivating them to choose social science instead of science stream.

**Orientation and motivation.** The motivation from people around such as teachers, school principals, friends, especially parents play an important role in science stream choice as indicated in the result of this study. Therefore, the insightful explanation and orientation on each stream as well as the encouragement from parents and teachers are needed to strengthen the students' learning and possibly attract the students' attention to choose science stream particularly the ones who are good at STEM.

There are some critical factors affecting the science and social science stream choices at Cambodian upper secondary schools. Those factors are student factor, family factor, school factor, and other factors including social, economic, friends, university subject and job market. The student factor refers to the students' ability and preference in choosing the stream which show the strong relevance to the teachers and school principals who provide the support and encouragement to students in choosing each stream. However, there is a concern of failing the grade 12 examination which show the gap between the level of test and students' ability. This trend also indicated the noticeable decrease of science stream choice. Moreover, the exclusion

of some exam subjects has made students not to pay attention to those subjects in school. For example, social science students do not take an exam on science subjects and vice versa.

The main limitation of this study is that it failed to capture the perspective of students' parents both from science and social science stream. This is because the author wanted to hear the opinion from the school level including school principals, teachers, and students. To get rich of information from every angle, the key informant interview with parents should be done.

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