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ABOUT JOURNAL

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MESSAGE FROM EDITOR-IN-CHIEF

I have great pleasure to praise the work and publication of Volume 2, Issue 1 of ***Cambodian Journal of Humanities and Social Sciences (CJHSS)***, which is available in two versions of the languages, both in Khmer and English. Since its inauguration last year, CJHSS received great number of positive feedbacks as well as constructive suggestions for improvement. In this issue, in response to the feedbacks from our advisory board members, reviewers and readers, CJHSS has accepted the third type of paper: policy analysis paper to be published in its future issues. CJHSS will play its pivotal role in promoting the research culture in Cambodia and makes a genuine contribution to sharing scientific knowledge produced by various researchers.

On behalf of the journal editorial team, I would like to express my sincere appreciation to those provided constructive feedbacks for CJHSS's future improvement. Also, I would like to express my deep gratitude to the editorial team, researchers, advisory board, reviewers, and all experts who have contributed to making this work possible. The editorial team and I look forward to any constructive feedback from readers, students, teachers, and researchers for the sake of the improvement of this scientific work with its significance and better quality.

Dr. Phon Kaseka

Editor-in-Chief

CONTENTS

កាលិកបត្រស្រាវជ្រាវមនុស្សសាស្ត្រនិងវិទ្យាសាស្ត្រសង្គម

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Cambodian Students' Motivation to Learn English: A Case Study of a Private University in Phnom Penh

ចលករសិក្សាភាសាអង់គ្លេសរបស់និស្សិតកម្ពុជា: ករណីសិក្សានៃសកលវិទ្យាល័យឯកជនមួយក្នុងរាជធានីភ្នំពេញ

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ABSTRACT

The present small-scale study examined the relationship between integrative and instrumental motivation and English proficiency among Cambodian university students. The participants were seventy-two (n=72) year-one students who learned English as a foreign language (EFL). The data were gathered through a survey questionnaire, an interview, and an English proficiency test. The findings indicated that the students' learning motivation was slightly better in integrative motivation compared to instrumental motivation. In addition, motivational orientations, including integrative and instrumental motivation, were found to be no significantly differences in term of gender. Interestingly, there existed a weak correlation between integrative motivation and English proficiency.

KEYWORDS: instrumental motivation, integrative motivation, English proficiency, Cambodian student

សង្ខឹត្តន័យ

ការសិក្សាស្រាវជ្រាវមួយនេះមានវត្ថុបំណងសិក្សាអំពីទំនាក់ទំនងគ្នារវាងចលកវសិក្សាបែប integrative និង instrumental ជាមួយនិងសមត្ថភាពភាសាអង់គ្លេសរបស់និស្សិតដែលកំពុងសិក្សានៅក្នុងសកលវិទ្យាល័យឯកជនមួយក្នុងប្រទេសកម្ពុជា។ សំណាកស្រាវជ្រាវគឺជានិស្សិតឆ្នាំទី១ ដែលកំពុងសិក្សាជំនាញភាសាអង់គ្លេសនៅសាកលវិទ្យាល័យចំនួន៧២នាក់។ ទិន្នន័យ

ស្រាវជ្រាវទទួលបានតាមរយៈកម្រងសំណួរស្ទង់មតិ ការសម្ភាស និងតេស្តវាស់សមត្ថភាពភាសាអង់គ្លេស។ លទ្ធផលបានបង្ហាញថា និស្សិតមានកម្រិតចលករសិក្សាបែប integrative ខ្ពស់ជាងចលករសិក្សាបែប instrumental បន្តិចបន្តួច។ លទ្ធផលស្រាវជ្រាវក៏បានបង្ហាញផងដែរថា ចលករសិក្សារបស់ទាំងពីរប្រភេទពុំមានទំនាក់ទំនងនឹងកត្តាភេទនោះទេ ដោយនិស្សិតទាំងពីរភេទមានកម្រិតចលករសិក្សាប្រហាក់ប្រហែលគ្នា។ ពាក់ព័ន្ធនឹងទំនាក់ទំនង លទ្ធផលបានបង្ហាញថា ចលករសិក្សាបែប integrative មានទំនាក់ទំនងខ្សោយជាមួយនឹងសមត្ថភាពភាសាអង់គ្លេសរបស់សិស្ស។

ពាក្យគន្លឹះ: ចលករសិក្សាបែប instrumental, ចលករសិក្សាបែប integrative, សមត្ថភាពភាសាអង់គ្លេស, និស្សិតកម្ពុជា

1. INTRODUCTION

According to Iwaniec & Dunn (2020), 1.5 billion people worldwide speak English. So far, English has been used and popularized in two domains: English as a second language (ESL) and English as a foreign language (EFL). It has remarkably and universally continued its exalted status as a leading edge on behalf of a language used extensively for communicative dissemination. That is because of its seminal role as a global language. Crystal (2003, p. 3) stated that English "achieves a genuinely global status when it develops a special role that is recognized in every country." Correspondingly, Kirkpatrick (2010) further posited that it is the lingua franca of Asia and a critical worldwide language.

Over the last three decades, English has grown in popularity in Cambodia, where its expansion is deliberately facilitated through Kachru's (1985) Expanding Circle or EFL. Institutional, governmental, and professional factors in Cambodia are what drive English teaching and learning (Hashim et al., 2014). Since the early 1990s, English has maintained its dominant position in Cambodia. For example, it has been the official foreign language in public and private formal education systems (Moore & Bounchan, 2020). English is the leading foreign language, ahead of others, namely French, Chinese, Japanese, Korean, and Vietnamese (Boun, 2017). Since then, its indispensable acclaim and dominance have generated Cambodian learners' enthusiasm for part-time or full-time formal learning in many foreign language schools and universities since they may be extrinsically encouraged to learn it as a passport to prosperous careers, international communication, scholarship opportunities, and higher education. Cambodian university students may take formal English classes with a certain level of English learning perception. Typically, they may include a state of enthusiasm for or interest in learning English. As English teaching in Cambodia continuously holds a learner-centered approach and promotes communicative language teaching (Neau, 2003), individual understanding differences may contribute to the various reasons to motivate learners to learn English.

Hall (2011) succinctly believed that with some level of motivation, it is easier to picture anyone acquiring a language. Mackey (2014) said that learning a foreign language could have many benefits and that learners can learn a second language (L2) if motivated. Students cannot reach long-term goals without the right motivation, and having a good curriculum and good teachers is not enough to guarantee that students will do well (Dörnyei, 1998). Motivation is theoretically known as a prime determinant of second language acquisition (SLA) (Hernández, 2006). It has a role in a student's ability to acquire an L2 (Wood, 1998). The elements, such as a substantial objective or need, the desire to accomplish the goal, the impression that learning L2 is relevant to achieving the aim of satisfying the need, the belief in the likelihood of learning L2 success or failure, and the value of prospective outcomes or rewards, all contribute to motivation. (Oxford & Ehrman, 1993; Dörnyei, 2001, as cited in Saville-Troike, 2006). Both instructors and academics have primarily regarded motivation as a critical component influencing the pace and effectiveness of SLA or foreign language acquisition (Dörnyei, 1998). According to Krashen's (2002) theory, motivation, viewed as a source of emotional filter factors, significantly boosts L2 acquisition. He further stated

that learners exhibiting a high level of motivation are thought to accomplish L2 acquisition.

Motivation in the context of learning an L2 has been a well-studied topic for the past thirty years. Gardner and his colleagues were the first to study this topic, and they have done the most in-depth research on motivation and how it affects SLA (Bernaus, 1995). Earlier research on motivation for learning was mainly focused on L2 education (James, 2012). In L2 motivation research, different researchers have conceptualized L2 motivation models, ranging from Gardner's socio-educational model (1985, 2001, 2005, as cited in Lai (2013)) to Dörnyei's L2 Motivational Self System (2005, 2009, as cited in Lai, 2013). On the other hand, many English instructors in Asian nations have long neglected inspiring language learners; as a result, learners have been hampered in their ability to utilize English in their daily lives (Sugita & Takeuchi, 2010).

In the same way, not much research has been done on what motivates people to learn English, especially in Cambodian higher education, even though "the position of English as a lingua franca situates it in an almost unique motivational sphere." (Iwaniec & Dunn, 2020, p. 163). Besides, Cambodian instructors seem unaware of their students' motivations or aptitudes. According to the teaching experience of the researcher, it may be presumed that some Cambodian EFL university students learning English have few opportunities and are afraid to interact in English outside the classroom. Thus, the mechanisms by which they are motivated to attain communicative learning seem constrained. In this circumstance, they may get demotivated to study English. With this in mind, this is not a typical scenario, and what and how beyond the desire of Cambodian university students to learn English should be spurred on empirical investigation.

This study will shed light on two educational benefits. The findings should raise awareness of the study setting inside the Department of English. They must assimilate their students' motivation levels due to formal English exposure. At a practical level, this may be a tangible and methodical study with implications for future course curriculum design, instructional practices, and course materials that support learners' motivation to learn foreign languages. Second, since there are few studies on learning motivation in Cambodia, the results will encourage English lecturers to heed their students' learning motivation. The researcher is prompted to be sure that it will motivate Cambodian lecturers to improve and assist Cambodian students' English abilities.

2. LITERATURE REVIEW

2.1. Motivation to Learn a Second Language (L2) Definition

"*Motivation* derives from the Latin verb *movere* meaning 'to move' What moves a person to make certain choices, to engage in action, to expend effort, and to persist in action – such basic questions lie at the heart of motivation theory and research." (Dörnyei & Ushioda, 2011, p. 3). Dörnyei (2001, p. 27) claimed that motivation is an engaging activity. It relates to "why people decide to do something, how long they are willing to sustain the activity and how hard they are going to pursue it." There are different scholars who have provided definitions of motivation. Pintrich and Schunk (1996) defined motivation as "the process whereby goal-directed activity is instigated and sustained" (p. 4). Besides, motivation refers to "an inner drive, impulse, emotion, or desire that moves one to a particular action" (Brown, 1994, p. 152).

The motivation to study any other academic subject differs considerably from the drive to study an L2. This is true because an L2 serves as a code for communication and a symbol of the L2 culture in which it is spoken (Cohen, 2010). Motivation is an impetus for affecting foreign language learning (Dörnyei, 1998). It is somewhat known that motivation determines whether or not a learner can learn a foreign language (Dörnyei, 2001). Spolsky (1989) argued that when a student is motivated, he will devote more time to learning a particular aspect of L2. The definition of L2 learning motivation defined by Gardner (1985) is considered acclaimed. According to Gardner (1985), motivation is the combination of effort and desire to attain the aim of language acquisition and positive attitudes about language learning. Moreover, Gardner & MacIntyre (1993) stated that motivation comprises three components: the desire to accomplish a goal, the work

expended toward that objective, and satisfaction with the activity itself. Mao (2011) emphasized that based on the theories of motivation (Garder, 1985; Gardner & MacIntyre, 1993), the importance of motivation has prompted several scholars to study language learning motivation.

2.2. Motivation Orientation: Instrumental and Integrative Motivation

People developed different motivational theories, such as the social-education theory, the three-level motivational construct theory, and the social-cognitive theory. Motivation is typically divided into two categories: intrinsic, extrinsic, integrative, and instrumental. This study, based mainly on the work of Gardner & Lambert (1972), looks at how learning an L2 can be made more interesting. Gardner & Lambert (1972) identified two major types of motivation: integrative and instrumental. These are addressed in the social-educational model (Gardner, 1985). Similarly, Lukmani (1972) stressed that students' motivations for learning a new language should be divided into integrative and instrumental categories.

Integrative motivation means that a person wants to learn a language to become part of the culture of those who speak it. In other words, learners should put in much effort to learn the language of a valued L2 community to talk with the group. For example, learners with integrative motivation like to learn English to understand it well, learn more about English speakers, and fit in with English-speaking societies like those in the US, UK, or Australia.

Instrumental motivation and integrative motivation are not always incompatible (Brown, 2000). *Instrumental reason*, conversely, implies that a student is intrigued to learn the language for specific goal incorporation, such as passing an exam, obtaining a job, or meeting other requirements (Winke & Brunfaut, 2021). It is instead called a functional objective (Thornbury, 2006). Language learners with instrumental drive recognize the benefits of social and economic aspects through L2 awareness.

Hamp-Lyons (1983) pointed out that, even though further research is needed, past studies demonstrate that instrumental motivation can be just as effective as integrative motivation in language acquisition. However, Gardner & Lambert (1972) echoed that integrative motivation is more productive for SLA. In the same vein, teachers and parents in Asian and non-Asian countries constitute a critical role in the integrative drive for SLA (Yu & Downing, 2012).

2.3. The Relevant Studies

According to a review of the literature in the linked articles, there have been numerous research studies on motivation in various settings, particularly EFL. Most studies showed that university students exhibited instrumental and integrative drives; however, the vast majority indicated more instrumental than integrative motivation. A few subsequent studies also revealed an association between English proficiency and learning motivation, including instrumental and integrative motivation.

Lim (2012) explored Cambodian EFL motivational orientation and proficiency. The primary purpose of his investigation was to examine the instrumental and integrative motivation of a sample of university students majoring in English, as well as possible relationships between motivational orientation and English proficiency. This mixed methods research adopted a motivation questionnaire, while an interview was later employed. The findings indicated that instrumental motivation was the primary reason students learned English. However, a negative association between students' motivation and English proficiency was later reported.

Chumcharoensuk (2013) did a study to compare the different ways Thai and Cambodian first-year English majors were motivated to learn English. This mixed methods study examined the similarities and differences in motivation between two groups of learners. The research tools, including a self-report questionnaire and interview, were used during data collection. The findings revealed that while most Thai and Cambodian students were instrumentally motivated to learn English, there were differences, as most Cambodian undergraduates showed integrative motivation towards English learning.

Choomthong & Chaichompoo (2015) used a modified version of Gardner's Attitude/Motivation Test Battery (ATMB) (2004) and a semi-structured interview to find out how and why Thai university students want to learn English. The samples were

1475 juniors. The findings revealed that learners' integrative and instrumental motivations were both high, with the instrumental motivation slightly higher than the integrative motivation.

Degang (2010) examined the level and sorts of English learning motivation of Thai undergraduate students (n=50). He initially utilized an adjusted 20-item questionnaire from Gardner's (1985) AMTB. The reports indicated that the students were highly motivated, both instrumentally and integratively, to learn English, although it was found that integrative motivation was more slightly than instrumental motivation.

In China, Liu (2007) discovered Chinese university students' attitudes towards and motivation to study English and the relationships between their attitudes and motivation and English proficiency. The researcher administered an adapted 44-item questionnaire from Gardner's (1985, as cited in Liu, 2007) and Clement et al.'s (1994, as cited in Liu, 2007). Two hundred and two non-English major undergraduate students participated in this survey. The results revealed that the samples had positive attitudes toward English and were engaged in instrumental and integrative motivation to study it. In addition, their attitudes and learning motivation were associated with their English proficiency.

Samad et al. (2012) examined how motivated Iranian EFL students were and how well they spoke English. The study's main goals were to look at two types of motivation: instrumental motivation and integrative. A hundred respondents were invited to complete the modified AMTB questionnaire. It was found that the majority of students (58%) had instrumental motivation, and the integrative reason was statistically significant (r =.72), except for the instrumental cause (r=.35). A finding additionally revealed that the high-ability students were highly integrative-motivated.

Oranpattanachai (2013) explored the motivation of Thai undergraduates in English classes. The main objectives were to determine integrative motivation and instrumental motivation. With 420 samples, this investigation utilized a motivation questionnaire and English course scores. The results showed that integrative and instrumental motivations existed among students. Also, integrative motivation was significantly different from instrumental motivation.

In their 2011 study on English motivation, Ghanea et al. looked at the link between Iranian EFL learners' integrative and instrumental motivation and how well they learned English. The samples comprised 128 undergraduate students from Shiraz Azad University majoring in English as a foreign language. Two main instruments were employed to collect the data. They were a language proficiency test and a questionnaire determining a motivation scale. The correlation coefficient and *t*-test were employed to examine the obtained data. The three key results were indicated, respectively. First, there was a significant correlation between integrative and instrumental motivation and English proficiency among Shiraz Azad University EFL students. Secondly, there was no relationship between instrumental motivation and integrative motivation. Thirdly, neither males nor females were associated with all types of the mentioned motivations.

Vaezi's (2008) research project is to describe and study the integrative and instrumental reasons why Iranian college students learn English as a second language. For the study, 79 students who did not study English as their major were chosen and asked to fill out a questionnaire about why they wanted to learn English. They were given a modified 25-item survey to determine which of the two types of motivation they were more likely to use. The results showed that Iranian students were more motivated by what they could get out of learning English. They were also very motivated and had good attitudes about it.

2.4. Research Objectives and Questions

In this way, the main goals of this study were to find out the levels of instrumental and integrative motivation Cambodian EFL learners use to learn English and to see if there is a link between motivational orientations and English proficiency. As a result, the above goals will be met by answering the guided research questions below:

(1) What are the levels of motivation of Cambodian EFL students?

(2) What is the difference between male and female students' motivational orientations to study English?
(3) What is the correlation between integrative and instrumental motivation and students' English proficiency?

3. METHODOLOGY

3.1. Research Design

This section discusses the methodological issues of the present study. The quantitative paradigm has dominated L2 motivation research for over four decades (Dörnyei & Ushioda, 2011). L2 motivation researchers affirmed that mixed methods research is academically a budding means for further L2 motivation studies (Dörnyei, 2007; Dörnyei & Ushioda, 2011; Kim & Seo, 2012, as cited in Zhang & Kim, 2013). In this study, the researcher argued that it might provide a well-deserved method to explore motivation to learn English in a Cambodian higher education setting. This study used a mixed methods approach, emphasizing categorization in the explanatory sequential design. Prioritized and finished first are the quantitative data collection and analysis, followed by a small amount of qualitative data for clarification and elaboration (Creswell, 2012).

3.1. Research Site and Participations

The current study's only territory was a private university in Phnom Penh, Cambodia. The researcher chose to perform the study at the site due to its ease of access for data collection. As the researcher is a part-time English lecturer there, he wanted to ascertain the adult learners' motivation for English study. Marshall & Rossman (2010) recommended that researchers have a much better chance of getting to their research site if they know the area well. Additionally, based on the current literature review, just a few research studies have been conducted in universities, regardless of whether they are private universities or colleges. Thus, this research elucidates further results in the context of private education. The researcher investigated 72 young adult students who were juniors (from two classes), all enrolled in one university. As for demographics, they were comprised of 42 female (58.3%) and 30 male (41.7%) year-one students who were taking a Bachelor's degree in Education in Teaching English as a Foreign Language (TEFL) at the time of the study (the academic year 2022-2023) using convenient sampling. They were drawn because they have some experience learning English and may express negative or positive attitudes towards learning English. Khmer is their mother tongue, and their ages range from 17 to 42, with an average age of 20.

3.2. Instrumentation

3.2.1. Questionnaire

According to the recommendation from Iwaniec & Dunn (2020), questionnaires should be considered for gathering information about language learning motivation. The electronic questionnaire-based survey, the primary tool, was employed using Google Forms and centered on probing the students' views on the kinds of motivation for learning English. The two casual-relationship variables, integrative and instrumental motivation, were assessed by the adopted questionnaire, which was based on Degang's (2010) self-reported questionnaire that had been modified from Gardner's Attitude/Motivation Test Battery (AMTB) (1985, as cited in Degang, 2010) and Liu's questionnaire (2005, as cited in Degang, 2010).

The motivational survey consisted of two sections using a five-point Likert scale. The first is the demographic data section (gender and age). The second one is comprised of 20 statements related to two major types of motivation, namely integrative motivation and instrumental motivation. Among those, ten items are about instrumental motivation (items 1-10), and integrative motivation comprises ten items (items 11-20). The respondents could respond to each statement by selecting only one answer among the five choices: *strongly agree* (5), *agree* (4), *neutral* (3), *disagree* (2), and *strongly disagree* (1). All items of the online questionnaire were entirely written in English because the research participants, whose major is English, were strongly assumed to have acute questionnaire comprehension.

According to Degang (2010), a panel of experts and language specialists once examined the questionnaire. Also, the researcher re-verified it to ensure that it would be finely and contextually adopted. The reliability coefficient of the adopted

questionnaire using Cronbach's alpha was .84, which is high.

3.2.2. Interview Protocol

Semi-structured interviews were used to gather qualitative data about the students' motivational orientations, such as integrative and instrumental motivation. Merriam (1998) said that one of the benefits of the semi-structured interview is that it gives the interviewees some power and control over the interview. Each person asked to participate was invited to talk about and explain important things and experiences related to learning English openly and honestly. Interview protocols with guided questions were made and changed based on the researcher's experience teaching English and a literature review. The researcher checked content validity, language clarity, and language appropriateness. The interview was conducted in Khmer since the first language is subject to the authenticity of the informants' perceptions and experiences in learning English. For further analysis, the researcher transcribed the data emanating from the interviews.

3.2.3. English Proficiency Test

A modified TOEFL ITP practice test was administered to assess students' English abilities. Due to the researcher's vast teaching expertise on-site, he determined that the test was contextually relevant and applicable to the participants. It comprises sixty items in total and covers different listening, vocabulary, grammar, and reading sections.

3.3. Instrument Administration

After finding a group of students who were all in an English-language undergraduate program at a private university in Cambodia, the researcher started evaluating the gatekeeper. He sought permission from the university's dean of the English Department, where this research was conducted. Once allowed, the researcher employed collective administration. He approached students from two separate classrooms and invited them to participate in the study. After informing the learners about the purpose, confidentiality, and voluntary nature of the survey and ensuring they completely understood the simplified survey procedure explanation, the English proficiency test and electronic questionnaire via Google Form were sent to them to fill out in their classrooms. The students were informed that their survey participation would not affect their final evaluation (semester result), nor was it required to include their names as part of the biographical information. To avoid bias, the researcher encouraged them to be truthful in their responses and stressed that no answer was better than any other one. The time allowed for taking the test was ninety minutes, and they were granted thirty minutes to complete the online questionnaire.

The semi-structured interviews were conducted only once, based on the students' availability after administering the online questionnaire and English proficiency test. Each typical interview session lasted between thirty and forty minutes. Eight informants (four males and four females) were chosen randomly. They were well informed of the intent of the interview and relevant ethical issues. Each interview was audio-recorded accordingly, following the informants' permission.

3.4. Data Analysis

Before answering any of the study questions, normality tests were done to see if parametric tests were the right way to process concrete data. Descriptive statistics were generated on the integrative motivation and instrumental motivation to seek replies from student participants in terms of frequency, percentage, mean scores (M), and standard deviation (SD).

The researcher adopted the interpretation of the score by Degang (2010), as depicted in Table 1. The mean was utilized to analyze the average scores for each variable as well as the sum of the mean scores for all items relating to the degree and kind of motivation.

Table 1
The interpretation of score (Degang, 2010)

Scale	Mean Range	Level	Score Range
5	Strongly Agree	Highest	4.50 - 5.00
4	Agree	High	3.50 - 4.49
3	Moderate	Moderate	2.50 - 3.49
2	Disagree	Low	1.50 - 2.49
1	Strongly Disagree	Lowest	1.00 - 1.49

The normality test, which is shown in Table 2, shows that the data on English proficiency scores,

instrumental motivation, and integrative motivation were not normally distributed. This means that the non-parametric method needs to be used.

The Wilcoxon Signed Ranks Test was performed to see if integrative and instrumental motivation statistically differed. The researcher also used the Mann-Whitney Test to determine if there was a difference between the mean scores of male and female students on integrative and instrumental motivation. Finally, Spearman's rank correlation coefficient was conducted to better understand the possible relationship between students' enthusiasm to study and their English competence.

Table 2
Test of normality

Tests of Normality			
	Shapiro-Wilk		
	Statistic	*df*	*Sig.*
Score	.960	72	.022
Instrument	.949	72	.005
Integrative	.891	72	.000
Total Motivation	.841	72	.000
a. Lilliefors Significance Correction			

The interview transcripts were transcribed and analyzed qualitatively. This was done by counting the frequency of the answers, which might better explain the entire data set. Simply put, the purpose was to find out if the information the samples wrote about themselves in the questionnaire matched what they said in person. It is worth mentioning that pseudonyms were used to refer to the interviewees in the following sections.

4. FINDINGS AND DISCUSSION

4.1. English Major Students' Levels of Motivation to Learn English

A mean analysis was computed to answer research question one about the students' levels of motivation when they are learning English in Cambodia's higher education.

Table 3
Mean values of each type and overall motivation

Motivation	*M*	*SD*	Degree
Instrumental	3.51	.05	High
Integrative	3.90	.79	High

As demonstrated in Table 1, the mean score for all motivational types fell between 1 (the lowest level) and 5 (the highest level). Table 3 indicated that the total mean for all items of instrumental and integrative motivation was 3.51 and 3.9, respectively, which similarly indicated a high level of motivation. The interpretation of such results was that to learn English at the university, the students postulated both types of orientation, including instrumental and integrative motivation; however, the latter has a slightly higher mean value than the former.

When further unpacked in qualitative data, the quantitative findings were primarily supported. On top of the instrumental orientation, all interviewees (n=8) shared a similar view by reporting that they predominantly perceived the significant role of English not only in Cambodia but also in the world.

People today are more likely to have an international attitude. It includes being interested in foreign or international affairs, being willing to live or work abroad, being ready to communicate with people from other cultures, and not being ethnocentric about other cultures (Yashima, 2002). Because of what the informants said, they did not doubt the usefulness of English, which has been growing a lot in Cambodia over the past few decades. As a result, university graduates are encouraged to get good jobs at government institutions, private companies, and schools that teach English as a foreign language. What is more, they will be able to travel abroad where English is spoken. To complete their academic tasks and self-study, which are of the utmost importance, they could have access to plenty of information from sources on the Internet. Interestingly, the most preferred career among the eight interviewees is an English teaching position. In addition, most interviewees (n=6) revealed a shared motivator: high classroom engagement in learning English. As an illustration, they actively and variously engaged in English learning activities, mainly aiming to obtain high scores on formative assessments such as homework, class participation, assignments, and achievement tests. For example, two interviewees stated the following:

> "Frankly speaking, I love English. If I cannot use English in the next few years or even from now on, I might not be able to get a good job. The reason is that English is a highly sought-after foreign language for most employers in Cambodia. I am taking two

> concurrent degrees, and English is my chosen one. I hope to be a full-time staff member at any company and a part-time teacher of English to earn much more money to support myself and my family."
>
> "I always work in pairs or groups assigned by my lecturers. I like sharing ideas and other relevant information with them. Also, I usually read my textbooks in English, such as Literature Studies or Core English, although I do not spend time reading other materials at home. What I know is solely about getting high scores at the end of the semester."

Regarding integrative motivation, all informants (*n*=8*)* shared a convergence of ideas about personal interests and passion for learning English. All the interviewees' learning experiences in English lasted at least three years. Two-thirds of the interviewees noted that they merely appreciated English, Cambodia's most eminent foreign language. Despite sometimes being nervous when learning English in class, they are happy and particularly enjoy learning it. Two informants (*n*=2) articulated that they have been, to some extent, influenced by the culture of Westerners, so they unavoidably found English intriguing. Moreover, two students displayed passive sociocultural language contact, which is not involved in direct communication with L1 speakers (Dörnyei, 1990, as cited in Lim, 2012). They habitually watch English movies and listen to songs in English. This was exemplified in the following illustrative quotes:

> "Sometimes I feel that speaking English makes me proud in front of other people. I am enthusiastic about behaving and acting like a foreigner. It does not mean such a show-off, but rather my preference. I use English to communicate with Khmers and foreigners, especially tourists."
>
> "I prefer watching movies in English. There are subtitle attachments so that I can follow up on any mispronounced words or sentences. It is helpful since I can improve my listening ability and learn a new way of life."

At this point, interviewees were mostly interested in personal interests or affinities, getting to know the target culture and blending into it, career prospects, communication, and study opportunities.

Using what we learned from both data types, the students had two kinds of motivation: instrumental and integrative at a high level. Two main reasons might account for such results. Based on this, the first plausible justification is that all students were predominantly determined to study English for integrative and instrumental purposes. Many scholars (e.g., Belmechri & Hummel, 1998; Dörnyei, 1994; Huang & Wen, 2005; Qin & Wen, 2002; Ushioda, 1996, as cited in Liu, 2012, p. 18) have manifested that instrumental and integrative motivation is not 'opposite ends of a continuum.' Liu (2012) further explained that both motivations are associated with sustaining language learning.

As Hashim et al. (2014) stated, English is a '*cultural capital*' notion in Cambodian society. English is the foreign language that develops the Cambodian economy (Igawa, 2008). Hence, Cambodian students are instrumentally motivated to maximize future career enhancement, study-related needs, or communication opportunities. It endorsed a study by Hum (2018), who reported that Cambodian university students were primarily prompted to believe that English revitalized their studies and jobs.

Considerable studies have contradicted the findings of this section. A plethora of studies expressed that university students' instrumental motivation slightly outperformed their integrative motivation (e.g., Al-Ta'ani, 2018; Choomthong & Chaichompoo, 2015; Dhakal, 2018; Kitjaroonchai & Kitjaroonchai, 2012; Liu, 2007; Tanjitanont et al., 2020; Vaezi, 2008), while the results of this showed that motivation was slightly more integratively oriented than instrumentally. A study undertaken by Degang (2010) corresponded to this result, pointing out that integrative motivation slightly outweighed instrumental motivation. Nonetheless, both motivational orientations were similar at a high level. Several works consistently echoed this result (e.g., Assavanadda & Tangkiengsirisin, 2018; Degang, 2010; Kashefian-Naeeini et al., 2018; Tanjitanont et al., 2020).

In addition to the finding thereof, another statistical treatment was employed to determine if there was any significant difference between the two sources. From Table 3, though there was slight difference in means of integrative motivation and instrumental motivation, the statistical significance proved that the difference in the two motivation was valid (*Z=-4.775*, *p =0.00*), from which it can be evident that the Cambodian EFL students were more integratively

motivated to learn English at the said university. This finding contradicted other previous studies (e.g., Zanghar, 2012; Choubsaz & Choubsaz, 2014), which revealed that a significant association between both variables was not confirmed.

Furthermore, this result was congruent with other studies that showed that there was a significant correlation between instrumental and integrative motivation; however, the mean score of instrumental motivation was higher than that of integrative motivation (e.g., Wang, 2010; Ghanea et al., 2011; Vaezi, 2008; Lim, 2012; Dhakal, 2018).

Table 4
Differences between instrumental and integrative motivation on Wilcoxon Signed Ranks test

Test Statistics[a]	
	Integrative - Instrument
Z	-4.775[b]
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Both types of motivation propelled the students toward English learning. Such a result might justify the empirical finding by Gardner and MacIntyre (1991), who pointed out that instrumentally and integratively motivated learners performed better than others who were not so motivated. The samples' propensity to familiarize themselves with native speakers, the target language community, or their affinity for English-speaking people may be the main factor explaining the outcome. However, they may not be able to interact regularly with native English speakers in Cambodia. In the interviews, three informants explained that the Cambodian community could hardly directly communicate with foreigners who spoke English, except for those who could be reached only in major cities, namely Phnom Penh and Siem Reap.

Interestingly, Lim (2012), who expanded on his discussion of why Cambodian college students might be integratively motivated, might shed light on the result of this section. He believed they might possess the ideal L2 self of being proficient in English. In this respect, they could raise more awareness of the culture of English speakers in which they are interested. Dörnyei (2009) indicated that the learner's ideal L2 self is a clear and accurate depiction of whom they wish to become; moreover, it can be applied to describe the motivational environment in a variety of learning circumstances where there is minimal or no contact with native speakers of the target language.

4.2. Differences between Male and Female Students of Motivational Orientations in Studying English

The Mann-Whitney test was used statistically to see if there was any possible correlation between males and females in terms of motivation to learn English. The findings similarly reported a non-significant difference between females and males in light of two sources, including instrumental and integrative motivation. Hence, there were no differences between males and females in their integrative motivation and instrumental motivation to study English. They would exert similar effort in their English learning at the university.

Like the quantitative data, the interview data showed that both male and female interviewees are interested in learning English for their own sake and helping others. They said they were ready to learn English and improve it by doing things like English-learning tasks or classroom activities and practicing English outside of class. Other studies (like Qureshi et al., 2018; Dhakal, 2018; and Ghanea et al., 2011) that came to similar conclusions (like Qureshi et al., 2018; Dhakal, 2018; and Ghanea et al., 2011) back up this result.

People often think women have an advantage over men when learning a new language. Additionally, this commonsense assumption is borne out by research (Heinzmann, 2009). For instance, according to past studies rigorously reviewed by Henry (2011), males were less motivated to learn L2 and had less favorable attitudes regarding the target language's speakers and cultures. Henry (2011) underpinned the sociocultural aspect, which might indicate whether gender is related to motivation. One premise that led to the explanation was that both male and female Cambodian learners showed an equally strong desire to learn English for various purposes.

4.3. Correlation between Motivational Orientation and Students' English Proficiency

A Spearman's rank correlation coefficient was used to find out if there was a link between achievement in studying English and both types of motivation.

Table 5
Spearman correlation matrix

	1	2	3
1. Instrument Motivation	—	.310**	-.010
2. Integrative Motivation		—	.243*
3. Students' English Scores			—

**. Correlation is significant at the 0.01 level [2-tailed].

Table 5 suggested a weak [r=*.243**] positive relationship between the English test scores and integrative motivation. From the findings, we may be able to conclude that while the students are more integratively motivated to learn English, their test scores tend to increase accordingly. Furthermore, the specific results in Table 5 showed that the student's English proficiency had nothing to do with instrumental motivation, no matter how good the student was at English; however, this conclusion may need to be verified with larger sample study.

Integrative motivation in L2 learners may encourage them to learn about the target language's history, culture, society, and a wide range of other topics on their own. Consequently, for those SLA learners, studying a language is a joy. L2 learning and integrative drive, according to Gardner, are significantly correlated (Wang, 2014). Samad et al.'s (2012) study confirmed this result because only integrative motivation was related to a student's proficiency. Such a result justified the claim that integrative motivation is more effective for SLA (Gardner & Lambert, 1972; Gass & Selinker, 2001). Nonetheless, these closer results did not align with Lukmani's (1972) study, which revealed that the test scores were significantly associated with instrumental but not integrative motivation.

5. CONCLUSION

This study aimed to determine the motivation levels to learn English and the correlation between motivational orientations and Cambodian EFL students' English proficiency. The findings showed that the students were integratively as well as instrumentally motivated in learning English. It supported the assertion of most papers that students are both instrumentally and integratively focused when learning a foreign language. Moreover, it was reported that integrative motivation had a minimal relationship with English proficiency. Due to the results, it is axiomatic that English classroom teachers should promote motivation, especially integrative orientation. Teachers who understand motivation are vital in stimulating students' integrative motivation.

5.1. Pedagogical Implications

The results present a picture that contributes to further literature on motivation, particularly in the Cambodian context. Even though integrative and instrumental dominance exists in this study, proper motivational enhancement is crucial to ensuring that both types of motivation, especially integrative motivation, will be sustained. Moreover, learners persistently indicate their appreciation of English and its cultures, and being highly proficient is crucial (Kitjaroonchai & Kitjaroonchai, 2012).

An implication is intercultural communicative competence, which cultivates integrative motivation. This means that English teachers should focus on cross-cultural teaching awareness, help students understand that learning English should be a way of life, and give students more freedom by giving them tasks related to real life. Also, authentic textbooks and other teaching materials (Jin, 2014) should be used to create a classroom community where people use the target language to learn about and share English culture. Incorporating extracurricular activities is an asset to boost learners' motivation (Denault & Guay, 2017). English debate, English-speaking competitions, student media, and English learning clubs with the involvement of native or native-alike lecturers and an English learning environment should expose and familiarize the students with hands-on experience and communication and arouse their interests. Since some samples in this study have problems mastering English vocabulary and grammar, teachers should consider teaching new words and grammar in context. Teachers should consider flipped classrooms (Afzali & Izadpanah, 2021), language games during a lesson (Yaccob & Yunus, 2019), and gamified learning (Hashim et al., 2019), which were implicatively suggested by previous studies that students were both engaged and motivated to learn grammar.

5.2. Limitations of the Study

A few possible limitations of the research should be noted. Because this small-scale study looked at the participants learning English at one university, generalization sounds impossible and impracticable enough for other university learners. For this reason, the researcher strongly suggested that further studies should only be more conclusive in different academic contexts with the triangulation of multiple data sources, namely journal writing, field notes from classroom observations, focus group interviews, and a larger sample. Besides, the link between motivation and language proficiency empirically requires longitudinal investigation. Iwaniec & Dunn (2020) suggested that a longitudinal study should be concrete and further explain the correlation between motivation and language outcome, meaning that motivation and language proficiency can grow stronger or weaker throughout language learning.

Since research on motivation in Cambodia remains scant, subsequent studies should be undertaken considering the following suggested directions: Firstly, future research might extend this present study by examining the possible correlation between motivation and other variables, such as self-regulation, self-efficacy, language learning strategies, language learning styles, language anxiety, and the experience of learning English. Similarly, various motivational models with more advanced research techniques should be employed to investigate motivation's more comprehensive role in learning English. The study of more than one setting or institution with diverse non-English majors and groups of participants may yield more notable results and be more generalizable.

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APPENDIX A

QUESTIONNAIRE

Part I: Personal Information

1. Gender: ( ) Male ( ) Female

2. Age:____ years old

Part II: Motivation Types

Instruction: Please choose one alternative by ticking in each statement below according to your degree of agreement or disagreement. 5=strongly agree; 4=agree; 3=neutral; 2=disagree; 1=strongly disagree.

A. Instrumental Motivation

Statements	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
1. I mainly focus on using English only for class assignments and exams.					
2. I simply quote the English textbooks and do not really communicate myself when speaking or writing in class.					
3. I am interested in reading only textbooks for my university study, but not other English texts e.g., newspaper, and magazines.					
4. I am more interested in earning an English-medium university degree and a good job than learning the English language itself.					
5. I am more interested in furthering my higher education than learning the English language itself.					
6. Learning English is important for travelling abroad.					
7. Learning English is important for making me a knowledgeable and skilful person.					
8. Learning English is important for making me an educated person.					
9. Being proficient in English can lead to more success and achievements in life.					
10. Being proficient in English makes other people respect me.					

B. Integrative Motivation

Statements	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
11. Studying English enables me to understand English books, movies, pop music etc.					
12. Studying English enables me to better understand and appreciate the ways of life of native English speakers.					
13. Studying English enables to be able to keep in touch with foreign acquaintances.					
14. Studying English enables me to discuss interesting topics in English with people from other national backgrounds.					

15. Studying English enables me to transfer my knowledge to other people e.g. giving directions to tourists.					
16. Studying English enables me to participate freely in academic, social, and professional activities among other cultural groups.					
17. Studying English enables me to behave like native English speakers: e.g. accent, and using English expressions.					
18. Studying English enables me to appreciate English arts and literature.					
19. Studying English helps me to be an open-minded and sociable person like English-speaking people.					
20. I am determined to study English as I can to achieve maximum proficiency.					

APPENDIX B

INTERVIEW GUIDES FOR SEMI-STRUCTURED INTERVIEWS

1. What is your experience of learning English?
2. Why do you pursue a Bachelor of Education in English?
3. How do you generally think about English?
4. What are your main reasons for learning English?
5. Do you make an effort to improve your English? Why or why not?
6. What is your main goal in learning English? Why?
7. What are the things that motivate you to learn English? How?
8. What do you feel when learning English?
9. What are your best ways to learn English effectively?
10. Who are the people motivating you to study English? Explain?
11. What are some learning tools and ways to learn English?

កាលិកបត្រស្រាវជ្រាវមនុស្សសាស្ត្រនិងវិទ្យាសាស្ត្រសង្គម

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Challenges and Solutions to Teaching and Learning Science at Upper Secondary School in Cambodia

បញ្ហាប្រឈមនិងដំណោះស្រាយចំពោះការបង្រៀននិងរៀនមុខវិជ្ជាវិទ្យាសាស្ត្រនៅថ្នាក់មធ្យមសិក្សាទុតិយភូមិនៅកម្ពុជា

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ABSTRACT

This study aimed to assess the current situation of human resources and school facilities to support teaching and learning science in Cambodian public high schools. This study surveyed 240 science teachers and 45 principals. The data analysis employed descriptive statistics such as mean, standard deviation and percentage, and inferential statistics such as t-test, One-Way ANOVA, and Chi-Square to examine the association of some demographic variables, including gender, school type and location. The results revealed that Cambodian high schools have suitable infrastructure, incorporating libraries, science-laboratory rooms, computer labs, internet connection, clean water, toilet and electricity. However, ordinary high schools lack laboratory materials and computers for students to learn and use to support their learning. The insufficient number of classrooms and science teachers leads to a large class size and a high student-to-teacher ratio. Cambodian high school science teachers had sufficient knowledge in their subject content matter and pedagogical skills to teach the subjects. However, they did not indicate strong confidence in being an expert in their major. Cambodian

high school science teachers possessed sufficient knowledge of basic ICT regarding administration work, social communication, and professional development. They have trivial knowledge of advanced ICT and did not indicate the effective use of ICT. The Ministry of Education, Youth and Sport of Cambodia should put more effort and investment into enhancing effective schools for science education and developing a comprehensive science teacher education program to produce effective teachers who can adopt ICT to teach science subjects effectively.

KEYWORDS: effective school, effective teaching, science education, science teachers, Cambodia

សង្ខិត្តន័យ

ការសិក្សានេះមានគោលបំណងវាយតម្លៃស្ថានភាពបច្ចុប្បន្ននៃធនធានមនុស្ស និងបរិក្ខារសាលារៀនដែលជួយសម្រួលដល់ការបង្រៀននិងរៀនមុខវិជ្ជាវិទ្យាសាស្ត្រនៅថ្នាក់មធ្យមសិក្សាទុតិយភូមិនៅកម្ពុជា។ ការសិក្សានេះបានធ្វើការស្ទង់មតិគ្រូបង្រៀនមុខវិជ្ជាវិទ្យាសាស្ត្រចំនួន 240 នាក់ និងនាយកសាលាចំនួន 45 នាក់។ ការវិភាគទិន្នន័យធ្វើឡើងដោយប្រើប្រាស់វិធីស្ថិតិពណ៌នាដោយបង្ហាញលទ្ធផលជា តម្លៃមធ្យម គម្លាតស្តង់ដារ និងភាគរយជាដើម។ ទិន្នន័យត្រូវបានវិភាគដោយប្រើប្រាស់វិធីស្ថិតិសន្និដ្ឋានដូចជា t-test, One-Way ANOVA និង Chi-Square ដើម្បីពិនិត្យមើលការទំនាក់ទំនងរវាងអថេរប្រជាសាស្ត្រមួយចំនួនដូចភេទ ប្រភេទសាលារៀន និងទីតាំង។ លទ្ធផលបានបង្ហាញថា វិទ្យាល័យនៅក្នុងប្រទេសកម្ពុជាមានហេដ្ឋារចនាសម្ព័ន្ធសមស្រប ដោយមានបណ្ណាល័យ មន្ទីរពិសោធន៍វិទ្យាសាស្ត្រ បន្ទប់ពិសោធន៍កុំព្យូទ័រ បណ្តាញអ៊ីនធើណិត ទឹកស្អាត បង្គន់អនាម័យ និងអគ្គិសនីសម្រាប់ប្រើប្រាស់។ ក៏ប៉ុន្តែ វិទ្យាល័យធម្មតាមានការខ្វះសម្ភារៈមន្ទីរពិសោធន៍ និងកុំព្យូទ័រសម្រាប់សិស្សរៀន និងប្រើប្រាស់សម្រាប់ទ្រទ្រង់ការសិក្សារបស់ពួកគេ។ ចំនួនថ្នាក់រៀន និងគ្រូបង្រៀនមុខវិជ្ជាវិទ្យាសាស្ត្រមានចំនួនមិនគ្រប់គ្រាន់នាំឱ្យមានចំនួនសិស្សច្រើនក្នុងមួយថ្នាក់ៗ និងសមាមាត្រសិស្សគ្រូខ្ពស់។ គ្រូបង្រៀនវិទ្យាសាស្ត្រនៅវិទ្យាល័យនៅកម្ពុជាមានចំណេះដឹងគ្រប់គ្រាន់លើខ្លឹមសារមុខវិជ្ជាឯកទេសរបស់ពួកគេ និងជំនាញគរុកោសល្យសម្រាប់បង្រៀនលើមុខវិជ្ជាឯកទេសនោះ។ លទ្ធផលក៏បង្ហាញថាគ្រូបង្រៀនវិទ្យាសាស្ត្រថ្នាក់វិទ្យាល័យនៅកម្ពុជាមានចំណេះដឹងគ្រប់គ្រាន់លើបច្ចេកវិទ្យាព័ត៌មាន និងទំនាក់ទំនង(ICT) ជាមូលដ្ឋានទាក់ទងនឹងការងាររដ្ឋបាល ទំនាក់ទំនងសង្គម និងការអភិវឌ្ឍន៍វិជ្ជាជីវៈ។ ពួកគេមានចំណេះដឹងតិចតួចអំពីបច្ចេកវិទ្យាព័ត៌មានកម្រិតខ្ពស់ និងមិនអាចប្រើប្រាស់ជំនាញបច្ចេកវិទ្យាព័ត៌មានក្នុងការបង្រៀនឱ្យមានប្រសិទ្ធភាពនោះទេ។ ក្រសួងអប់រំ យុវជន និងកីឡាកម្ពុជាគួរខិតខំប្រឹងប្រែង និងវិនិយោគបន្ថែមទៀតក្នុងការលើកកម្ពស់សាលារៀនប្រកបដោយប្រសិទ្ធភាពសម្រាប់ការអប់រំមុខវិជ្ជាវិទ្យាសាស្ត្រ និងបង្កើតកម្មវិធីអប់រំគ្រូបង្រៀនវិទ្យាសាស្ត្រឱ្យបានគ្រប់ជ្រុងជ្រោយដើម្បីផលិតគ្រូបង្រៀនប្រកបសមត្ថភាព អាចប្រើប្រាស់បច្ចេកវិទ្យាព័ត៌មានផ្សេងៗ ដើម្បីបង្រៀនមុខវិជ្ជាវិទ្យាសាស្ត្ររបស់ខ្លួនប្រកបដោយប្រសិទ្ធភាព។

ពាក្យគន្លឹះ: ប្រសិទ្ធភាពសាលារៀន, ប្រសិទ្ធភាពការបង្រៀន, ការអប់រំវិទ្យាសាស្ត្រ, គ្រូបង្រៀនវិទ្យាសាស្ត្រ, កម្ពុជា

1. INTRODUCTION

Cambodia is one of the countries with the fast economic growth in the world. Her economy has sustained an average growth rate of 7.7 per cent between 1998 and 2019 (World Bank, 2021). To keep growing at this high pace, Cambodia needs thousands of engineers and technicians (Khieng, Srinivasa, & Chhem, 2015). Cambodia has become a lower-middle-income country since 2015 and is aspiring to become an upper-middle-income country in 2030 (World Bank, 2021). Science has become a part of the prioritized agendas to promote the economic and social development of the country as specified in the Cambodia Industrial Development Policy 2015-2025 (Royal Government of Cambodia, 2015).

Aligning with the ambition of the Royal Government of Cambodia, the Ministry of Education, Youth and Sport (MoEYS) has made great efforts to reform the

education system to promote education in general and science in particular by supporting and implementing the tracking education system at high school since 2010, directing students towards either the science track or the social science track, developing the secondary resource centres (SRCs) in 2011, reforming the national exam from 2014, promoting STEM (Science, Technology, Engineering and Mathematics) education and New Generation School (NGS) policies in 2016, as well as increasing teacher salary. These boil down to the logic that Cambodia needs science and science-related workforces and citizens to serve the labour markets and its economic goal and to be capable of being lifelong learners at a higher level of education or her workplace.

On the other hand, the efforts made by the MoEYS have not made significant improvements yet. Cambodian students have still performed low in science. The National Assessment 2018 showed only 20% of Cambodian 11th-grade students achieved a basic level or higher in Physics (MoEYS, 2019b). Similarly, the results of the Program for International Student Assessment for Development (PISA-D) showed only 5% of the 15-year-old students (equivalent to high school grade 10) attained merely a minimum proficiency level (i.e., level 2 of the 6 PISA proficiency levels) in science. Teaching quality was argued as the main factor accounting for low achievement (MoEYS, 2018).

School facilities were also a concerning topic while addressing teaching and learning quality. Cambodian school infrastructure has been seen as relatively poor and under-resourced, even worse in rural areas (MoEYS, 2018) and has slowly been developed. Nationwide, there are 741 high schools, of which 75% are public schools. Most public schools (i.e., 74%) are in rural areas (MoEYS, 2021). Beginning with the Education Sector Development Project 2 (ESDP2), launched in 2011, eighteen public schools were converted to SRCs consisting of two science labs, two computer labs with internet services, an e-library and a large seminar room. Followed by three other projects for a decade, the number has increased to as many as 67 schools in total, equivalent to about 12%. In addition, the functioning of SRCs has been under-investigated and under-improved due to the insufficient operation budget and low teacher competency in laboratory skills. As part of the educational reform in 2014, New Generation Schools (NGS) were established with better facilities. As for 2023, there are 6 (less than 1%) NGS high schools in Cambodia.

Regarding ICT for Education, the Education for All National Plan 2003-2015 was an unprecedented official document of Cambodia that mentioned ICT policy in Cambodian education. Since then, significant strategic policies, plans, projects and programs have been documented and implemented concerning ICT in education. One of the specific goals is to enhance the quality of teaching and learning through ICT integration. Although much effort has been made over these last two decades, ICT usage in teaching and learning remains limited (MoEYS, 2019a), as can be seen in the baseline statistics of the Education Strategic Plan (2019-2023) showing only five per cent of upper secondary schools used ICT as a supporting tool in teaching and learning. Fortunately, enormous efforts and investments in distance learning during the COVID-19 outbreak have fostered digital transformation and proliferated ICT in education in Cambodia (Heng, 2021; Thy, Ly, & Ean, 2023). However, the current situation (i.e., after the re-opening of the schools) of ICT facilities and usage in high schools remains uncovered.

Furthermore, science subjects have gradually been losing their popularity among high school students. The number of student enrolments in the science track dramatically dropped from around 94% in 2014 to about 39% in 2019. On average, about 54% of those who chose the science track passed the National Grade 12 Exam between 2015 and 2019 (Ing, 2019). This trend seems to be reversed to what MoEYS intended to attain despite MoEYS's efforts. These rationales motivate the authors to conduct this study to understand the current situation of science education in Cambodia. The present study aims to determine the challenges facing teaching and learning in science at upper secondary education in Cambodia, centring around human and infrastructure resources and propose appropriate improvement solutions. Therefore, this study seeks to answer two questions:

- Does the current situation of human and infrastructure resources in schools facilitate teaching and learning science in Cambodia?
- How do Cambodian high school science teachers perceive their knowledge and skills about the subject matter, and ICT to teach their subject?

2. LITERATURE REVIEW

The quality of teachers defines the quality of education. Teachers and their role are central to discussion among education policymakers (Hanushek & Rivkin, 2006). The quality of teachers can be measured by effective teaching (ET), which is the most outweighing determinant of student learning in the classroom (Sanders & Rivers, 1996). ET requires good teaching that requires teachers to have strong background knowledge of the subject matter: their content knowledge (CK) and pedagogical content knowledge (PCK) (Kleickmann et al., 2013). While CK represents teachers' understanding of the subject matter, PCK is the knowledge needed to make the subject matter accessible to students (Shulman, 1986). This knowledge is the key component of teacher competence that supports teachers' instructional practice as well as student learning (Kleickmann et al., 2013).

In addition, the world today is in the industrial revolution 4.0 period, where the rapid advancement of ICT affects all aspects of society, and education is not an exception. Knowing the subject matter would not be enough for a teacher. Teachers should know about ICT and be able to utilise it to improve teaching and enhance student learning (Noor-Ul-Amin, 2013). Particularly for science subjects, ICT interventions can be used to enhance the practical investigation (i.e., ICT-based experiment) or as a virtual alternative to real practical work (i.e., simulation) (McFarlane & Sakellariou, 2002; Smetana & Bell, 2012). Therefore, knowledge about ICT should also be considered an essential criterion for being a qualified science teacher in the current era and future.

On the other hand, the subject matter, pedagogy, and ICT knowledge are regarded as internal factors of teachers. Several external factors also contribute to ET. While teaching and learning require the existence of teacher and student, the teacher-student interaction is the most critical to ET (Koc & Celik, 2015). Two factors that affect teacher-student interaction in the school are class size (the number of students per class) and student-to-teacher ratio. When class size is big, students are less likely to interact with teachers and vice versa. There is less teaching on a one-to-one basis. Teachers have less time to focus on students, while students have less time to actively attend teacher activities during class (Mishel et al., 2002; Schanzenbach, 2014). This is in a similar vein to the student-to-teacher ratio. Class size and student-to-teacher ratio are generally associated with each other, sometimes considered the same. They both are strongly associated with the number of classrooms and teaching staff available in the schools; however, they are different. Even though the class size is small, the student-to-teacher ratio can still be high, depending on how many classes a teacher is responsible for.

Besides, school facilities such as science laboratories, computer labs and Internet connection, library, clean water and sanitation, and electricity are essential and indirectly and directly contribute to an effective school (Murillo & Román, 2011). Science laboratories allow teachers and students to do various laboratory activities as part of the teaching and learning process. The laboratory has become a distinctive feature of science education (Hofstein, 2017). Science laboratories directly affect students' attitudes and academic performance as per the instructional theory of learning interaction (Pareek, 2019).

The computer is a prominent ICT tool and is becoming increasingly more effective in supporting secondary education (Murillo & Román, 2011). A computer with an internet connection enables students to explore, create, connect, and build digital literacy. The students can access real-time and up-to-date knowledge (e.g., new scientific discoveries) and resources such as science simulation software and videos. In this regard, schools should have computer labs with internet connection for students, especially in developing countries where most students cannot afford a computer. More importantly, the effectiveness is associated with the student-to-computer ratio, where the fewer the ratio, the better (Murillo & Román, 2011).

Libraries have also served crucial roles in teaching and learning. Fundamentally, a library is an organized set of resources, which includes human services as well as the entire spectrum of media (e.g., text, video, hypermedia) (Marchionini & Maurer, 1995). These resources have their role to support and improve teaching and learning (Kuhlthau, 2010; Murillo & Román, 2011). Williams et al. (2013) studied the impact of the school library on learning. The results revealed that school library is an attribute to improving academic attainment, successful curriculum or learning outcomes and positive attitude towards learning.

Electricity is crucial for everyday school operations, including lighting and powering all electrical and electronic devices to support administration things and the teaching and learning process. Last but least, water and sanitation are unarguably important indicators for an effective school. Poor availability and access to water and sanitation are major health concerns and constitute a principal barrier to quality education in schools and narrowing the gender gap in education (Jewitt & Ryley, 2014; Sommer, 2010). Agol & Harvey (2018) reported that the lack of toilets and water sources puts girls at a higher risk of dropping out of school than boys. Poor water and sanitation particularly emphasized the challenges of girls in managing their menstrual hygiene (Jewitt & Ryley, 2014).

Profile of Cambodian Public High Schools

There are three types of public high schools in Cambodia, including Ordinary High Schools (OHS), Secondary Resource Schools (SRS) and New Generation Schools (NGS). OHS and SRS are non-autonomous schools that fixedly follow the Cambodian national curriculum. Teachers and staff are assigned by the Ministry of Education, Youth and Sport (MoEYS). OHS have a relatively poorer infrastructure, which generally lacks science laboratories and computer labs. SRS have a better infrastructure with a resource building that consists of two science labs, two computer labs with internet services, an e-library and a large seminar room. In addition, SRS receive extra budget and technical support for teacher professional development. NGS are semi-autonomous and can generate some income in addition to government subsidy, modify the curriculum to suit their context and recruit teachers and staff as needed and wanted. NGS are richer in infrastructure, especially related to ICT. Every teacher receives a laptop computer, a monthly bonus on top of the state salary and technical support from a local non-government organization (NGO). Therefore, although all three schools are public schools incorporating the same prototype, they practically have different conditions, e.g., receiving support differently, technically and financially.

3. METHODOLOGY

3.1. Research Sample

The selection of participants followed three steps of the sampling process, as the following. Firstly, the researchers purposively selected one province from each of the four regions of Cambodia (the Tonle Sap, the coastal and sea, the central plain, and the mountain) and the capital city. Due to the budget constraint, only one best province that represented the uniqueness of its region was selected. Therefore, the researcher decided to do it purposively. In addition, the capital city was in the central plain; however, its characteristic was far different from other provinces in the same region. Secondly, four high schools from each chosen province, with the criteria of being two urban schools and two rural schools, were purposively and conveniently selected, whereas, for the capital, two downtown and two suburban schools. Thirdly, the selection of teachers and school principals followed a convenient sampling method, where all approachable science teachers in each selected school, during administering the survey, were requested to participate in this study. It is worth noting that the procedure was trying to collectively cover the characteristics of the sample as much as possible, aiming to have a representative sample of the population. When the sample size required was small, together with the complicated nature of Cambodia's geography, employing a random selection method cannot guarantee that all these characteristics are included proportionally in the current study. This study's participants were 285, of which 240 were teachers and 45 were principals and vice-principals.

3.2. Research Instrument

The study employed a survey research method. There were two questionnaires used to collect data: the principal questionnaire and the teacher questionnaire. All were developed by researchers and consisted of two sections.

- The principal questionnaire had 21 questions in total, asking about demographic information, school facilities and statistics of students and teachers.
- The teacher questionnaire had two sections. The first section has 9 questions about demographic information and access to ICT, and 4 questions for school infrastructure assessment, asking the teacher to rate the science-laboratory rooms[1], the sufficiency of material recourse for teaching and learning, the library, and the toilet between 0 to 10, ranking from very bad (0 score) to very good (10 scores). The second section has 11 Likert-type items asking about teachers' knowledge of their subject matter, pedagogy and ICT. Thirteen items were adopted from the work of De Freitas (2018) and modified to suit the Cambodian context, and five items were developed by the researchers. The thirteen items are 5 point-scale items (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

The instruments were reviewed and approved by a team of science teacher educators and members of the Commission of Research Development and Innovation of the National Institute of Education (NIE) in Cambodia for content validity.

3.3. Data Collection and Analysis

Teachers filled out the questionnaire, while the principal and vice-principals were interviewed (i.e., interview survey method). The raw data collected from the questionnaire were entered into a Microsoft Excel spreadsheet and cleaned. The data analyses were performed using the Statistical Package for the Social Sciences (SPSS v.25). The data analysis employed descriptive statistics such as mean, standard deviation and percentage, and inferential statistics such as t-test and One-Way ANOVA, Chi-Square to examine the association of some demographic variables, including gender, school type and location.

4. RESEARCH FINDINGS

Descriptive Statistics

The total number of teachers who participated in this study was 240, of which 44.6% were females, with an average age of 40.4 (*SD = 8.15*), and 11.8 years (*SD = 8.99*) of teaching experience. Most teachers are holding a bachelor's degree (80.0%) followed by a master's degree or higher (14.6%). The number of principals was 45, and 26.7% were females.

Table 1
Number of participants by qualification

	Teachers No. (%)	Principals No. (%)
12+2	11 (4.60)	0 (0)
Bachelor	192 (80.0)	26 (57.8)
Master or higher	35 (14.6)	18 (40.0)
Other	2 (0.80)	1 (2.20)
Total	240 (100)	45 (100)

The average age was 48.62 (*SD = 7.30*) with about 9.52 (*SD = 5.27*) of experience as a principal. About fifty-eight per cent of the principals hold a bachelor's degree and 40.0% hold a master's degree or higher (Table 1).

Research Question 1: Does the current situation of human and infrastructure resources in schools facilitate teaching and learning science in Cambodia?

School Facilities

School principal's data illustrated that all schools have a library and toilets, 78.9% have science-laboratory rooms, and 78.9% possess computer labs. Internet connection is available in all of the schools, and about 95% of schools have access to electricity and clean water.

[1] Authors use science-laboratory rooms instead of science laboratories because most schools in Cambodia reserve a few rooms for laboratories based on Cambodian school standards, and they are generally just empty rooms.

Teachers were asked to evaluate the science-laboratory rooms, the sufficiency of material resources for teaching and learning, the library, and the toilet. The results were summarized in Table 2. Overall, teachers rated 4.90 for the science-laboratory rooms, 4.85 for the sufficiency of laboratory materials, 7.27 for the library, and 6.10 for the toilet. This assessment showed the scores were relatively high for the library and moderate for the toilet assessments, while the scores were relatively low for the science-laboratory rooms and the sufficiency of laboratory materials, and there are big gaps between schools. NGS received up to 8 points, while SRS was 5.52 points and 3.38 points for OHS. Moreover, schools in the capital were rated over the average (6.04), while the schools in other locations were below average, 4.73 and 4.03 for urban and rural, respectively. The overall student-to-room ratio was 44.2. However, the numbers varied greatly due to school locations (Table 3). The ratio in schools in the capital was up to 77.1. This shows that the schools in the capital were lacking rooms for usage as classroom.

Table 2

Assessments of the laboratory, material resource, library and toilet by school types and school locations

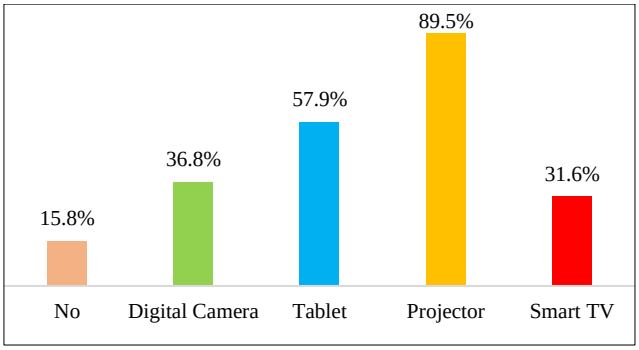
	Laboratory Rate Mean (SD)	Material Resources Rate Mean (SD)	Library Rate Mean (SD)	Toilet Rate Mean (SD)
		School Types		
NGS	8.04 (2.01)	8.00 (1.91)	7.14 (1.65)	6.60 (2.33)
SRS	5.52 (2.69)	5.25 (2.84)	7.03 (1.89)	6.00 (2.54)
OHS	3.38 (3.06)	3.58 (2.98)	7.61 (1.82)	6.09 (3.22)
P-value	< ***.000***	< ***.000***	.102	.596
		School Locations		
Capital	6.04 (3.23)	5.96 (3.46)	6.81 (1.71)	6.46 (2.53)
Urban	4.73 (3.09)	4.66 (2.98)	7.19 (1.88)	6.12 (2.85)
Rural	4.03 (2.90)	4.11 (2.82)	8.33 (1.54)	5.50 (3.04)
P-value	***.007***	***.011***	***.002***	.294

Similarly, the student-to-classroom ratio was 43.4. The number of students per class was not statistically significantly different due to region. For schools in the capital, especially, the number of students per class was about 50.4. This indicated that the schools in the capital implemented a shift system (i.e., morning-shift and afternoon-shift classes). However, the number differed due to school types (Table 3). NGS was significantly the lowest ratio (*Mean 33.4, SD = 0.59*).

On the other hand, the student-to-computer ratio was 55.0. The numbers were spread extensively across school types (Table 3). NGS have the least ratio (15.1), whereas ordinary high schools (OHS) have the highest ratio (70.0). Schools also have some other electronic devices other than the computer, including projectors, smart TVs, tablets and digital cameras, in which about 90% of schools have projectors and about 60% have tablets to serve for teaching and learning, while, about 16% of schools have no extra electronic device (Figure 1).

Figure 1

Other electronic devices available in schools



Teacher and Staff

Overall, 53.8% of the teachers own a computer, 12.1% own a tablet, and 96.3% own a smartphone. Figure 2 shows percentages of teachers who own these devices and access to the Internet categorized by type of

school. Regarding computer availability, around 90% of NGS teachers own a computer, while about 50% of SRS and OHS teachers do. In addition, more than 95% of the teachers had a smartphone and 94.2% had access to the Internet. On average, the student-to-staff ratio was 17.4, and the student-to-teacher ratio was 20.5. This situation was not different for all school types and locations (Table 3).

Figure 2

Percentage of teachers owning electronic devices and access to the Internet by school type

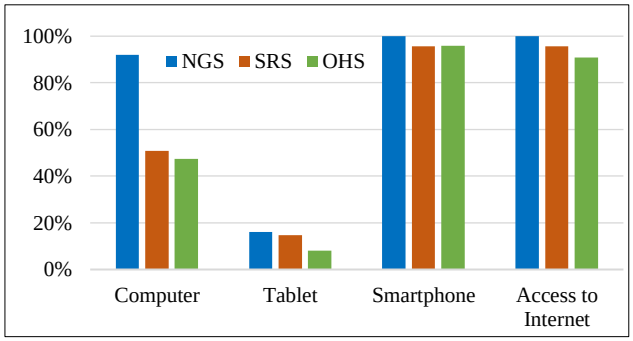


Table 3

Ratios of students to teacher, room, classroom and computer by school types and school locations

	Student-to-Staff Ratio Mean (SD)	Student-to-Teacher Ratio Mean (SD)	Student-to-Room Ratio Mean (SD)	Student-to-Classroom Ratio Mean (SD)	Student-to-Computer Ratio Mean (SD)
			School Types		
NGS	14.0 (1.47)	17.9 (3.42)	34.8 (12.8)	33.5 (0.59)	15.1 (6.32)
SRS	18.2 (7.51)	22.3 (7.17)	42.3 (23.9)	44.4 (7.42)	57.5 (34.8)
OHS	17.8 (3.82)	20.1 (4.09)	47.7 (21.9)	45.2 (11.8)	70.0 (39.0)
p-value	*.098*	*.193*	*.403*	***.036***	***.026***
			School Locations		
Capital	18.6 (4.00)	21.3 (3.88)	77.1 (30.0)	50.4 (22.7)	53.1 (64.7)
Urban	16.1 (5.92)	19.4 (5.86)	35.6 (12.3)	40.6 (5.27)	39.5 (22.3)
Rural	20.1 (3.60)	23.0 (4.09)	44.2 (13.8)	45.8 (5.06)	79.8 (51.0)
p-value	*.063*	*.081*	***.005***	*.323*	*.216*

Research Question 2: How do Cambodian high school science teachers perceive their knowledge and skills about the subject matter, and ICT to teach their subject?

About 72.5% of teachers stated that they have sufficient knowledge about their subject matter. About 44.6% considered themselves an expert in their major. About 69% of teachers confessed that they had pedagogical knowledge and skills to help students better understand the content of their subject matter. The results showed no statistical difference among gender, school type and school location.

Regarding knowledge and skills in ICT, the data shows that 59.6% of the teachers affirmed that they knew how to use social media such as Facebook, YouTube, Telegram, etc., and 54.2% knew how to use online conferencing tools such as Zoom, Google Meet, Microsoft Teams, etc. And about half of the teachers believed that they could update their knowledge and skills in their field from various sources on the Internet. However, only one-third of the teachers said they knew about different ICT technologies that could be used to teach the content in their subject. Less than one-fourth felt confident in using online learning platforms (e.g., Google Classroom, Seesaw, Moodle) to give lessons to their students. There is no statistical evidence of association with gender, school type, and school location either found.

When asked about the effective use of computers, only 21.3% of teachers believed they could do it. In

this case, in particular, NGS showed a significantly higher percentage of agreement, 60%, while the other two schools were pretty low, 15.5% for SRS and 18.2% for OHS (χ^2 *(4, N = 240) = 29.58, p < .000*).

For knowledge in advanced ICT, 21.3% of teachers confirmed knowing how to create and publish web pages, and only 3.3% said they understand computer programming and know how to code. The results also showed no statistical difference among gender, school type, and school location.

Table 4
Percentage of teachers rated on survey items

Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am confident that I have sufficient knowledge about my subject.	1.3%	5.8%	20.4%	44.6%	27.9%
I consider myself an expert in my subject.	2.5%	16.7%	36.3%	33.8%	10.8%
I use a variety of teaching strategies to help my students better understand the content of my subject.	1.3%	6.7%	23.3%	47.1%	21.7%
I know how to use social media (e.g., Facebook, YouTube, Telegram, etc.).	2.5%	14.6%	23.3%	36.3%	23.3%
I know how to use conferencing tools (e.g., Zoom, Google Meet, Microsoft Teams, etc.).	5.0%	13.8%	27.1%	30.4%	23.8%
I can update my knowledge and skills in my subject from various sources on the Internet.	4.2%	17.5%	30.8%	35.8%	11.7%
I know about different ICT technologies that I can use to teach the content in my subject.	11.3%	23.8%	31.7%	27.5%	5.8%
I am confident to use online learning platforms (e.g., Google Classroom, Seesaw, Moodle, etc.) to give lessons to my students.	12.5%	30.4%	33.3%	16.3%	7.5%
I have the technological skills to use computers effectively.	17.1%	28.8%	32.9%	16.7%	4.6%
I know how to create and publish web pages.	20.8%	33.8%	24.2%	15.0%	6.3%
I understand computer programming and know how to code.	60.4%	23.8%	12.5%	2.1%	1.3%

5. DISCUSSION

The class size in Cambodia is pretty big, on average about twice as many as in European or OECD countries (about 20 students per class) (OECD, 2023). Such a big class size can lead to less teacher effectiveness or quality of teaching and learning (Akerhielm, 1995; Koc & Celik, 2015; Schanzenbach, 2014). Literature could not give a clear-cut conclusion on class size and outcome relationship (Akerhielm, 1995); however, there was an agreement that reducing class size could lead to student-centred teaching, more individualized instruction, fewer disruptions and less student misbehaviour (Hattie, 2005). Reducing class size can help to enhance teaching and learning (Schanzenbach, 2014) but is a very costly decision, and the size effect is rather small, about 0.1-0.2, compared to other educational interventions (Hattie, 2005). According to Smith & Glass (1980), 10-15 students, at least below 20, per class is regarded as reasonably small. In this sense, it would be challenging for a least developed country like Cambodia.

The student-to-teacher ratio of Cambodian high schools remains high compared to European and OECD countries. While only 12 and 13 in European and OECD countries, respectively (OECD, 2023),

Cambodia is about 1.7 times bigger. This should be another concern for Cambodia. Koc & Celik (2015) argued that the effectiveness of teachers depended on teacher-student interaction and this interaction heavily depended on the number of students per teacher (i.e., student-to-teacher ratio), not directly on class size. In their study 'The Impact of Number of Students per Teacher on Student Achievement', Koc & Celik (2015) found a moderate negative correlation between the student-teacher ratio and achievement.

The pivot of class size and student-to-teacher ratio discussions toward effective teaching or learning outcome is student-teacher interaction. Class size indicates student-teacher interaction during classes, whereas student-to-teacher ratio is overall. Learning does not happen only during but also before and after the classes. If the teacher's schedule is not tight, they have time for students and help them learn. In this sense, the solution should be that hiring more teachers is more cost-effective than constructing more school buildings aiming at reducing class size, particularly for developing countries like Cambodia, where the annual budget for education is limited. However, this solution may not apply to the schools in the capital city of Phnom Penh, where the scarcity of classrooms is about double compared to the other areas. Furthermore, the traditional practice of the shift system should be greatly reduced or discontinued because lots of curriculum time is lost annually (Dawson, 2010). MoEYS should consider building extra buildings in existing schools and, if possible, opening new high schools to share the exceeding number of students from existing high schools. Besides, the school principal should consider grouping students who share a similar manner which is beneficial from a class size (Akerhielm, 1995) and assign appropriate teachers to such a class. Teachers should be aware of and apply the concept of excellence in teaching for different class sizes (Hattie, 2005).

Science laboratories have played important roles in science education (Hofstein, 2017). They enhance the science teaching and learning process and affect students' attitudes and academic performance in science (Pareek, 2019). However, Cambodia seems to move slowly on this. Overall, Cambodian high school science laboratories are still in bad condition, particularly for OHS, which is the same as what has been reported by Set (2016) and Mam (2021). Cambodia needs more political and financial commitment from MoEYS or the Royal Government of Cambodia to improve this situation.

Educational technologies in the classroom become increasingly necessary and the computer is the primary tool. Computer technologies can transform traditional into state-of-the-art teaching and learning by accessing information to explore new knowledge and allowing teachers and students to interact with peers and experts and express and communicate beyond classroom walls (Songer, 2007). Word processing, spreadsheet, and presentation software have facilitated text preparation and printing freely as wanted. For science classes, computer simulations present theoretical or simplified models of real-world components, phenomena, or processes, including animations, visualizations and interactive laboratories' (McFarlane & Sakellariou, 2002; Smetana & Bell, 2012). Believing in such advantages, many countries around the globe keeps trying to reduce the student-to-computer ratio to 1 (one computer for one student). Japan, for example, through the GIGA (Global and Innovation Gateway for All) School program by March 2024, every pupil will have one terminal (a PC or a tablet) with high-speed and secure Internet for their learning at school (The Japan Times, 2021). In some advanced economy countries such as Luxembourg, the United Kingdom, the United States, New Zealand, Australia etc., the student-to-teacher ratio has already been smaller than one, where the OECD average is about 1.25 (OECD, 2020). Sadly, in Cambodia, the ratio is extremely high (55), even compared to its neighbouring countries like Thailand (1.25) and Vietnam (4) (OECD, 2020). More effort and investment are required for Cambodia to reduce the number and to catch up with neighbouring countries in the region. In the meantime, schools may organise schedules for students to access school computers with a clear purpose (i.e., for learning or support learning). It may also be possible that schools offer priority to only students of senior level rather than all students. Therefore, the schools could optimise this shortage of resources. Research evidenced that just one hour per day of using a computer could significantly improve student reading and mathematics performance (Lee et al., 2009).

The findings showed teachers had enough knowledge of their subject content matter and pedagogical skills to teach their subjects. According to Shulman (1986), teaching is a complex process that needs to emerge between subject content knowledge and general pedagogy. These two are the primary elements for teachers to design effective teaching and learning models and are widely accepted as teacher knowledge (Berry et al., 2016). Teaching quality relies on teachers' subject content knowledge and pedagogical skills to facilitate effective teaching and promote a fruitful learning experience for students (McNamara, 1991). Further-more, teachers of a subject should be an expert in that subject. An expert teacher is a master of their subject matter and sensitive to diverse ways of how student learn their subject, and flexible to adapt appropriate approaches, on the spot, to dealing with students (Van Driel & Berry, 2012). Regarding this, Cambodian teachers did not indicate strong confidence in being an expert in the field. They may need extra support to enhance their expertise and develop mastery of their major. Continuous professional development or in-service training (INSET) program should offer for Cambodian science teachers both in subject matter and pedagogy.

In the current age of the 21st century, ICT incorporates into all aspects of life (Noor-Ul-Amin, 2013). In education, ICT gained popularity for making the teaching and learning process more and more successful and fascinating (Bhattacharjee & Deb, 2016; McFarlane & Sakellariou, 2002). It is good news that Cambodian high school science teachers showed sufficient knowledge of basic ICT regarding administration work, social communication, and knowledge and skill development. Importantly there is no gap in gender, school type and location. On the other hand, Cambodian high school science teachers did not indicate the effective use of ICT. This is critical for ICT for education (Noor-Ul-Amin, 2013). While in the information age, teachers need to be able to effectively utilize their ICT knowledge and skill in teaching in a way that can improve student learning. This seems to be challenging for Cambodian science teachers. Bingimlas (2009) addressed three major barriers effectiveness of ICT integration: lack of confidence, lack of competence, and lack of access to resources. All these barriers reflect the current situation of Cambodian high school science teachers, in which many teachers have low confidence in using ICT, do not own a computer, and lack advanced ICT knowledge. Buabeng-Andoh (2012) argued technical competency, incorporating pedagogy, is essential. It can affect effectiveness directly and mediate through confidence since competency is also a factor in improving confidence (Peralta & Costata, 2007). Technical competencies can remedy the fear of failure (Buabeng-Andoh, 2012) and the fear of damaging the computer (Peralta & Costata, 2007) and encourage teachers to use ICT in teaching. This suggests that Cambodian high school science teachers ought to master or learn more advanced ICT, including content, pedagogy and technical, especially relevant to their subject matter.

6. CONCLUSION

Cambodia high schools have acceptable infra-structure, incorporating libraries, science-laboratory rooms, computer labs, internet connection, clean water, toilet and electricity. However, science-laboratory rooms lack materials, especially for OHS. Similarly, most OHS have very few or no computers for students to learn and use to support learning.

There is a lack of classrooms, leading to having high student-to-classroom ratio and class size, especially in the capital city. The number of science teachers is also insufficient, leading to a high student-to-teacher ratio. These are the challenges for Cambodian science teachers to teach effectively.

Cambodian high school science teachers have enough knowledge of their subject content matter and pedagogical skills to teach their subjects. However, they did not indicate strong confidence in being an expert in their major. Cambodian high school science teachers showed sufficient knowledge of basic ICT regarding administration work, social communication, and knowledge and skill development, but they did not indicate the effective use of ICT. They also lack knowledge of advanced ICT, such as creating websites and coding.

As for implications, MoEYS should increase the number of high school science teacher recruitment. In Phnom Penh, MoEYS should build extra buildings in existing schools and, if possible, construct a few new high schools to share some students from existing

schools which helps reduce class size and student-to-teacher ratio. For OHS, MoEYS should put more effort and investment into incrementing the number of laboratory materials, both types of items and their quantity, and the number of computers.

Cambodian teachers need extra support to enhance their expertise in their major and develop pedagogy mastery. MoEYS should have continuous professional development or INSET programs to strengthen teachers' subject content matter and pedagogy. As for ICT for education, in the short run, MoEYS should have professional development or INSET programs on how to teach effectively using ICT, and in the long run, university courses or PRESET teacher training programs should consider such a topic in the curriculum.

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កាលិកបត្រស្រាវជ្រាវមនុស្សសាស្ត្រនិងវិទ្យាសាស្ត្រសង្គម

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Analysis of Cambodian Students' Errors in Solving Quadratic Function Problems Using Newman's Error Analysis

ការវិភាគកំហុសក្នុងការដោះស្រាយចំណោទគណិតវិទ្យាទាក់ទងនឹងអនុគមន៍ដឺក្រេទី២ដោយប្រើទ្រឹស្តីវិភាគកំហុសរបស់ញូមែន

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ABSTRACT

Errors and misconception in students' mathematics learning have become hot topics for teachers, educators and researchers for decades. Consistent errors may lead to misconception which ultimately affect the students' learning performance. This study centered on errors made by the students when they attempted to solve mathematics word problems. The objective of this study was to identify the errors the students made in solving quadratic function word problems. Qualitative method with students' test paper analysis and the in-depth interview using Newman's Error Analysis (NEA) framework were used to identify the students' errors and mistakes. Forty grade 12 students studying in a Cambodian public high school participated in the study. It was found that the students made the most errors in comprehension level (36.2%), reading errors accounted for 2.15% while transformation errors made up of 12.27%. Process skills errors made up of 19.94% while encoding errors (29.44%) ranked second among errors the students made. Failure to know or understand individual mathematical concept, for example vertex, symmetry line, interception point, range and domain of function etc. had hindered the students' comprehension of the problem and led to difficulties in solving math problems. This study suggested careful attention should be taken into account when introducing specific mathematics concept to students, especially at the early stage. Emphasizing the

relationship between each concept helped strengthen the students' comprehension of the problem and improve their overall mathematics learning ability.

KEYWORDS: mathematics word problem, error, Newman's Error Analysis, quadratic function, Cambodian student

សង្ខិត្តន័យ

ការសិក្សាអំពីកំហុស និងការយល់ខុសទាក់ទងនឹងការរៀនមុខវិជ្ជាគណិតវិទ្យារបស់សិស្សបានក្លាយជាប្រធានបទដ៏សំខាន់មួយសម្រាប់គ្រូបង្រៀន អ្នកអប់រំ និងអ្នកស្រាវជ្រាវទាំងឡាយ។ កំហុសដែលសិស្សបានបង្កើតឡើងច្រំដែលៗអាចក្លាយទៅជាការយល់ខុស និងចុងក្រោយប៉ះពាល់ដល់លទ្ធផលនៃការសិក្សាលើមុខវិជ្ជាគណិតវិទ្យារបស់ពួកគេ។ ការសិក្សានេះផ្តោតជាចម្បងទៅលើកំហុសដែលសិស្សអាចនឹងបង្កើតឡើង នៅពេលពួកគេព្យាយាមដោះស្រាយចំណោទគណិតវិទ្យា។ វត្ថុបំណងនៃការស្រាវជ្រាវគឺសិក្សានិងកំណត់នូវប្រភេទកំហុសដែលសិស្សបង្កើតឡើងក្នុងការដោះស្រាយចំណោទគណិតវិទ្យាទាក់ទងនឹងអនុគមន៍ដឺក្រេទី២។ ការសិក្សាប្រើប្រាស់វិធីសាស្ត្រស្រាវជ្រាវបែបគុណភាព ជាមួយនឹងការវិភាគទៅលើសន្លឹកកិច្ចការប្រឡងរបស់សិស្ស បូកនឹងការសម្ភាសបែបស៊ីជម្រៅដោយវិធីវិភាគកំហុសរបស់ញូមែន (Newman's Error Analysis[1])។ សិស្សានុសិស្សថ្នាក់ទី១២ចំនួន៤០នាក់ដែលកំពុងសិក្សានៅវិទ្យាល័យរដ្ឋមួយក្នុងប្រទេសកម្ពុជាបានចូលរួមក្នុងការសិក្សានេះ។ ការស្រាវជ្រាវជ្រាវបានរកឃើញថា ក្នុងអំឡុងពេលដោះស្រាយចំណោទអនុគមន៍ដឺក្រេទី២ សិស្សទាំងឡាយបានបង្កើតនូវកំហុសច្រើនបំផុតក្នុងកម្រិតយល់ដឹង (36.2%), កំហុសក្នុងការអានមានចំនួន 2.15% ខណៈកំហុសក្នុងការកំណត់វិធីដោះស្រាយមានចំនួន 12.27%។ កំហុសក្នុងដំណើរការដោះស្រាយចំណោទមានចំនួន 19.94% ស្របពេលដែលកំហុសក្នុងការទាញបញ្ជាក់លទ្ធផលមាន 29.44% និងស្ថិតក្នុងចំណាត់ថ្នាក់ទីពីរច្រើនជាងគេ។ កង្វះខាតការដឹងឬយល់ពីបញ្ញត្តគណិតវិទ្យានីមួយៗ ឧទាហរណ៍ដូចជា ចំណុចកំពូលនៃខ្សែកោង បន្ទាត់ឆ្លុះ ចំណុចប្រសព្វរវាងខ្សែកោងនឹងអ័ក្សកូអរដោនេ ដែនកំណត់ និងសំណុំរូបភាពនៃអនុគមន៍ជាដើម បានរារាំងដល់ការយល់ដឹងរបស់សិស្សអំពីចំណោទបញ្ហាទាំងមូល ហើយបានក្លាយជាឧបសគ្គសម្រាប់សិស្សក្នុងការដោះស្រាយចំណោទគណិតវិទ្យា។ ការសិក្សានេះអាចក្លាយទៅជាសារមួយដ៏សំខាន់សម្រាប់គ្រូបង្រៀន ឱ្យបង្កើនការយកចិត្តទុកដាក់ឱ្យបានខ្ពស់ក្នុងការបង្រៀននិងពន្យល់នូវខ្លឹមសារបញ្ញត្តគណិតវិទ្យាជាក់លាក់ណាមួយដល់សិស្ស។ ការពន្យល់ពីទំនាក់ទំនងរវាងបញ្ញត្តគោលនីមួយៗអាចជួយពង្រឹងការយល់ដឹងរបស់សិស្សអំពីលំហាត់ឬចំណោទគណិតវិទ្យា និងបង្កើនសមត្ថភាពក្នុងការរៀនរបស់សិស្សលើមុខវិជ្ជានេះផងដែរ។

ពាក្យគន្លឹះ: ចំណោទគណិតវិទ្យា, កំហុស, វិធីវិភាគកំហុសរបស់ញូមែន, អនុគមន៍ដឺក្រេទី២, សិស្សានុសិស្សកម្ពុជា

1. INTRODUCTION

In general education [2], mathematics plays very important role in strengthening students' critical thinking and problem-solving skills etc. Mathematics has been regarded as one of the most important subjects among other school subjects. In relation to this, Jha (2012) and Peter (2011) mentioned that mathematics plays major role in improving the person's mind, influencing his/her reasoning ability and developing the person's personality.

In any country, mathematics and the national language are two most compulsory subjects to be taught at every school level. The requirement of mathematics increases throughout grade levels due to its role in scientific, technology and human development. Peter (2011) stressed that mathematics

[1] It should be note that the Khmer terms for Newman's five errors have not officially defined, but in this paper the researchers used tentative translation as follow: reading error-កំហុសក្នុងការអាន, comprehension error-កំហុសក្នុងការយល់, transformation error-កំហុសក្នុងការកំណត់វិធីដោះស្រាយ, process skills error-កំហុសក្នុងដំណើរការដោះស្រាយ and encoding error-កំហុសក្នុងការទាញបញ្ជាក់លទ្ធផល.

[2] In Cambodia, the term general education refers to the education system comprises of 12 grades: primary level, lower secondary level and upper secondary level.

is considered to be the only subject which is universally used in all cultures of the world to produce the educated man. Despite its importance, the learning of mathematics are still major issues for learners at all levels.

1.1. Research Problem

In mathematics classroom, two types of mathematical problems are primarily focused: (i) ready-to-solve math problem and (ii) mathematics word problem. Solving mathematics word problem is one of an integral part of the students' learning. In ready-to-solve problem, the students are not required to think about how the equation or expression of problem is generated or what phenomena an equation is represented; however, in math word problem, the students need to critically analyze the real-word phenomena, draw symbol, expression, equation or mathematics representation before proceeding to the calculation process.

Table 1
Interview *questions followed the Newman's Error Analysis prompts*

Problem	Example
Ready-to-solve math problem	Calculate the root(s) of the equation $x^2 + 2x + 3 = 0$ in real number domain.
Mathematical word problem	The sum of two numbers is 18, and the product of these two numbers is 56. What are the numbers?

According to Seifi et al. (2012), dealing with real-world problems that requires critical thinking, process skills solutions, pictorial and symbolic representation and interpretation is even more important than just as equations or math expression ready to be solved. For the first example in Table 1 above, the student can proceed to solve the quadratic equation directly after understanding the problem. They can use whatever method they know to solve the problem. However, for the second example, the students need to go through several steps, for example:

- First, read and try to understand the problem's requirement.
- Determine the correct mathematical expression or equation representing the math situation.
- Determine the best way to solve the problem.
- Proceed with the calculation process.
- Provide written solution to the problem and fit the math situation.

Due to the nature, math word problem poses more difficulties to learners compared to the ready-to-solve math equations. The issues in learners' difficulties in solving mathematics word problems have attracted attention among teachers and mathematics educators alike (Capone et al., 2021; Fatmanissa & Novianti, 2022; Seifi et al., 2012). Despise of the presence of the students' difficulties in mathematics learning, however, the study focusing on this issue is not much popular in Cambodia's context.

There were several studies conducted by MoEYS and partners as well as independent researchers; however, those existing literature focused on general issues in education sector, for example issues in research and higher education in Cambodia (Eam, 2015, 2016; Un, 2022; Williams et al., 2016), issues in English learning or instruction (Heng, 2012; Chhom & Kep, 2022; Em, 2022; Phon, 2017; Seng & Tep, 2022), issues related to student's learning achievement (Heng, 2013; Soeung et al., 2012), issues on school dropout (Heng et al., 2016) and issues about teachers and teaching profession (No & Heng, 2017). There were some studies about mathematics education in Cambodia (Khieu et al., 2019; Ly et al., 2022; Mong, 2020); however, those studies covered general issues in mathematics teaching and learning, but none focused on issues in students' mathematics learning with specific math contents.

Lack of knowledge in the issue, scarcity of scientific findings and lack of attention and consideration in mathematics education research motivates this study. The present study intended to fill the gap in scientific knowledge about contemporary issues in Cambodian mathematics education, especially focusing on a specific topic: quadratic function.

1.2. Research Objectives

The current research focused on the students' errors in solving quadratic function problems. Specifically, the objective of the study was to identify the students' errors in solving quadratic function word problems using Newman's Error Analysis (NEA) framework. The study was guided by the following question:

At which level, according to Newman's Error Analysis framework, do the students commit error/s in their attempt to solve quadratic function word mathematics?

2. LITERATURE REVIEW

2.1. Quadratic Function Concepts

In mathematics education, function concepts play very important roles in mathematics learning. Function concepts have been explicitly stated at higher grades; however, the natural concepts of function buried in all elements of mathematics from the early grades of study to the advanced level of mathematics learning. At primary school education, function concepts are implicitly introduced in mathematics curriculum in the form of concrete topics such as percentage, fraction, proportion etc. The concepts are later explicitly built from primary concepts of percentage, fraction and proportion into linear function and more complicated concepts throughout the grades. Other concepts of function such as quadratic, trigonometric, exponential and logarithm functions etc. are studied in higher grades following linear and non-linear function concepts.

In Cambodian mathematics curriculum, the concepts of quadratic function are explicitly introduced in grade 8 covering topics such as creating the table of values, identifying the domain and range (image) of the function, solving quadratic equation using different methods, for example, discriminant method, perfect squared method, factorization method etc. The concepts of solving quadratic inequalities, vertex, axis of symmetry, interception points, tangent line, common form $(y = f(x) = ax^2 + bx + c)$ and its standard vertex form $y = f(x) = a(x - h)^2 + k$ are also introduced step by step throughout higher grades. Moreover, more complicated concepts such as the relationship between the graph and its coefficients, the roots and its discriminant ($\Delta = b^2 - 4ac$), etc. are covered. These concepts are then used extensively in limits of functions, derivatives and integration in senior secondary mathematics education and university mathematics education.

2.2. Students' Errors in Mathematics

Error is very common in the process of learning and solving mathematical problems, and sometimes students make certain mistakes during the process of their calculation. Errors or mistakes can be valuable sources for teachers to understand students' way of thinking because when solving mathematical problems, students usually put their knowledge and understanding into the calculation process (Cahyani et al., 2021). Error patterns in mathematics calculation reveal misconceptions about what they have learned, and that misconceptions are derived from problems due to conceptual misunderstandings (Ashlock, 2006; Holmes et al., 2013; Muzangwa & Chifamba, 2012). These conceptual misconception or misunderstanding may affect the students' future learning in mathematics. Teacher needs to be aware of students' mistakes, especially the persistent errors that might contain students' misconceptions about the topic they are learning.

Errors are usually divided into two types namely systematic error and unsystematic error (random error). An error can be a mistake, miscalculation or misjudge and such category falls under unsystematic errors. According to Muzangwa & Chifamba (2012), misrepresentation of a mathematics concept is not a misunderstanding that may produce a misconception in learning. Systematic error fall into the consistent errors or mistakes students made which caused by their conceptual misunderstanding. According to Holmes et al. (2013) and Muzangwa & Chifamba (2012), misconceptions are derived from problems due to conceptual misunderstandings and mistakes are derived from computational or minor mishaps or carelessness.

2.3. Newman's Error Analysis

Newman Error Analysis (NEA) is an error identification framework proposed by a famous Australian mathematics educator, Anne Newman, in 1977. The model has been proved to be a reliable tool for studying students' errors in mathematical word problems (Muzangwa & Chifamba, 2012; Prakitipong & Nakamura, 2006; Singh et al., 2010; White, 2010; Zakaria et al., 2010). The method had also been used in science subject research, for example Haqq et al. (2021). During the mathematical problem-solving processes, the students will commit errors and, according to Newman, these errors may be categorized into the following stages:

Reading ➔ Comprehension ➔ Transformation ➔ Process Skills ➔ Encoding

While teaching mathematics and when encountered with students who struggle in learning this subject, teachers usually said that their students could not solve mathematics problems correctly and that they made errors in mathematics problem solving. Newman, however, suggested that the students may commit errors in reading or comprehension of the problem before they arrive at pure mathematics problem-solution process. For Newman's method, it is assumed that in the process of problem solving, there are two kinds of obstacles that hinder students from arriving at correct answers (Jha, 2012, p. 17; Prakitipong & Nakamura, 2006, p. 113).

- *Troubles in reading language and abstract understanding of the problem which hinder their understanding the meaning of problems.*
- *Troubles in processing the mathematical problems that consists of transformation, process skills, and encoding answers.*

According to Newman, in order to assess the students' errors, teachers need to ask the correct questions so that these errors can be detected from their mathematical thinking which also gave the birth to her proposed error analysis framework.

- *Reading Error*

  Reading error occurs when the student fail or cannot recognize the written words, symbols or mathematical expressions in the given problem.

- *Comprehension Error*

  Comprehension errors occurs when the student could read or recognize the words, expression or mathematics symbols properly but they failed to understand its requirement or fully comprehend the problem, thus causing him/her to make mistakes or unable to get to problem-solution process.

- *Transformation Error*

  Transformation error occurs when the student has correctly comprehended the question or the requirement in the mathematics problem but they failed to identify proper mathematical operation or sequence of operations to successfully pursue the course of problem-solution.

- *Process Skills Error*

  Process skill error occurs when the student could correctly identify the proper procedures (or sequence of operations) for the problem, but they failed to execute or carry out the mathematical operation or procedures correctly.

- *Encoding Level*

  Encoding error occurs when, despite having solved the mathematical tasks appropriately and correctly, the student fails to provide an acceptable written form of the answer.

The following table presents some prompts which can be used to detect the student's error in specific stage, according to Newman.

Table 2
Interview questions followed the Newman's Error Analysis prompts

Questions	Error Stages
1. Can you read the question to me? 2. Do you understand the problem?	Reading
3. How confident are you that you can do this problem? 4. Tell me what is the question asking you to do?	Comprehension
5. Tell me the method you can use to find an answer to the question	Transformation
6. Show me how you worked out the answer to the question 7. Can you show me the working steps that you have used in order to find the answer? 8. Explain to me what you are doing as you do it 9. Do you know you are right? Why?	Process Skills

10. Can write down your answer to the question? 11. Tell me what is your answer? 12. How confident do you feel about the answer?	Encoding

3. METHODOLOGY

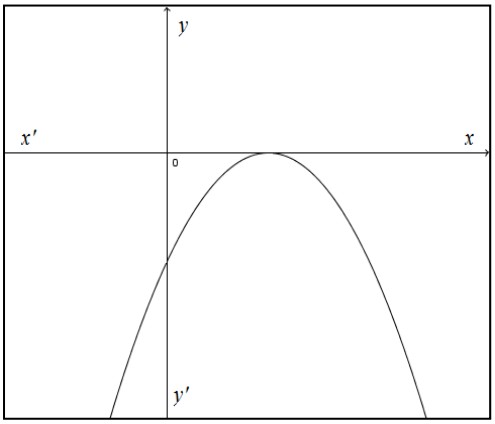
This study employed a qualitative-based research methodology where quadratic function knowledge test and in-depth interview using Newman's Error Analysis prompts were used as data gathering methods. A total of forty grade 12 students studying in a Cambodian public high school participated in this study.

3.1. Instrument and Data

- **Quadratic Word Problem Test**

The quadratic word problem test consisted of six items covering relevant concepts in quadratic function. The test was designed to capture the characteristics of the students' knowledge and problem-solving skills in quadratic function concepts. The testing concepts for each item were presented in the following table.

Table 3
Quadratic function concepts measured in each item of the instrument

Item	Measuring mathematical concepts
1	Given $y = f(x) = -x^2 - 2x + 3$ (a) Write the equation of this function into standard form $y = f(x) = a(x-h)^2 + k$. (b) Find the coordinates of vertex, axis of symmetry, and y-interception of the graph of this function.
2	(a) Please explain how you get the graph of the function $f(x) = x^2 + 2x - 1$ from the graph of $y = x^2$ then plot the graphs of these two functions on the same plane. (b) Given $-4 \le x \le 6$ for the quadratic function $y = f(x) = x^2 + 2x - 1$. Find the domain and range of this function.
3	Determine the value of m for which the equation $x^2 + (m+1)x + 1 = 0$ has two different real roots.
4	Make the table values for $y = -\frac{1}{2}x^2$ and $y = x^2$ then plot the graphs of these two functions. Compare the graphs of $y = x^2$ and $y = -\frac{1}{2}x^2$.
5	Suppose that the profit or loss of a factory depends on a function $f(t) = t^2 - 2t - 3$, where t is the amount of products the company sells. For which value of t that the factory doesn't have any profit or loss?
6	Given the graph of a quadratic function $y = f(x) = ax^2 + bx + c, \quad a \neq 0$  Explain the relationship between the graph of this function and its coefficients a, b and c and discriminant (Δ).

Expression	Positive	Negative	Zero	Why
a				
b				
c				
Δ				

- **In-depth Interview**

Face-to-face in-depth interviews took place one day after the students completed the test, and the interview lasted from 25 minutes to 30 minutes. The interview questions followed the Newman's Error Analysis prompts presented in Table 1 above. There were two practical ways of interview could be used as illustrated below:

(i) during the interview process on a specific item, if the researcher found that the students made an error at any stage of Newman's error, the interview was stopped.
(ii) during the interview process on a specific item, even any stage of Newman's error was detected, the interview still proceeded until the end of that item.

For this study, the researchers opted for the second scenario due to its benefit in capturing detailed information of knowledge and problem-solving skills the students' processed.

3.2. Data Analysis

The data analysis was made based on the solution papers submitted from the students and the interview scripts conducted with the participating students. The interview contents were transcribed and analyzed using content analysis based on Newman's Error Analysis framework. The errors the students made were categorized into (i) reading error, (ii) comprehension error, (iii) transformation error, (iv) process skills and (v) encoding error.

4. RESEARCH FINDINGS

There were forty students participated in this study. The age of the students ranged from 17 to 19 years old during the study was conducted.

4.1. Students' Errors According to Newman's Framework

It was revealed that out of the six testing items, the forty participating students made a total of 326 errors, according to Newman's Error Analysis framework. Not all the six testing items were solved by each student, and some problems were left blank. In this case, the blank problems were left out of the analysis.

Table 4
The distribution of the students' errors according to Newman's Error Analysis

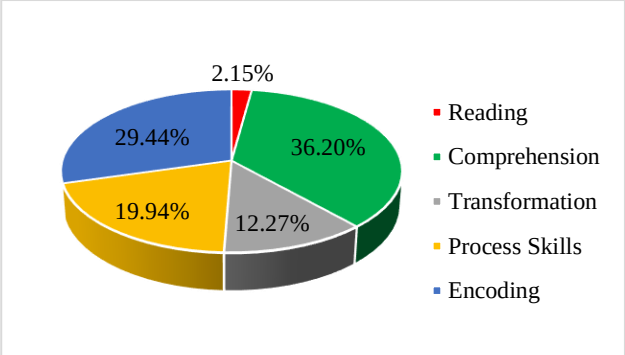
Student	Reading	Comprehension	Transformation	Process Skills	Encoding	Total
S1	0	3	0	2	3	9
S2	0	5	1	1	3	10
S3	0	3	0	2	2	7
S4	0	4	0	2	3	9
S5	0	4	1	2	5	13
S6	0	5	1	0	1	7
S7	0	5	6	5	6	22
S8	0	4	4	4	5	17
S9	0	5	5	4	5	19
S10	0	5	2	3	4	14
S11	2	3	3	4	4	16
S12	0	5	2	4	5	16
S13	0	4	2	4	6	16
S14	0	5	0	1	2	8
S15	0	5	3	5	5	18
S16	0	4	2	5	5	16
S17	0	4	0	2	4	10
S18	0	4	1	3	3	11
S19	1	5	3	3	4	16
S20	2	5	4	4	6	21
S21	1	1	0	0	1	3
S22	1	2	0	0	0	3
S23	0	2	0	1	1	4
S24	0	1	0	1	1	4
S25	0	2	0	0	0	2
S26	0	2	0	1	1	4
S27	0	2	0	1	1	4
S28	0	2	0	0	0	2
S29	0	1	0	0	1	2
S30	0	1	0	0	0	1
S31	0	2	0	0	1	3
S32	0	1	0	0	1	2
S33	0	2	0	0	1	3
S34	0	2	0	0	0	3
S35	0	2	0	1	1	4
S36	0	2	0	0	1	3
S37	0	1	0	0	1	2
S38	0	1	0	0	1	2
S39	0	1	0	0	1	3
S40	0	1	0	0	1	2
Total	*7*	*118*	*40*	*65*	*96*	*326*

The students made the most errors at comprehension level, i.e., comprehension error, which accounted for 36.2% of all the errors produced. In addition, the students committed several process skills errors (19.94%), despise having identified the correct ways to solve the problems. Surprisingly, encoding errors accounted for considerably high proportion which made up to 29.44% of the total errors made. Despise having solved the problem correctly, the students still made mistakes in encoding level, that is they failed to provide the proper solutions to the questions asked in wording or written formats.

The study also revealed that reading errors were related to the students' misreading of mathematics operations, expressions and specific mathematics

vocabularies etc., however, these mistakes were not found to be obstacles for the students' comprehension of the problems.

Figure 1
Distribution of the students' errors based on Newman's Error Analysis



It was evidenced that the students had difficulties in conceptualizing individual mathematical concepts, for example, vertex, domain of function and range of function etc. The students' poor conceptualization in the mathematical concepts had, obviously, hindered their understanding about the problems and failed in the subsequent steps of problem-solving processes.

The transformation errors were strongly related to how much the students could comprehend and understood the problems' requirement; however, some students even though they could identify the problems' requirement, they still committed errors in transformation level due to their poor memorization of the correct mathematical formulas.

4.2. Examples of the Analysis of the Student's Errors Based on Newman's Framework

This section presented some examples of the analysis of the errors the students committed when they tried to solve the quadratic function word problems in the test paper. The errors were classified based on Newman's Error Analysis framework: (i) reading error, (ii) comprehension error, (iii) transformation error, (iv) process skills error, and (v) encoding error.

➲ Reading Errors

A reading error occurred when the students could not recognize the written words, symbols or math equation or expressions. Misreading of the words, symbols or those expressions also falls into this error category.

Problem 2-B:

A. Please explain how you get the graph of the function $f(x) = x^2 + 2x - 1$ from the graph of $y = x^2$ then plot the graphs of these two functions on the same plane.
B. Given $-4 \leq x \leq 6$ for the quadratic function $y = f(x) = x^2 + 2x - 1$. Find the domain and range of this function.

(R: Researcher, S8: Student Number 8)

R: Can you read problem 2-B to me?
S8: Given -4 greater than or equal to x greater than or equal to 6, for the quadratic function $f(x) = x^2 + 2x - 1$. Find the domain and range of this function.
R: After reading, did you have any word or expression that you were not familiar with?
S8: I didn't know many things in the question. I didn't know what is the domain or range of function.

The student failed to read the symbol " $\leq$ " correctly in the given expression $-4 \leq x \leq 6$, instead of reading it as *"-4 is less than or equal to x and less than or equal to 6"*, the student read it as *"-4 is greater than or equal to x and greater than or equal to 6"*.

➲ Comprehension Error

A comprehension errors occurred when the students were able to read the question or were able to recognize the mathematics symbols properly, but they failed to understand the problem's requirement, thus causing him/her to make mistakes, could not fully understand the problem and was unable to get to problem-solution.

Problem 1-A:

Given the function $y = f(x) = -x^2 - 2x + 3$
A. Write the equation of this function into standard form $y = f(x) = a(x - h)^2 + k$.
B. Find the coordinates of vertex, axis of symmetry, and *y*-interception of the graph of this function.

(R: Researcher, S13: Student Number 13)

R: Can you read problem 1-A to me?
S13: [Reading] …
R: After reading, did you see any unfamiliar word or expression?
S13: I didn't know the standard form, teacher.
R: Did you mean the word 'standard form?'
S13: Yes teacher.

R: How about the math expression $y = f(x) = a(x-h)^2 + k$ here? Have you ever seen it before?
S13: I used to see it before.
R: Overall, did you understand the question asked?
S13: I understood, but I didn't know what exactly is to transform it into the standard form.
R: Did you think you can do it or not?
S13: No, teacher. Actually, I didn't know which standard form I need to transform to as I didn't know anything about it.

The student mentioned that she understood the problem, but her words "*I understood, but I didn't know what exactly to transform to the standard form*" indicated that she did not understand the requirement of the problem and what it meant by the standard vertex form, which was comprehension error.

➲ **Transformation Error**

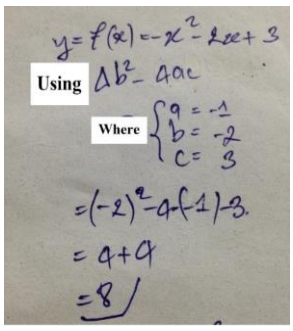
A transformation error occurred when the pupil could correctly comprehend the problem or the question's requirement but failed to identify the proper math formula, operation or sequence of operation to successfully pursue the course of problem-solution process.

Problem 1-A:

Given the function $y = f(x) = -x^2 - 2x + 3$
A. Write the equation of this function into standard form $y = f(x) = a(x-h)^2 + k$.
B. Find the coordinates of vertex, axis of symmetry, and *y*-interception of the graph of this function.

(R: Researcher, S10: Student 10)

R: Can you read problem 1-A to me?
S10: [Reading]
[…]
R: I saw you did some calculation on your paper; can you tell me why you chose to solve this problem using the delta method?



S10: For this case, $\Delta = b^2 - 4ac$. I chose it because I looked at the given expression $y = f(x) = -x^2 - 2x + 3$ at which the values of $a = -1, b = -2$ and $c = 3$.
R: Could you tell more clearly why you chose delta method ($\Delta = b^2 - 4ac$) to solve this problem?
S10: I could not find out other way for this problem, so I chose to do it using this method.

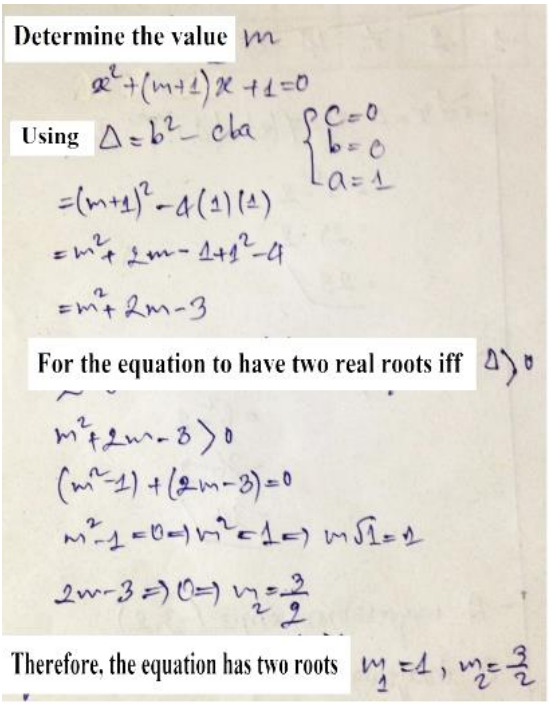
From the interview, the students could understand the problem requirement, but they chose an incorrect way to solve it. The students might have thought that the delta method could be used to transform the function $y = f(x) = -x^2 - 2x + 3$ into the standard vertex form ($y = f(x) = a(x-h)^2 + k$).

➲ **Process Skills Error**

A process skill error occurred when the pupil could correctly identify how to solve the problem or chose the correct formula or sequence of procedures to solve the problem, but they failed to carry out the procedures correctly.

Problem 3:

Determine the value of m for which the equation $x^2 + (m+1)x + 1 = 0$ has two different real roots.



(R: Researcher, S10: Student Number 10)

R: Can you read this problem to me?
S10: [Reading]
[…]
R: Did you know what is the question asking you to do?
S10: It asked to determine the value of m so that the equation had two different real roots.
R: OK, can you tell me how you get the problem done?
S10: Because the question asked to determine the value of m, so I took the given equation and solve it using the delta-method $\Delta = b^2 - cba$

where, for this case, $c = 0, b = 0$ and $a = 1$. Then I got: $\Delta = (m+1)^2 - 4(1)(1)$ then I got $\Delta = m^2 + 2m - 3$. But we know that for the equation has two real roots if and only if $\Delta > 0$. Then I solved it one more time.

R: Can I see what you are doing here? Let me ask you something more. You wrote $m^2 + 2m - 3 > 0$ and got $(m^2 - 1) + (2m - 3) = 0$, can you explain to me how did you get "-1" in the expression $(m^2 - 1)$?

S10: I got if from $2m - 3$

From this interview, the student understood the problem's requirement that is to get the two different real roots. Moreover, he/she knew that the condition for this to happen when the value '$\Delta > 0$'. However, they chose the incorrect formula of delta method as well as committed a lot of errors during the process of problem solving. In this case, the student made mistakes in both transformation and process skills levels.

➲ Encoding Errors

An encoding error occurred when, despite having appropriately and correctly solved a mathematical task, the pupil failed to provide an acceptable written form of the answer to the problem. In this research, this error also included those mistakes made with the conclusion of the solutions.

Problem 5:

Suppose that the profit or loss of a factory depends on a function $f(t) = t^2 - 2t - 3$, where t is the amount of products the company sells. For which value of t the factory doesn't have any profit or loss?

(R: Researcher, S29: Student Number 29)

R: Can you read this problem to me?

[…]

R: From your calculation, what is the answer for this problem?

S29: I got the values for t which are $t_1 = 3$ and $t_2 = -1$.

R: What do these values refer to?

S29: They are the amount of products that the factory needs to sell so that they will not have any loss or profit.

R: What is the conclusion for this problem?

S29: I concluded that, the factory needs to sell the products $t = 3$ & $t = -1$ so that they will not get any loss or profit.

For this problem, many students made mistakes in drawing the written solution to the problem. They could provide the correct answer, but they lack the concept of amount which requires only positive value. For this problem, the students provided the solution with both positive and negative values of t.

5. DISCUSSION

It was found that the students made the most errors at comprehension level. The finding reflected the general characteristics of the students' difficulties in solving the mathematical word problems. Without restricting to a specific math content and research contexts, several past studies, for example Jha (2012), Prakitipong & Nakamura (2006), Singh et al. (2010), White (2010) and Zakaria et al. (2010), showed that during the process of solving mathematics problems many students made a lot of errors in comprehension before they arrived at problem-solving processes. Students struggled in understanding the problems' requirement which led to failing to identify the correct way to solve the problems. In addition to this, Jha (2012), Singh et al. (2010) and White (2010) added that that the students would make more errors in transformation level than in comprehension level although errors committed in comprehension level accounted for higher percentage comparing to the other levels. In relation to this, Jha (2012) found that , in Southeast Asia, comprehension and transformation errors accounted for about 70% of errors made by students on standard word problems.

From the study, reading errors were not found to be obstacles for the students' comprehension of the problems; however, lack of conceptual understanding did play major roles in hindering their comprehension. For example, in Problem 1-B, the students were asked to determine the coordinates of the vertex of the function $y = f(x) = -x^2 - 2x + 3$, the symmetric line and the *y*-interception point of the graph using the vertex form $y = f(x) = a(x-h)^2 + k$. From the interviews, however, many students did not know or they failed to understand the concept of '*vertex of graph of a function*'. Many students suggested that only the function with graph having maximum point (i.e., the quadratic graph with coefficient $a > 0$) should have vertex. The students may have confused the term '*vertex*' to the term used in Khmer language which is translated as the '*peak of something*'. In mathematics classes, many teachers introduced the

term 'vertex' in Khmer as 'កំពូល' (*pronounced kompoul*) which was literally referred to the 'highest point' in Khmer language. The students may lack of a complete understanding of the concept of 'vertex' for a quadratic function that refer to 'the maximum point' or 'minimum point' depending on the value of the coefficient a.

Past experience of being a high school mathematics teacher in Cambodian public schools, the researcher argued that two major reasons might have contributed to the students' lack of conceptual understanding in each mathematical concept then led to their poor comprehension of the problems. The first reason may be the lack of focus on the concepts themselves during the teachers' introduction of the lessons. The second reason may be the habit of practicing mathematics problem solving. In Cambodian's mathematics classes, more practices are put in ready-to-solve mathematical problems rather than word problems. Failing to provide more practical exercises on the concepts, especially in word problems or real-world problem may hinder the students' holistic comprehension of the problems.

6. CONCLUSION

This study aimed at identifying errors the students made when they attempted to solve quadratic function word problems using Newman's Error Analysis framework. The study found that the students committed the most errors in comprehension level and encoding level. Reading errors were found to be related to misreading of mathematics signs, specific mathematics vocabularies etc., however, these mistakes were not found to be obstacles for students' comprehension of the problems. Failure to understand individual mathematical concept, for example vertex, symmetry line, interception point, range and domain of function etc., had hindered the students' comprehension of the problem were sources of the students' comprehension errors. More errors in encoding and lead to difficulties in solving the math problems. This study suggested careful attention should be taken into account when introducing specific mathematics concept to students. Emphasizing the relationship between each concept helped strengthen the students' comprehension of the problem and improve their overall mathematics learning ability.

INFORMATION

This paper is part of my unpublished thesis for the degree of master of mathematics education at Hiroshima University. Having realized the significant findings related to the issues in mathematics education research, the authors wished to share the findings to academic community by discussing with current relevant literature. The data was a bit old; however, the authors believed that the essence of the findings should still be relevant, especially in mathematics education in Cambodia. The study contributes primarily in pedagogical context where students' learning of mathematics is the main focus.

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A Small-Scale Study on Students' Attitudes towards Online English Learning in the Context of COVID-19 in Cambodia

ឥរិយាបថនិស្សិតសាកលវិទ្យាល័យចំពោះការរៀនភាសាអង់គ្លេសតាមអនឡាញក្នុងបរិបទកូវីដ-១៩ក្នុងប្រទេសកម្ពុជា

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ABSTRACT

This study was conducted on 255 Cambodian university students to find out the students' attitudes towards online English learning in the context of COVID-19 in Cambodia. The study employed quantitative research methodology with survey method using a 25 Likert-scale survey questionnaire. The questionnaire focused on five constructs of online English learning: effectiveness, autonomy, open-mindedness, interaction, and anxiety. This study had three objectives: (i) to study the students' attitudes towards online English learning, (ii) to compare the students' attitudes towards online English learning in relation to gender, location and type of university, and (iii) to study the relationship between the students' attitudes towards online English learning with respect to the five constructs. The results showed that the students' attitudes towards effectiveness, autonomy, open-mindedness, interaction of online English learning were high while their attitudes in term of anxiety of online English learning were at medium level. Moreover, the relationship between the students' attitudes with respect to the five constructs ranged from weak to moderate. Furthermore, the students' attitudes with regards to some constructs of online English learning were found to have significantly different in relation to gender, university location and types of universities.

KEYWORDS: online English learning, attitude, effectiveness, autonomy, open-mindedness, interaction, and anxiety

សង្ខិត្តន័យ

ការសិក្សានេះបានធ្វើឡើងជាមួយនិស្សិតសកលវិទ្យាល័យនៅកម្ពុជាចំនួន២៥៥នាក់ ក្នុងគោលបំណងស្វែងយល់អំពីឥរិយាបថរបស់ពួកគេចំពោះការរៀនភាសាអង់គ្លេសតាមអនឡាញ ក្នុងបរិបទនៃការរីករាលដាលជំងឺកូវីដ-១៩។ ការសិក្សានេះប្រើប្រាស់វិធីសាស្ត្រស្រាវជ្រាវបរិមាណវិស័យជាមួយវិធីស្រាវជ្រាវបែបស្ទង់មតិ តាមរយៈកម្រងសំណួរដែលមានចំនួន ២៥សំណួរ។ កម្រងសំណួរស្ទង់មតិផ្តោតទៅលើបញ្ហត្តិទ្រឹស្តីប្រាំអំពីការរៀនភាសាអង់គ្លេសតាមអនឡាយ ដែលរួមមាន ប្រសិទ្ធភាព ស្វយ័តភាព ការបើកចិត្តទូលាយ អន្តរកម្ម និងការចាប់បារម្ភ។ ការសិក្សានេះមានវត្ថុបំណងស្រាវជ្រាវចំនួនបីគឺ៖ ទីមួយ សិក្សាអំពីឥរិយាបថរបស់និស្សិតចំពោះការរៀនភាសាអង់គ្លេសតាមអនឡាញ, ទីពីរ ប្រៀបធៀបឥរិយាបថរបស់និស្សិតអំពីការរៀនតាមអនឡាញដោយផ្អែកទៅលើកត្តាភេទ ទីតាំងនិងប្រភេទសកលវិទ្យាល័យដែលពួកគេកំពុងសិក្សា, និង ទីបី សិក្សាអំពីទំនាក់ទំនងរវាងបញ្ហត្តិទ្រឹស្តីទាំងប្រាំនៃឥរិយាបថរបស់និស្សិតទៅលើការរៀនភាសាអង់គ្លេសតាមអនឡាញ។ លទ្ធផលស្រាវជ្រាវបានបង្ហាញថា ឥរិយាបថរបស់និស្សិតមានកម្រិតខ្ពស់ទៅលើប្រសិទ្ធភាព, ស្វយ័តភាព, ការបើកចិត្តទូលាយ និងអន្តរកម្ម នៃការរៀនភាសាអង់គ្លេសតាមអនឡាញ។ ជាមួយគ្នានេះ ឥរិយាបថរបស់ពួកគេទៅលើការចាប់បារម្ភដែលកើតមានពីការរៀនតាមអនឡាញមានត្រឹមកម្រិតមធ្យមប៉ុណ្ណោះ។ ឥរិយាបថរបស់និស្សិតទៅលើបញ្ហត្តិទ្រឹស្តីនៃនៃការរៀនតាមអនឡាញ ក៏មានទំនាក់ទំនងខ្លាំងនឹងគ្នាក្នុងកម្រិតខ្សោយទៅខ្លាំងផងដែរ។ ការសិក្សាក៏បានបង្ហាញផងដែរថា ឥរិយាថរបស់និស្សិតទៅលើបញ្ហត្តិទ្រឹស្តីមួយចំនួននៃការរៀនភាសាអង់គ្លេសតាមអនឡាញ ក៏មានភាពខុសគ្នាអាស្រ័យទៅលើកត្តាភេទ ទីតាំងនិងប្រភេទសាកលវិទ្យាល័យផងដែរ។

ពាក្យគន្លឹះ ការរៀនភាសាអង់គ្លេសតាមអនឡាញ, ឥរិយាបថ, ប្រសិទ្ធភាព, ស្វយ័តភាព, ការបើកចិត្តទូលាយ, អន្តរកម្ម, ការចាប់បារម្ភ

1. INTRODUCTION

When COVID-19 attacked the whole world including Cambodia, its negative impacts threatened Cambodia's education, in which most of the higher education institutions shifted from the traditional teaching and learning in the classroom to online teaching and learning. This online method became an alternative to further the educational process when the classrooms were closed because of the widespread COVID-19 pandemic (Chet et al., 2022).

For Cambodia, to respond the spread of this COVID-19, the Ministry of Education, Youth, and Sports (MOEYS) announced the closure of all the 124 public and private universities on 16 March 2020 and quickly shifted to online learning and distance learning after decades of only providing educational services in the traditional university classrooms by the MOEYS. Thus, when the educational institutions were ordered to close immediately, the shortages of infrastructure and learning resources appeared to be a challenge for most HEIs in Cambodia. In response to this challenge, the HEIs made a decision to use open forums such as Facebook Messenger, Telegram, Zoom, and Google Classroom to support the ongoing process of students' learning (Chet & Sok, 2020). Having followed the measures of social distancing and not allowing physical learning in universities, Agasisti & Soncin (2021) raised that only online learning and blending learning were the options to further the educational sector.

As evident, COVID-19 crisis made various stakeholders in Cambodian education face unlimited and unexpected tension and increasingly show their mental health and emotion. In addition, COVID-19 added more pressure on the implementation of Educational Strategic Plan 2019-2023 to increase the enrolment in higher education institutions among the population whose age ranged from 18 to 22. Hence, to help divide the best methods in the efforts of restoration and response to the spread of COVID-19 pandemic in order to help promote quality of distance learning during the emergency, Ministry of Education, Youth, and Sports (MOEYS) and Education Sector Working Group (ESWG) made a decision to use a comprehensive and coordinated assessment in education. Obviously, in July 2020, MOEYS set up a Cambodia Education Response Plan

to COVID-19 Pandemic to ensure effective implementation of the Educational Strategic Plan 2019-2023 and aimed to respond to educational crisis responsibly, effectively, and efficiently: (1) staff and students could go on distance teaching and learning safely, (2) students and educational staff could go back to educational institutions safely, (3) staff and students could teach and learn in the coordinated learning environment, and (4) the national and sub-national system of MOEYS could be resilient (MOEYS, 2020).

Besides responding to COVID-19, MOEYS (2020) also made a response to Cambodia Vision 2030 and Sustainable Development Goal 2030 by setting up "Cambodia's Educational Roadmap 2030" which set the vision for Cambodia's educational system 2030 to become a system with strong and competitive capacity for knowledge-based society in the region (MOEYS, 2019) as well as set the 2030 vision: schools became institutions which ensure high quality education for all, teachers have capabilities, gain motivation and receive sufficient support to facilitate students to obtain high quality education, classrooms become modern ones which can provide students best opportunities for learning, and students get good health, have motivation and commitment and be Cambodia's future ones (MOEYS, 2022).

Certainly, COVID-19 has caused the surge of online learning; however, the term "online learning" has occurred for so many years. Online learning, electronic learning, distance learning, or distance education is getting knowledge and skills through the information and instruction coordinated by all technology utilization and various distance learning forms (King et al., 2001).

According to Bušelić (2017), distance learning is defined as an educational sector which emphasized on pedagogical methods accompanied by technology which aimed to provide education to students who could not attend the direct classrooms. Moreover, emergency remote teaching (ERT) is an online teaching which is mandatory, temporary, and unplanned to keep educational sustainability. Hence, the shift to such a way has caused strong impacts on students and teacher's lives in the educational context, including language education (Hodges et al., 2020).

Like other subjects, language learning also needed online teaching and learning, and it became prominent during the spread of COVID-19. However, there have not been so many published studies before the existence of COVID-19, particularly the studies which are directly related to the students' attitudes towards online language learning or language learning during this pandemic. Even though the online platform has helped to go on the process of teaching and learning, effectiveness and impacts of this platform have become to be the key points in the research agenda of the HEIs around the world between 2020 and 2022 (Chet et al., 2022).

Regarding language learning, for many decades there have been a lot of studies which link the development of the second language with motivation and attitude (Al-Tamimi & Shuib, 2009; Boo et al., 2015; Chalak & Kassaian, 2010). In addition, there have been numerous studies which show that the high level of motivation and positive attitudes was related to the improvement of language learning (Kormos & Csizér, 2008; Masgoret & Gardner, 2003). However, some studies also showed the relationship between anxiety and language achievement at a low level as well (Teimouri et al., 2019).

Related to attitude studies, attitudes had a lot of related variables and had strong differences, including pedagogy, teaching materials, environment, lesson contents, and other factors. In addition, both definitions and operationalization of the attitude-related key constructs were also strongly different in various studies (Pusey & Nanni, 2022). Moreover, some researchers took different stances on attitudes of learners such as Dörnyei & Taguchi (2010) claimed that attitudes were hard to change, while Gardner & Tremblay (1994) stated that attitudes were easily changeable.

1.1. Overview about Students' Attitudes

Learning English as a second language involves several factors, including psychological attributes (attitude, aptitude, intelligence, anxiety, and motivation) (Hashemifardnia et al., 2021; Haidara, 2016). Among those, attitude is a psychological factor which affects L2 learning, and a positive attitude towards L2 learning is facilitative while a negative one towards L2 learning is a hindrance. Moreover, L2 learners' attitude is defined as a collection of feeling

considering language use and its status in the community (Knouse et al. (2021).

Regarding the attitude, Mckenzie (2010) raised that a particular problem with the definitions of attitude as it might be overlapped with various concepts such as 'belief', 'opinion', 'value', 'habit', 'trait', 'motive', and 'ideology' in social psychology. In general, attitude research can be conducted based on two psychological approaches: the behaviorist and the mentalist view, both of which regard that individuals' attitudes are not born with but are learned.

Based on Garrett (2007), attitude can be as a psychological construct and a mental construct. As a psychological construct, attitudes can be cognitive (beliefs and stereotypes), affective (evaluations), and behavioural. As a mental construct, respondents' attitudes are not really certain to be represented by research data, so three research approaches are vital such as societal treatment approach, direct approach, and indirect approach.

Concerning language attitude assessment, Chengchen Li & Li Wei (2022) also raised that there is a variety of methods, and among those, Likert scales, due to their convenience and accessibility to participants, are popularly used in language attitude research.

Moreover, student language learning attitude might be explained in a four-step formation: cognitive process (students' perception and development of a concept of language and the language class); affective process (students' development of such feelings as excitement, happiness, confidence, adequacy, boredom, frustration, anger, and inadequacy); evaluation of these feelings; and translations into certain behaviors of those evaluations (Smith 1971, as cited in Chengchen Li & Li Wei (2022).

According to Jiang et al. (2022), when it comes to L2 learning, l2 learners' levels of proficiency can be indirectly affected by the attitude. In their study on Iranian EFL learners' motivation, anxiety, and attitudes during the COVID-19 pandemic, the results revealed that online learning had positive impacts on the participants' motivation, anxiety, and attitudes. Moreover, their motivation rose, their anxiety declined, and their positive attitudes were formed towards L2 learning because of the online learning.

Regarding the definition of anxiety Amin et al. (2022) defined that feeling anxious occurred when one faced such life events as participating in an interview, taking an exam, or suffering from a disease. Moreover, this study, focusing on knowledge, anxiety, and preventive behaviour against Omicron among junior high school students in Egypt, found out that more than half of the students had poor knowledge and low preventive behaviour towards Omicron and showed a high level of Omicron-related anxiety.

In a study by Ushida (2005), focusing on students' change of attitude motivation based on the duration of online courses of French and Spanish, students were found out to have high anxiety at the start of the online language course; however, they still kept positive towards online learning and had motivation for the whole course. In addition, a source of the students' anxiety was due to not being familiar with online forums, and teachers had the roles to maintain students' positive attitude and motivation.

Regarding the utilization of technology in Cambodian higher education during COVID-19, Sol (2021) raised critical challenges such as the lack of digital infrastructure and learning resources, accessibility issues, and limited digital literacy, as well as the experience of faculty members and students. In addition, he brought up some priorities for Cambodian higher education to address those challenges by improving infrastructure and learning resources, digitalizing the delivery approach, providing regular development and training for faculty members, and promoting diverse collaboration and partnerships.

Furthermore, some students dropped out and even rejected using computers as language learning tools in the blended learning program because they still preferred reading and writing on paper (Stracke, 2007).

However, in Saudia Arabia, Ta'amneh (2021), who studied about the attitudes and challenges towards virtual classes in learning English language courses, found out students' positive attitudes towards the use of online learning as they thought it was the best strategy during COVID-19 pandemic, and it could help them in their academic achievement.

In Indonesia, based on a study on how EFL learners maintain motivational factors and positive attitudes during COVID-19 by Adara & Puspahaty (2021), they found out that to keep learners' motivation and positive attitude towards language learning need both intrinsic and extrinsic motivation. Furthermore, teachers are much needed to maintain personal communication with students during COVID-19.

In another study in Indonesia by Risten & Pustika, 2021, the results showed that students had a positive attitude of using Moodle as a learning platform and revealed a positive attitude towards the importance of learning English in vocational high school.

Similar to the above study, Indriani & Widiastuti (2021) found that students demonstrated a positive attitude towards online English learning through the LMS Moodle in spite of learning through it for the first time.

Besides, in a study on Google Classroom by Moonma (2021) to determine 111 second-year Thai EFL students in 7 majors in Thailand, the result showed that students had a positive attitude towards using it and perceived it to be useful as they could submit their assignments and received class announcements well.

Regarding the flipped classroom, based on the study of Webb et al. (2014) on attitudes of students and teachers in English as a foreign language program in China towards teaching and learning in flipped classroom, he found out that this flipped classroom initially did not meet students' expectation, but they were beginning to accept this method at the end of 15-week course duration.

Furthermore, according to the study of two groups of students in Macau and in the U.S. found out that blended classroom could lead to grammatical accuracy and trust more than traditional learning, and this method enhanced student engagement. Thus, this method seemed to take ages to achieve students' acceptance (Webb & Doman, 2016).

Even though numerous learning and teaching methods have been established to go on the educational process in the context of COVID-19, students show both acceptable and unacceptable attitudes towards those methods, and a lot of studies have explored learners' faith and purposes as well as motivation in online language learning (Lamb & Arisandy, 2020).

1.2. Advantages and Challenges of Online Learning

As a matter of fact, online learning has both advantages and disadvantages for students as well as other stakeholders. For the advantages, online learning provided a lot of benefits including unprecedented opportunities for students who faced difficulty in rural areas or low socio-economic status as they could have time for extracurricular activities, self-paced learning, student-student interaction, and preparedness for digital systems (Cheam, 2021).

Similar to the above study, Altameemy & Alreface (2021) found out that online learning was not only able to help promote self-study, but it also set up a good base for improving learning skills as students were self-motivated for learning and doing various tasks and made self-evaluation on their study. Besides, the students claimed that online learning created a spirit of awareness because they had trust related to tasks, work submission, and submission schedule. Moreover, online learning gave students a program in which they could determine their capacity to be self-reliant and to fulfil learning tasks with high confidence. Furthermore, online learning provided support to slow-learning students by providing them sufficient time to take self-paced learning steps and by going back to watch the recorded lessons after their teachers finished teaching.

Furthermore, based on the study of university students' attitude towards digital technology by Novikova et al. (2022) showed four key advantages of digital utilization in education: (1) obtaining learning materials, (2) saving time, (3) feeling convenient and comfortable in learning, and (4) speed and extent of receiving information.

In addition, based on Castillo-Cuesta et al. (2022), students' collaborative skills and open-mindedness were developed by using virtual work-spaces. Moreover, by using this way, teachers were also able to create a positive e-learning environment in which students could exchange different perspectives on various topics as well as express their mutual respect for those views.

Even though a lot of studies recording the benefits of online learning and accessibility of online teaching, students have also faced challenges in online learning such as proliferation of understanding load required by online teaching (Hollister et al., 2022; Mayer, 2017; Sweller, 2020); insufficient knowledge or inconvenience in digital utilization, shortage of social interaction and feeling of isolation faced by students during online learning (Yuan & Kim, 2014); inability in the ways of asking questions such as lack of privacy although there was a tool for allowing such a thing such as chat function in Zoom app. In addition, other challenges include decreasing opportunity for sharing own comments, shortage of teaching methods and other activities, shortage of obtaining sufficient technology (Winke & Goertler, 2008); problems for learning places and technical issues which made the most hard-working students feel confused.

Furthermore, based on the results of Chet et al. (2022), among 1,002 students who were pursuing their majors and participated in the survey, 81.4% did not request for carrying on the online learning after COVID-19, 62% claimed that online teaching negatively affected their studies, and online learning severely reduced their learning capacities.

Besides, the prolongment of COVID-19 strongly impacted higher education institutions (HEIs) such as the possibility of shutdown of some HEIs, impact on quality of teaching and learning, worsening skill gaps and educational inequality, and emotional health (Heng & Sol, 2021).

Obviously, these above-mentioned challenges reduced emotion, attitude and behaviour faced by students during COVID-19 pandemic, all of which helped provide information about operationalization of attitudes developed in the study in addition to differences and attitudes of individuals which were commonly shown to play roles in motivating students such as persistence and interest (Hidi & Harackiewicz, 2000; Hunsu et al., 2017; Major et al., 2006); and particularly motivation in learning a second language such as difference, tolerance, willingness in communication, and anxiety (Dewaele & Ip, 2013; Dörnyei & Ryan, 2015).

In fact, the above-mentioned issues were not only faced by students but also by teachers who were working in the context of distance teaching, which in turn impacted on students' experience and attitude. If concentrating on those challenges, some of the severe barriers which teachers needed to coordinate included lack of feedback to students (Lee & Pyo, 2003), common decrease of student participation (Hew & Cheung, 2014; Yoon et al., 2020), insufficient time in preparation for the change to distance teaching which was vital for teachers to obtain teaching technology successfully (Gerard et al., 2011), and increasing cognitive load for online teaching in terms of multitasking and strong focus on techniques required to provide to distance classrooms (Mayer, 2017; Sweller, 2020).

Regarding this technical issue, in the study of Coman et al. (2020) found that the disadvantages of online learning outweighed advantages in the context of COVID-19, and the technical issue was the key one followed by shortage of teachers' technical skills and teaching styles in adjusting to online learning environment as well as shortage of student interaction with teacher or poor interaction with teachers. Moreover, because of facing such techniques and internet-related issues, they also might cause bias in teachers' evaluation by using those forms and materials and might contribute to a doubtful attitude towards e-learning (Hafner et al., 2022).

In a study on Turkish teachers' attitudes towards online instruction by Civelek et at. (2021), EFL teachers did not feel capable enough of effective online instruction delivery because they did not have sufficient knowledge and skills.

Nonetheless, while both students and teachers have met the same numerous challenges, students seem to face more problems. As evident, Hartshorn & Mcmurry (2020) showed that the impacts of COVID-19 caused more stress for both students and teachers in all contexts; however, shifting to online teaching, students faced more challenges than their teachers.

Regarding the regions, based on the study of Chea et al. (2022), while developed countries obtained successful lessons in online learning and teaching in the forms of blended learning which combined between online teaching and physical classroom to help students locating in unfavourable areas, teachers in such developing countries as in Cambodia were not readily prepared when the schools were instantly closed and the education was shifted from the

traditional classrooms. In the same study, even though most teachers could have access to computers, they still preferred using smart phones for their online teaching.

Related to technology, online teaching and learning still caused other challenges even though technology enabled Cambodian university students to carry on their study through online learning during the pandemic due to shortage of experience which was partly from lecturers and partly from students in universities. As evident, according to the Network Readiness Index by Dutta & Lanvin (2019), Cambodia ranked 107 out of the surveyed 121 countries, obtaining 32.29 out of 100 scores, which showed that Cambodian lecturers and university students would face a lot of challenges in the process of online learning during the pandemic.

Regarding the university students' perception of online learning effectiveness, Em, Phann, & Khan (2022) found out that the target students had moderate perception of online learning effectiveness and showed insignificant difference in their perception in relation to gender and years of study.

Based on the investigation of all the above studies which focused on the topics of attitude towards online language learning during COVID-19 crisis with the purpose to show what can be expected in response to students' attitude towards the pandemic situation, the results showed both positively and negatively of online learning among students in all corners. The common feature of all the texts showed that every crisis could increase anxiety, decrease level of motivation, stress, reduce self-efficacy and willingness of communication, and generally have a negative attitude towards learning. Moreover, while individual differences may strongly impact language learning, the co-existence of other crises may also affect language learning as well.

1.3. Research Problem

All in all, concerning Cambodian education since the COVID-19 outbreak, a lot of local researchers have conducted their studies to find out the impacts of COVID-19, readiness for online learning and teaching, as well as perceptions of online learning platforms and technology during COVID-19 in Cambodia (Chet & Sok, 2020; Cheam, 2021; Sol, 2021; Chet et al., 2022; Chea et al., 2022; Em et al., 2022). Nevertheless, there has been little research which directly focuses on online English learning attitudes during the pandemic, in particular on relationship between students' attitude and gender, correlation between attitudes and university location (Phnom Penh and provincial universities) and university type (public and private universities).

Thus, to fill these knowledge gaps, the present study aimed to investigate the students' attitudes towards online English learning in the context of COVID-19.

1.4. Research Objectives

The present study had the following objectives:

- To study the students' attitudes towards online English learning during COVID-19.
- To compare the students' attitudes towards online English learning in relation to variables gender, location and type of universities.
- To study the relationship among the students' attitudes toward online English learning with respect to the five constructs.

2. METHODOLOGY

For this study, quantitative research methodology such as descriptive and correlation methods was used (Creswell & Creswell, 2018), and the gathered data were analysed by SPSS version 23.

2.1. Research Sample

The present study was conducted with 255 junior undergraduate students from various universities in Cambodia. 153 (60%) of the participants studied in Phnom Penh, while 102 (40%) studied in the provinces. Female students comprised 160 (62.7%) of the research sample and male students accounted for 95 (37.3%). The sample was formed using voluntary sampling technique where the students who filled out the readily-prepared online survey questionnaire were regarded as the research sample.

2.2. Research Instrument

The instrument for this study was an online survey questionnaire about the students' attitudes towards online English learning in the context of COVID-19. The questionnaire was divided into two key parts:

Part I: General Information

This part consists of eight items about the respondents' background information such as gender, age, university location (Phnom Penh and provinces), university type (public and private institutions), learning schedule, year of study, and major of study.

Part II: Students' Attitudes towards Online English Learning

This part consists of 25 Likert-scale items explaining five different constructs of students' attitudes towards Online English learning during Covid-19. The items were adapted from Pusey & Nanni (2022) presented in the following table. The rationales for adapting from this source were based on the consultation with colleagues as well its suitability to the context of online learning during COVID-19 in Cambodia.

Table 1
Attitudes and their operationalization

Construct	Operationalization
Effectiveness of Instruction (Items 9-13)	The degree which students believe the instruction they obtain is effective.
Open-mindedness (Items 14-18)	The degree which students welcome or are open-minded about online learning.
Autonomy in Study (Items 19-23)	The degree which students feel they are capable of learning autonomously in an online classroom or online environment.
Interaction (Items 24-28)	The degree which students believe that online learning allows or enhances interaction.
Anxiety (Items 29-33)	The degree which students feel nervous, anxious, or uncomfortable about online learning.

Before administering the main study, the researcher conducted a pilot survey among 15 students to see how well the instrument was developed and check the language used in the questionnaire. The final version of the survey questionnaire had a considerably high reliability with Cronbach's alpha value of 0.954[1].

Table 2
The characteristics of the adopted items

	Reliability	Normality Check (Shapiro-Wilk)	
		Sig.	Conclusion
Effectiveness	*.840*	*0.112*	Normal
Open-mindedness	*.901*	*0.001*	Not Normal
Autonomy	*.894*	*0.002*	Not Normal
Interaction	*.906*	*0.006*	Not Normal
Anxiety	*.894*	*0.002*	Not Normal

2.3. Data Collection

Because COVID-19 was still going on, in particular a new variant Omicron was emerging during the study, the data collection was carried out in an online format. Moreover, as the study focused not only on Phnom Penh students but also provincial students, the online survey was more convenient. The data collection took place around 60 days, and the questionnaire URL link in the Google Form was sent to the students via Telegram groups as well as through contact with relevant known teachers. In addition, to prevent from missing responses in any questions, all of them were turned on "required" so that the students did not skip any of them.

2.4. Data Analysis

The survey data were coded and entered into the SPSS program for analysis. Descriptive summaries and statistical tabulations were used to present the general information of the participants. Non-parametric tests: student's independent t-test and Mann-Whitney were used to compare students' attitudes in relation to gender, location, and type of universities in objective two, and Spearman's correlation was used to compare the five constructs of students' attitudes towards online English learning in objective three.

The interpretation of the descriptive information of each construct for the students' attitudes towards online English learning followed the following table.

[1] The reliability scale between 0.7 and 0.9 was considered high and good according to Kline (1999).

Table 3
Interpretation criteria for students' attitudes

Score Rank	Conclusion	Interpretation
1 - 2.25	Low	Very negative attitudes
2.25 - 3.5	Medium	Relatively negative attitudes
3.5 - 4.75	High	Considerably positive attitudes
4.75 - 6.0	Very High	Very positive attitudes

The interpretation of the relationship between each construct of the students' attitudes towards online English learning was based on the following table.

Table 4
Interpretation criteria of Spearman coefficients.

Spearman ρ	Correlation
≥ 0.70	Very strong relationship
0.40 – 0.69	Strong relationship
0.30 – 0.39	Moderate relationship
0.20 – 0.29	Weak relationship
0.01 – 0.19	No or negligible relationship

(In Leclezio et al., 2015 adapted from Dancey & Reidy, 2004)

3. RESEARCH FINDINGS

3.1. Participants' Information

There were 255 students participated in the study with the majority of them (62.7%) were female where male students covered 37.3% of the remaining sample. 81.2% of the participants aged between 18 and 24, those aged between 25 and 30 accounted for 12.2%, students who were under 18 years old made up of 8%, while those older than 30 occupied 5.9% of the research sample. In addition, students from private universities covered the biggest proportion (72.2%) while 27.8% of them were from public universities. Moreover, 60% of the participating students attended the universities in Phnom Penh while 40% of them studied in the provinces.

Regarding their learning sessions, most of them (63.9%) studied on weekdays, and 36.1% of the participants studied at the weekend. Among them, 45.9% were pursuing Year 3, while sophomores and senior students were 27.1% respectively. In relation to their majors, English literature students ranked the highest proportion (46.7%), followed by management (12.9%), accounting (10.6%), banking and finance (7.5%), international relation (3.9%), information and technology (3.9%), and others (12.6%).

However, there were 96 students equalling to 37.6% revealed their intention to carry on online learning but in a hybrid manner. Besides, 22% wanted to further their online class.

Table 5
Students' perception regarding the continuation of online learning after COVID-19 ends.

	Frequency	Percent
Want to go on	56	22
Do not want to go on	103	40.4
Want to go on in hybrid	96	37.6
Total	255	100.0

3.2. Students' Attitudes towards Online English Learning

Objective 1: Students' Attitudes towards Online English learning

Table 6
Mean and standard deviation values of the five constructs.

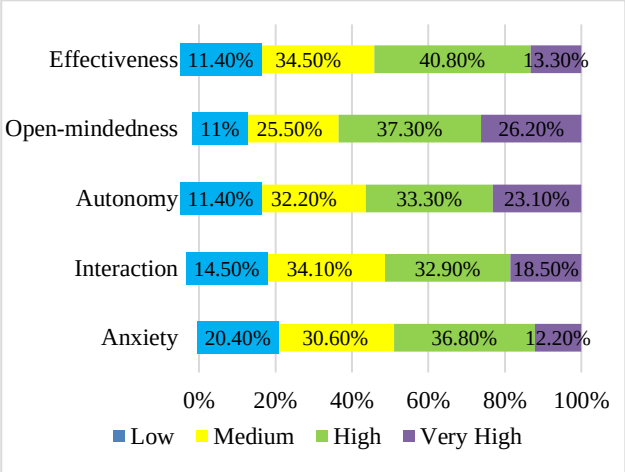
Construct	Mean	SD	Interpretation
Effectiveness	3.58	0.99	High
Open-mindedness	3.85	1.12	High
Autonomy	3.74	1.10	High
Interaction	3.60	1.12	High
Anxiety	3.38	1.12	Medium

The interpretation of the finding in this section followed the criteria shown in Table 3 in section 2.4 above. The variant means and standard deviation (SD) indicated different attitudes towards online English learning. In general, most students thought that online learning had high effect on their English e-learning. Also, students perceived that online learning promote their open-mindedness (*Mean = 3.85, SD = 1.12*) than other items, for instance, autonomy, interaction, and effectiveness of instruction (see Table 6). While the students' perceptions about the four-mentioned constructs were high, only the students' perception on the anxiety imposed by online English learning showed a medium level (*Mean =3.38, SD=1.12*). The findings implied that the students had high positive attitudes towards their online English learning during COVID-19 pandemic.

Moreover, in order to show more clearly and deeply about students' attitudes, the five constructs of students' attitudes towards online English learning were set from low to very high (See Figure 1).

Figure 1

Four levels of the five constructs of students' attitude towards online English learning



Based on data in Figure 1, the effectiveness of instruction in online English learning revealed that most students had a confident attitude that the instruction they obtained in online classroom with a high level (40.8%) plus even a very high one (13.3%) whereas the medium and low levels were 34.5% and 11.4% respectively.

For open-mindedness in online English learning, the result showed that students had the attitude of welcoming or being open-minded about online learning with a very high level of 26.2% along with a high level of 37.3%, while the medium and low levels were 25.5% and 11% respectively.

Regarding the autonomy construct which wanted to find out whether students felt that they had abilities to study autonomously in online class or online environment, it was shown that students had the attitude of giving high value on autonomy with a very high and high levels of 23.1% and 33.3% respectively, followed by 32.2% of medium level and 11.4% of low level.

For the interaction construct which studied students' confidence on whether online learning may allow or enhance interaction, the result showed that most students seemed to have semi-autonomy as the medium level was 34.1% and the high level was 32.9%, followed by the very high level (18.4%) and the low level (14.5%).

Last but not least, for the anxiety construct which focused on whether students felt nervous, anxious, or uncomfortable about online learning or not, most students were found out to have a high level of anxiety up to 36.8% and a very high one in 12.2%, while the medium and low levels were 30.6% and 20.4% respectively.

Objective 2: Comparison of the Students' Attitudes with Respect to Different Subgroups

Based on the results of independent t-test in Table 7, students' attitudes on effectiveness of instruction towards online English learning during COVID-19 was found to be no significantly different in gender, university location, and university type variables.

Table 7

Comparison of the attitudes in relation to gender, university location and university type.

	Gender	University Location	University Type
	Sig.	*Sig.*	*Sig.*
Effectiveness	*.106*	*.842*	*.252*
Open-mindedness	*0.041*	*0.426*	*0.049*
Autonomy	*0.010*	*0.358*	*0.077*
Interaction	*0.38*	*0.735*	*0.47*
Anxiety	*0.867*	*0.166*	*0.939*

The same as the effectiveness of instruction, Mann-Whitney tests showed that the students' attitudes on interaction and anxiety towards online English learning were also found to be statistical insignificant in relation to variables of gender, university location and type.

However, the Mann-Whitney results revealed that the students' attitudes on open-mindedness was shown to be significantly different in gender, and male students had a more positive view (*Median = 4.00*) compared to the female (*Median = 3.80*). In addition, the students' attitude on open-mindedness was also expressed to be significantly different in relation to university type, and the private university students perceived more positively (*Median = 4.00*) than public university students (*Median = 3.60*).

Moreover, regarding the students' attitudes on autonomy towards online English learning was found to be significantly different only in relation to gender. It was evidenced that male viewed more positively (*Median = 4.00*) compared to their female peers (*Median = 3.40*). However, the differences of students' attitudes towards autonomy of instruction were not found among variables of university location and type.

Objective 3: Relationships among Constructs of the Students' Attitudes

Table 8
Spearman Correlations among students' attitudes

	1	2	3	4	5
1. Effectiveness of Instruction	1.0	.753**	.779**	.770**	.312**
	.	.001	.001	.001	.001
2. Autonomy		1.0	.775**	.823**	.277**
		.	.001	.001	.001
3. Interaction			1.0	.833**	.338**
			.	.001	.001
4. Open-mindedness				1.0	.273**
				.	.001
5. Anxiety					1.0
					.

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 8 above, the results related to correlation among the five constructs of the students' attitudes towards online English learning during COVID-19 showed a positive trend from a low to a high level.

Based on the interpretation criteria of Spearman correlation coefficients as shown in Table 4 in Section 2.4, the students' attitudes related to "effectiveness of online instruction" had a very strong positive relationship ($\rho = 0.753$) with their attitudes relevant to "autonomy of students in online English learning". Based on this correlation, it could be concluded that when the teachers' effectiveness of online instruction was higher, the students seemed to understand that online learning created higher autonomy in their learning during COVID-19 pandemic.

In addition, the effectiveness of online instruction also had a very strong relationship with students' interaction in online English learning ($\rho = 0.779$), in which we could draw a conclusion that higher effectiveness of instruction might lead students to have a higher trend of interaction in online learning during the pandemic. Furthermore, the effectiveness of online instruction was still strongly correlated with the open-mindedness in online learning ($\rho = 0.770$), which could be concluded that students would welcome online learning when there was high effectiveness in online teaching.

Much different from above, the students' views on the effectiveness of online instruction had a moderate relationship with anxiety imposed by online learning ($\rho = 0.312$). Regarding students' autonomy in online English learning, it was also strongly correlated with the students' interaction in online English learning ($\rho = 0.775$), which could mean when students had autonomy in online English learning, it could lead them to be more active to participate in every activity in online learning. In addition, it even had much stronger relationship with students' open-mindedness ($\rho = 0.823$), which could show that students' autonomy seemed to enable them to increasingly accept online learning. Nevertheless, it had a weak relationship with students' anxiety in online learning ($\rho = 0.277$), which could reveal that because of high students' autonomy it might reduce students' anxiety in online learning, too.

Looking at students' interaction in online English learning, it had a very strong relationship with students' open-mindedness in online English learning ($\rho = 0.833$), which could be concluded that when students had more interaction in the online class, they also seemed to welcome the online learning. Similar to the effectiveness of online instruction, it also had a moderate relationship with students' anxiety in online English learning ($\rho = 0.338$). This could mean that when students conducted more interaction in online learning, it might decrease their anxiety in online learning.

Related to students' open-mindedness in online English learning, it had a weak relationship with their anxiety ($\rho = 0.273$), which might reveal that when

they welcomed online learning, they also seemed not to be anxious about online learning.

To sum up, the above findings showed the correlation between various constructs of students in online English learning generally had a moderate and weak relationship with students' anxiety, so we could draw a conclusion that most students had a positive attitude towards online English learning during COVID-19 crisis.

4. DISCUSSION

4.1. Objective 1

Related to objective 1 that studied about students' attitudes towards Online English learning focusing on the five constructs, four of them ranked from very high to high level, of which open-mindedness was the highest one, followed by autonomy, interaction, and effectiveness of instruction (Refer to Table 6).

Based on this finding, it could be discussed that most students had a positive attitude towards online learning during COVID-19 pandemic because they had convenience in online learning, which was congruent to the study of Cinkara & Bagceci (2013); Joseph & Nath (2013); Jiang et al. (2022), and Shahzad et al. (2020), all of which found out that English learners had a positive attitude towards online learning during COVID-19 expansion. Among those studies, Shahzad et al. (2020) stated that online learning brought the positive change of students' attitude because they had determination and commitment to their study as well as welcome to online learning during COVID-19 situation. They also showed their comfort during online learning, could contact their teachers easily and ask questions in voices or messages; moreover, their teachers could either reply to them directly while studying in online class or when they were free.

In addition, the research finding was also consistent with the research of Novikova et al. (2022) which showed a positive attitude in digital utilization in education such as getting learning materials, saving time, having convenience and comfort while studying, as well as obtaining fast and large information. In addition, based on the study of Hazaymeh (2021) revealed that most students up to 86.66% effectively obtained their language proficiency through online distance learning, and they had a positive attitude towards online learning which could empower them and got high scores in creativity and innovation, communication and collaboration, research and information proficiency, critical thinking, problem-solving, decision, and digital citizenship.

Among all the constructs of students' attitude, only anxiety construct was shown in the lowest level (Table 6); therefore, we could discuss that students did not feel anxious in their online English learning, which was congruent to the research of Resnik & Dewaele (2021) which found out that students felt happy rather than being anxious both in English physical classroom and in distance teaching contexts; however, their enjoyment in English learning was a bit lower in English distance teaching than in physical classroom.

4.2. Objective 2

Regarding Objective 2, it was revealed that student open-mindedness had significant relationship with gender, and in particular male students had more positive views towards online learning. This result shows that male and female students are different in terms of new technological tools and advancements, and male students usually seem to spend more time on internet and have more interest in the use of technological devices (Dhamija, 2014). Moreover, they have more new strategies and welcome online learning more than female ones. Alghamdi et al. (2020) raised that males have better learning strategies and technical skills than females in the online learning contexts. Due to these, male students may have better attitude than female students towards online learning.

Moreover, another result in Objective 2 which reveals that student open-mindedness also had significance with the type of university, in which the students from private universities seemed to view it more positively than those from the public university. Based on this, it could be inferred that the students in the private universities who had more affordability and access to internet as well as various facilities during online learning, in particular when their universities were mostly located in the towns, enabled them to have more positive attitude towards their online learning than their counterparts in the public universities.

The last finding in Objective 2 which found out the significant relationship between students' autonomy and gender, it could be inferred that male and female students had a little bit difference in their autonomy towards online English learning; in particular, male generally felt more curious in accessing and finding out how to use technology during online learning. However, this finding was strongly contrary to the finding of Firat (2016) which showed no significant difference between students' autonomy and gender.

4.3. Objective 3

Regarding objective 3 which studied the correlation between the five constructs of students' attitude towards English online teaching and based on the Spearman correlation's result, the effectiveness of online instruction was strongly correlated with autonomy of online English learning. Generally, when students were independent in their learning, it also relied on the effectiveness of instruction. Certainly, these two factors were strongly interdependent in learning, and this finding had a strong correlation with the finding of Tsai (2021) research that found strong distinction between the student groups who followed the instruction particularly related to students' autonomy strategies, behaviour, and confidence. Moreover, based on the analysis of the course management system list in the same study, it also revealed strong correlation between online learning activities and students' autonomy as well.

In addition, the effectiveness of online instruction had strong relationship with students' interaction in online English learning, which was strongly congruent to the study of Kyei-Blankson et al. (2019) that showed the teacher-student interaction and the student-lesson content interaction was more significant than the student-student interaction; moreover, teachers' presence played a strong role in students' learning after the presence of knowledge and society. Moreover, this finding was consistent with the study of Sher (2009) that showed that student-teacher interaction was one of many key factors in promoting students' satisfaction in online courses. In this study, it also revealed that a teacher or an institution should set up a learning environment which motivates student-teacher and student-student interaction. Moreover, if wanting to create a satisfactory learning environment, a teacher has to encourage students to actively participate in discussion during the course, provide feedback on students' work, and tell them about their academic progress as well as regard them as different individuals. Furthermore, the online learning environment should be the one that motivates students to share their learning experience, builds community spirit among all students, and supports teamwork as well.

Besides, the finding which found that the effectiveness of online instruction had very strong relationship with students' open-mindedness was consistent with the result of Shaaruddin & Mohamad (2017) that showed the effectiveness of active learning strategy including enhancing ideology of open-mindedness among other strategies such as establishing positive learning environment, allowing direct interaction between teachers and students, enhancing communication skill, letting students participate individually in learning activities, and encouraging the contribution.

However, the finding which showed moderate relationship between the effectiveness of instruction and students' anxiety in online learning was similar to the finding of Ajmal & Ahmad (2019) that found because of the distance students could not discuss or share various issues with their teachers daily, which caused them to feel anxious in online learning method among other causes of anxiety such as shortage of interaction with classmates, shortage of knowledge and understanding about the exam format, exam schedule, and exam location.

Related to the students' autonomy that showed very strong relationship with interaction and open-mindedness in Online English learning was strongly congruent to the study of Bray et al. (2008) whose finding revealed that students who had high satisfaction in online learning were the ones that could overcome challenges in distance learning and feel easy to use computer and to communicate with teachers. Related to this autonomy-interaction correlation, the development of student autonomy required students to understand the level of autonomy required for online learning, and they needed to be aware of their own strategy, strength and weakness in

addition to the understanding of their dependency on others (Eneau & Develotte, 2012).

Nevertheless, the students' autonomy in online learning had a poor relationship with students' anxiety, and this finding was similar to the research of Bai et al. (2020) that found learning anxiety and learning effectiveness indirectly impacted the behaviour of autonomous learning through learning motivation.

Regarding the strong relationship between interaction and open-mindedness in online English learning was congruent to the result of Nelson Laird (2005), whose finding revealed that the amount of interaction that students had with multiple friends was important in the analysis of open-mindedness; moreover, this finding gave a recommendation that enhancing interaction between a student with a lot of classmates could enable that one to be more open-minded and independent in the quality of every interaction.

Moreover, the moderate relationship between interaction and anxiety was consistent with the study of Azizi et al. (2022), whose qualitative result disclosed that the interaction quality in online course was poor because it could lead to students' anxiety and dissatisfaction in online class, and because they might not begin group work and project in the class, did not have enough time to share and discuss views with others and to get feedback from their friends or teachers. In this study, it also expressed a moderate negative correlation between university students' satisfaction and anxiety in online class, which meant the more satisfied they were in online class, the less anxious they were.

5. CONCLUSION

5.1. Conclusion

In overall, the results revealed that four out of the five constructs of the students' attitudes towards online English learning had high levels, except a medium level for the anxiety construct. In addition, those five constructs were strongly correlated but had moderate and weak correlation with anxiety construct. Furthermore, regarding gender, open-mindedness and autonomy constructs were found to be significantly different, in which male viewed more positively compared to female. Besides, concerning the university type, only open-mindedness construct was significantly different, in which students from private universities perceived more positive views than students from public universities.

5.2. Implications

Even though the research findings revealed that students had more positive attitude towards their online English learning during COVID-19, most of them seemed not to welcome back to online learning as when they were asked whether they wanted to study online or not (refer to Table 5), 40.4% showed that they did not want to study online at all, while 37.6% revealed their intention to carry on online learning but in a hybrid manner. This could be caused by a few implications.

First, it might be related to pedagogical implication in which some teachers were still not familiar with the utilization of technological tools and teaching techniques to conduct their online teaching delivery more effectively and satisfactorily.

Moreover, it could be in terms of curriculum implication that most educational institutions in Cambodia did not fully prepare their curricula which could effectively respond to educational online platforms which started abruptly because of the COVID-19 pandemic. As a result, both private and public institutions should focus more on providing more pedagogical training to teachers on using online platforms and developing appropriately separate curriculum for online teaching delivery in the future.

5.3 Limitation and Further Study

This study also has some limitations. First is limitation of method and design as this study was conducted online in Google form and sent via telegram to target university students in Phnom Penh and a few provinces, where the researcher has gone to work; thus, the number of samples was still narrow as it did not cover universities in the whole country. Second is limitation of data techniques because this study focused only on students' attitude which did not include the attitude on teachers' side. Moreover, there was difficulty in determining which attitude derived from online learning and which one originated from the general crisis situation which the study

respondents were facing, especially for the sources of students' anxiety in online learning.

For the future study, the researcher may conduct in a number of directions. First, for later research, the researcher will collect student samples which cover more universities than this in the whole country. Second, the researcher will modify the questionnaire to include the teachers' views on language education during the crisis, which will enable this research to raise comprehensive understanding in English language learning and teaching during the crisis. For the last direction, the researcher will conduct attitude-related study in each construct more comprehensively in order to determine much clearly about the source of each attitude.

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APPENDIX

SURVEY QUESTIONNAIRE

"A Small-Scale Study on Students' Attitudes toward Online English Learning in the Context of COVID-19 in Cambodia"

I am doing research on "A Small-Scale Study on Students' Attitudes toward Online English Learning in the Context of COVID-19 in Cambodia;" therefore, I would like to invite you all to spend around 10 minutes to fill out this survey. The purpose of this research is to find out the attitudes of students related to online English learning during the COVID-19 pandemic focusing on 5 aspects: effectiveness of instruction, autonomy in study, open-mindedness, interaction, and anxiety. Thus, your participation can help create necessary data and useful knowledge related to the above research, which is the most current issue that has not been comprehensively studied in Cambodia yet.

Your participation in this study will not involve any risk because the information which is provided to me is kept confidential and used by me for the purpose of organizing, analyzing, and writing the research report only.

I would like to deeply thank you for your participation in this survey.

Part 1: General Information

Q1- Gender: ☐ Male ☐ Female
Q2- Age: ☐ Below 18 ☐ 18-24 ☐ 25-30 ☐ Over 30
Q3- Location of University: ☐ Phnom Penh ☐Province
Q4- Type of University: ☐ Public/State ☐ Private
Q5- Study Session: ☐ Morning ☐ Afternoon ☐ Evening ☐ Weekend
Q6- Year of Study: ☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4
Q7- Major: ☐ English Literature ☐ Finance and Banking ☐ Accounting ☐ Management
☐ IR ☐ IT ☐ Others
Q8- Willingness to stud online after the end of Covid-19 pandemic
☐ Yes ☐ No ☐ Yes, but in hybrid manner.

Part II: Students' Attitudes towards Online English learning

In this part, please rate to what extent you agree or disagree with the following:

1 = Strongly Disagree 2 = Moderately Disagree 3 = Slightly Disagree
4 = Slightly Agree 5 = Moderately Agree 6 = Strongly Agree

Item	Perception Statements	1	2	3	4	5	6
Effectiveness of Instruction							
Q9	My teacher used various tasks to engage students in my online English classes.	☐	☐	☐	☐	☐	☐
Q10	My English teachers could provide effective feedback during online learning.	☐	☐	☐	☐	☐	☐
Q11	Online classes helped me learn English better than physical classes.	☐	☐	☐	☐	☐	☐
Q12	It was easy to understand the teachers' explanation in an online class.	☐	☐	☐	☐	☐	☐

Q13	My teacher could manage the online class and the students just like he does in physical classes.	☐	☐	☐	☐	☐	☐
Autonomy in Study							
Q14	Online learning let me work at my own pace.	☐	☐	☐	☐	☐	☐
Q15	I could learn independently in an online class.	☐	☐	☐	☐	☐	☐
Q16	I felt comfortable in online learning outside a normal physical class.	☐	☐	☐	☐	☐	☐
Q17	I knew I would succeed in an online class.	☐	☐	☐	☐	☐	☐
Q18	I felt at ease to catch up with teachers teaching online.	☐	☐	☐	☐	☐	☐
Open-mindedness							
Q19	I felt excited about online learning.	☐	☐	☐	☐	☐	☐
Q20	Doing an online class was a good learning opportunity.	☐	☐	☐	☐	☐	☐
Q21	I wanted to learn how to use technology for online learning.	☐	☐	☐	☐	☐	☐
Q22	I welcomed all challenges of learning in an online environment.	☐	☐	☐	☐	☐	☐
Q23	I obtained creativity from online learning.	☐	☐	☐	☐	☐	☐
Interaction							
Q24	I could actively participate in every activity in my online English class.	☐	☐	☐	☐	☐	☐
Q25	I had a lot of opportunities to practice my English in online classes.	☐	☐	☐	☐	☐	☐
Q26	I had a lot of opportunities to hear my classmates discussing learning during my online English classes.	☐	☐	☐	☐	☐	☐
Q27	I had a lot of opportunities to talk to my teachers about lessons in my online English class.	☐	☐	☐	☐	☐	☐
Q28	I could work out or discuss the problems with my partners or my friends like we do in physical classes.	☐	☐	☐	☐	☐	☐
Anxiety							
Q29	I felt nervous and over-reacted to online learning.	☐	☐	☐	☐	☐	☐
Q30	I felt worried that learning online requires digital knowledge and skills to learn the lesson contents effectively.	☐	☐	☐	☐	☐	☐
Q31	I felt worried that I might fail the exam by learning online.	☐	☐	☐	☐	☐	☐
Q32	I felt nervous and panicked when taking the test/exam online during my online classes.	☐	☐	☐	☐	☐	☐
Q33	I felt worried that I might not interact or respond well to my teacher or friends when learning online.	☐	☐	☐	☐	☐	☐

Thanks for spending your valuable time to complete this questionnaire!

កាលិកបត្រស្រាវជ្រាវមនុស្សសាស្ត្រនិងវិទ្យាសាស្ត្រសង្គម

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MoEYS's Intervention During Covid-19 School Closure: Strategies and Measures, Challenges and Future Readiness

អន្តរាគមន៍របស់ក្រសួងអប់រំយុវជននិងកីឡា អំឡុងពេលបិទសាលាដោយសារកូវីដ-១៩៖ យុទ្ធសាស្ត្រនិងវិធានការអប់រំ បញ្ហាប្រឈម និងការត្រៀមខ្លួនសម្រាប់អនាគត

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ABSTRACT

COVID-19 pandemics caused unprecedent impacts on Cambodia's education, and to prevent community outbreak, Cambodian government issued sets of social distancing measures with closure of all educational institutions and others. To leverage the impact on the students' learning, MoEYS provided numerous supporting programs. The study focused on (i) the MoEYS's intervention, (ii) the challenged MoEYS faced and (iii) the MoEYS's readiness for future crisis. Qualitative in-depth interview with 10 key informants were used to gather research data. The study found that to support teaching and learning during school closure, thousands of video lessons were produced. Various e-learning platforms were developed and launched for self-learning. 17% of high schools were equipped with ICT infrastructure, and 13% of teachers were trained in how to use or teach using ICT. Difficulties in arranging online working, developing online inspection tools, and educational quality became the most challenging situation for MoEYS. However, the results from intervention programs such as the newly developed videos and learning materials, the ICT

infrastructure provided to schools, training programs launched became the key assets for MoEYS's readiness to deal with similar crisis in the future. The study recommends that all developed video, measures and intervention procedures be documented, blended learning using ICT be remained, further develop e-learning materials, keep providing ICT skills development and ICT facilities, provide more supports for disadvantage schools, and promote mental health education.

KEYWORDS: Ministry of Education, Youth and Sport, COVID-19, strategy, challenge, readiness

សង្ខិត្តន័យ

ការរីករាលដាលនៃជំងឺកូវីដ-១៩បានធ្វើឱ្យប៉ះពាល់យ៉ាងធ្ងន់ធ្ងរដល់ការអប់រំនៅក្នុងប្រទេសកម្ពុជា ហើយក្នុងគោលបំណងការពារនូវការឆ្លងទ្រង់ទ្រាយធំក្នុងសហគមន៍ រាជរដ្ឋាភិបាលកម្ពុជាបានប្រកាសបិទនូវគ្រឹះស្ថានអប់រំទាំងអស់ ដោយការរៀននិងបង្រៀនត្រូវអនុវត្តពីចម្ងាយឬតាមអនឡាញ។ ដើម្បីកាត់បន្ថយនូវផលប៉ះពាល់ដល់ការអប់រំរបស់កុមារ ក្រសួងអប់រំ យុវជន និងកីឡាបានដាក់ចេញនូវយន្តការទ្រទ្រង់ការអប់រំជាច្រើន។ ការស្រាវជ្រាវនេះផ្តោតជាសំខាន់ទៅលើ (១) យន្តការទ្រទ្រង់ការអប់រំរបស់ក្រសួង, (២) បញ្ហាប្រឈមដែលបានជួបប្រទះ និង (៣) ការត្រៀមខ្លួនសម្រាប់អនាគតរបស់ក្រសួងអប់រំប្រសិនបើមានបញ្ហាប្រហាក់ប្រហែលគ្នាកើតឡើងនាពេលអនាគត។ វិធីស្រាវជ្រាវគុណវិស័យដោយការសម្ភាសបែបស៊ីជម្រៅជាមួយនឹងក្រុមគោលដៅសំខាន់ៗចំនួន១០នាក់ ត្រូវបានប្រើប្រាស់ដើម្បីប្រមូលទិន្នន័យសម្រាប់ការស្រាវជ្រាវ។ ការសិក្សានេះបានរកឃើញថាដើម្បីទ្រទ្រង់នូវការបង្រៀននិងរៀនក្នុងអំឡុងកូវីដ-១៩នេះ ក្រសួងអប់រំ យុវជន និងកីឡាបានផលិតនូវកម្រងវីឌីអូសិក្សារាប់ពាន់មេរៀននិងប្រធានបទ។ ក្រៅពីនេះនៅមានសម្ភារៈសិក្សាពីចម្ងាយនិងតាមអនឡាញជាច្រើនទៀតត្រូវបានផលិត និងដាក់បញ្ចូលក្នុងប្រព័ន្ធសិក្សាតាមអនឡាញនានា។ ជាមួយគ្នានេះ មានសាលារៀនចំនួន ១៧% ត្រូវបានបំពាក់នូវបរិក្ខារបច្ចេកវិទ្យា មានគ្រូបង្រៀនចំនួន ១៣% ទទួលបានការបណ្តុះបណ្តាលជំនាញបច្ចេកវិទ្យាសម្រាប់ការរៀនពីចម្ងាយនិងតាមអនឡាញ។ បញ្ហាប្រឈមដែលក្រសួងបានជួបប្រទះក្នុងអំឡុងពេលកូវីដ-១៩មានដូចជា ការពិបាកក្នុងការរៀបចំកិច្ចប្រជុំឬធ្វើការតាមអនឡាញ ការផលិតឧបករណ៍វាយតម្លៃតាមអនឡាញ និងបញ្ហាពាក់ព័ន្ធនឹងគុណភាពនៃការអប់រំ។ ទោះជាយ៉ាងណា លទ្ធផលដែលទទួលបានពីយន្តការនានាដែលក្រសួងអប់រំបានដាក់ចេញ ដូចជា កម្រងវីឌីអូមេរៀនដែលផលិតបាន គ្រូបង្រៀនដែលទទួលបានការអប់រំលើបច្ចេកវិទ្យាបង្រៀនតាមអនឡាញ ហេដ្ឋារចនាសម្ព័ន្ធបច្ចេកវិទ្យាដែលបំពាក់នៅតាមសាលារៀន និងក្លាយទៅជាចំណុចវិជ្ជមានសម្រាប់ក្រសួងអប់រំក្នុងការត្រៀមខ្លួនសម្រាប់អនាគត។ អនុសាសន៍ដែលផ្តល់ជូនចេញពីការសិក្សានេះមានដូចជា (១) ចងក្រងទុកនូវវីឌីអូមេរៀន បទពិសោធន៍ និងយុទ្ធសាស្ត្រដែលបានដាក់ចេញសម្រាប់ជាមេរៀននាពេលអនាគត, (២) បន្តប្រើប្រាស់ការរៀននិងបង្រៀនដោយប្រើវិធីចម្រុះ (blended learning), (៣) បន្តផលិតកម្រងវីឌីអូមេរៀន, បន្តបំពាក់នូវហេដ្ឋារចនាសម្ព័ន្ធបច្ចេកវិទ្យាតាមសាលារៀន, (៤) ផ្តល់ការគាំទ្រសម្រាប់សាលារៀននៅតាមតំបន់ងាយរងគ្រោះ និង (៥) បញ្ចូលនូវការអប់ទាក់ទងនឹងសុខភាពផ្លូវចិត្តដល់គ្រូនិងសិស្ស។

ពាក្យគន្លឹះ ក្រសួងអប់រំយុវជននិងកីឡា, កូវីដ១៩, យុទ្ធសាស្ត្រ, បញ្ហាប្រឈម, ការត្រៀមខ្លួនសម្រាប់អនាគត

1. INTRODUCTION

The World Health Organization (WHO) announced the Coronavirus Disease of 2019 as a pandemic on March 11, 2020. On March 16, 2020, in order to prevent community outbreak, the Royal Government of Cambodia (RGC) put a strong measure to close all educational institutions as well as the administration departments at national level. Closure of educational institutions and related was believed to be the best way to secure the lives of students, teachers and education staff from COVID-19. It was the first time in education history that the global pandemic largely disrupted more than 190 countries with nearly 1.6 billion learners and 0.63 billion teachers (Nugroho et al., 2020). In Cambodia alone, it was estimated that 3.2 million students (MoEYS & ESWG, 2021) and

113,000 school personnel, of which 93,225 were teachers were affected (Chhy, 2020). The closure periods varied from one country to another. Cambodian schools were closed for more than half of the official school calendar across the academic year 2019-2020 and 2020-2021, ranking the fourth for fully prolonged closure among South-East Asian countries (ADB, 2021). It was estimated that 3.2 million Cambodian students were affected by the outbreak (MoEYS & ESWG, 2021).

Without clear information on schools reopening, the Ministry of Education Youth and Sport (MoEYS) and development partners implemented remote learning to continue teaching and learning (MoEYS & UNICEF, 2022). MoEYS had developed a response plan and financial plan which focused on safe remote teaching and learning, student and staff safety, adaptable learning environment, and resilience education system (MoEYS & ESWG, 2021). It was an immediate transformation to technological-based teaching and learning. Such rapid adoption of technology in teaching and learning created challenges for both teachers and students Thy et al. (2023) since they were not ready (Chea et al., 2022). This situation may also apply to the staff of MoEYS at the central level. A sudden switch from working from the office to home, and from traditional face-to-face to distance online was also complicated. In addition, Cambodian schools did not have much autonomy and resources to function independently but awaited guidance and resources from the central administration. In this sense, more loads were put on central staff in addition to their existing tasks. However, a lack of studies on how the central department work during the pandemic in general, in Cambodia in particular. Therefore, this study aims to explore and understand MoEYS's intervention dealing with managing and supporting teaching and learning during the outbreak.

1.1. Research Purpose

The current research focused on the MoEYS's intervention in alleviating the impact of Covid-19 on teaching and learning at upper secondary schools. With this objective, the research was guided by the following research questions:

- What were the coping strategies and measures MoEYS laid out to support the continuation of teaching and learning during school closure?
- What challenges did MoEYS face during their intervention in supporting teaching and learning during school closure?
- How ready are MoEYS to support the continuation of teaching and learning if a similar situation (pandemic) happens in the future?

2. METHODOLOGY

The current study employed qualitative methodology design in which in-depth interviews with key informants were used to gather the research data.

2.1. Sample and Data

The selection of research respondents followed convenient and purposive sampling techniques. The selection was based on the principle of being conveniently approachable and that the target informants could provide comprehensive data and information to the study. A total of 10 key informants were contacted: one female and nine males with ages between 37 and 57 years old. The participants were key staff and experts from different departments of MoEYS and relevant public educational institutions such as (i) National Institute of Education (NIE), (ii) Department of Information and Technology (DIT), (iii) Department of Examination Affairs (DEA), (iv) Education Quality Assurance Department (EQAD), and (v) General Secondary Education Department (GSED) of MoEYS. The average length of the interviews was about 45 minutes.

2.2. Research Instrument

The research data were collected through in-depth interview with key informants using a series of interview question (see Appendix). The interview questions covered different aspects of the educational situations and interventions that MoEYS issued to support the teaching and learning school closure. The interview questions also covered key aspects of challenges MoEYS faced during the implementation of educational interventions as well as MoEYS's readiness in educational supporting mechanism for future crisis. Additional questions covering insightful information were also asked depending on each informant's responses.

2.3. Data Analysis

The interviews' scripts were transcribed and analyzed using qualitative content analysis procedures with thematic categorization to capture key information to the research questions. The analysis focused on the issues covered as followed:

- the MoEYS' educational interventions or supporting mechanism which could be viewed as opportunities/advantages gained during the pandemic.
- the challenges MoEYS faced during the implementation of educational supporting programs during Covid-19.
- MoEYS' readiness in deploying educational supports if a similar crisis happens in the future.

3. RESEARCH FINDINGS

This section presented the findings from the study that involved 10 key informants from MoEYS and relevant educational institutions in Cambodia. The findings were intended to cover the following questions.

- *What were the coping strategies and measures MoEYS laid out to support the continuation of teaching and learning during school closure?*
- *What challenges did MoEYS face during their intervention in supporting teaching and learning during school closure?*
- *How ready are MoEYS to support the continuation of teaching and learning if a similar situation (pandemic) happens in the future?*

3.1. MoEYS's Strategies and Measures

Undeniably, the Covid-19 pandemics hit Cambodia's education hard and affected both teaching and learning at all school levels. During this critical period, MoEYS and relevant stakeholders issued numerous educational supporting programs to make the continuation of teaching and learning possible and to minimize learning loss among students as much as possible. In this study, it was found that MoEYS and its partners delivered the following key educational supporting programs as urgent intervention.

E-learning Materials Development

Under the supervision of the General Secondary Education Department (GSED), numerous distance and online teaching and learning resources including online video lessons, worksheets and other important teaching and learning materials have been developed. Even started for the purpose of online teaching and learning during school closure, some material development activities are still going on, and the materials developed could be used over and over again in the future.

> *At the first stage, we solely developed these teaching and learning materials for grades 9 and 12 due to the requirement for national examinations. We worked with selected teachers of six subjects: Khmer language (Khmer literature), mathematics, physics, chemistry, biology and history for developing lesson videos.*
>
> *[...] when the situation was getting worse and worse and all schools were closed, GSED started developing the first batch of documents which we called lesson videos and covered all grades.*
>
> *[…] up to now, [time of interview] the development process was still in continuation. Another batch of materials and documents were developed which we called guiding lessons to assist the students to learn more effectively.*

In addition to ready-to-use material development, GSED and relevant departments had involved in developing and distributing the materials to more easily accessible technological platforms such as MoEYS's mobile apps, websites, YouTube channel and TV broadcast etc.

> *[…] when the quality of our questions [worksheet] becomes better and better, we planned to develop a mobile app to make it easy to access and be aligned with digital context, digital economics and government. Between 2023 and 2025, this work will become a system that supports education and reduces using textbooks by making it so digital that students anywhere can have it. One more thing is to catch digital education for a digital economy foundation.*

Approximately, 5,000 video lessons were developed and among these, 1,800 videos for the high school level and covered all subject matter were developed and distributed for use during this period.

Pedagogical and Technological Trainings

In cooperation with several units and departments, MoEYS also provided number of pedagogical and technological trainings to school teachers on how to conduct online lessons using available technology such as Messenger, Google Meet, Telegram, Google Classroom and many others. It was reported that NIE

had trained 250 to 300 academic staff, TTD had trained number of teacher trainers in the regional and provincial teacher training colleges and teacher education colleges. According to DIT, the total number of trained people reached 1,064 for physical and 12,000 for virtual training, and this figure accounted for about 13% of Cambodian school teachers. It was emphasized that most of the trained teachers are working in urban schools, where they were more likely to have access to the Internet connection, possessed electronic devices for teaching.

Equipment of ICT Materials at Schools

In addition to material development and training, MoEYS and its responsible units and department would equip several schools with ICT supported system and infrastructures. By February 2022, through DIT, 17% of high schools (525 in total) have been equipped with computer rooms together with internet connection. The number of computers ranges from 24 to 80 units depending on the school size. More than 50 (about 10%) other high schools received tablets between 10 to 20 items per school. It should be noted that the equipment of these ICT materials was not solely done during the pandemics, but rather a combined efforts before and during the school closure. The project could be viewed as an accelerating activity to existing projects aimed at enhancing the school's capacity for digital education. COVID-19 pandemics had accelerated the process for school material and infrastructure development for digital era, and its accomplishment was beyond the objectives set before the pandemics.

3.2. MoEYS's Facing Challenges

Together with the launch of educational supporting programs, MoEYS faced with challenges during this time period. The study has identified the following key challenges that MoEYS faced.

Meeting Arrangements

Meeting has been viewed has a mean to get thing done collectively; however, a sudden change from face-to-face meeting to online or virtual meeting had imposed challenges for both the organizers and participants. In this study, the challenges in meeting arrangement were due to the following reasons:

- lack of ICT skills in operating new technology, meeting platforms and electronic devices etc.
- hard to control the online discussion due to lack of interactive environment.
- possessed certain level of resistance to online meeting due to the lack of ICT skills.
- Internet connection issues which caused meeting disruption and poor communication environment.

Establishing Working Mechanism

The spread of Covid-19 had happened unpredictably, MoEYS experienced quite challenging situation in establishing working mechanism during school closure. All relevant departments were required to set up new working environment during school closure. Due to social distancing measures, online working, meeting and inspecting were mandatory, which then required each responsible department to develop proper online inspection tools and mechanism. Lack of experience, the requirement of ICT skills coupled with other constraints had imposed challenging situation for all staff.

Educational Quality Concern

Quality education is considered the primary goal of education, and with rapid transferring from traditional face-to-face and classroom instruction to distance and online learning had caused quality issues at all grades. Although MoEYS and relevant stakeholders tried every possible means to make the continuation of daily teaching and learning possible, quality wise was still a major problem which could not be ignored. Within the existing framework, resources and supporting mechanisms the problem still existed, especially at those more disadvantage areas. Through the interviews with the respondents, the study has identified several reasons which could be the factors for quality issues during school closure.

- lack of quality online teaching and learning resources. Those materials also did not cover all grades and contents in the textbooks.
- teachers and students lack good quality Internet connection for distance and online teaching and learning.
- the devices used for teaching and learning online were not available for everyone, especially among students at more disadvantage areas.

- most students used mobile phone for online learning which were not suitable for effective learning due to small screen.
- lack of technological skills in operating devices and accessing the online teaching and learning technology such as Google Classroom, Google Meet, Telegram, Messenger etc.

The following was an extracted from the interview conducted with one of the research key informants. Some participants also expressed similar messages.

> *During the early stage of school closures, directors and teachers found it hard to provide online teaching from home. They came to school only for cleaning and worksheets distribution purposes. During school closure, only around 40% of the students received worksheets to study at home. Also, the effect of distance teaching and learning wasn't enough if comparing to face-to-face learning.*

3.3. MoEYS's Future Readiness

As mentioned in Section 3.1, with the supports from MoEYS and stakeholders, school directors, teachers and other educational staff received some trainings and opportunities to explore new ways of teaching whether distance or online instruction. In relevance to this, our respondents strongly believed that MoEYS has certain degree of readiness to cope with similar crisis if it is to happen in the future. In this study, we have several factors which could be the key indicators for MoEYS's future readiness.

Availability of E-Learning Teaching and Learning Materials and ICT Knowledge

Beside the challenges and impacts imposed by COVID-19; however, the pandemics also provided Cambodia with indispensable opportunities to learn and adapt to new ways of teaching and learning. The newly developed teaching and learning materials would become key assets for MoEYS's future readiness if school closure or online teaching and learning are required. Coupled with training programs provided during the COVID-19, school teachers, administrators are equipped with certain level of foundation knowledge, skills and experiences in online instruction and work. As elaborated by the research participants, the current Covid-19 helped push ICT for education in Cambodia to ten years in advance.

School ICT Infrastructure

School ICT infrastructures, for example, the existing Internet connection, computer labs, electricity connection to run those ICT equipment and devices are key asset to enhance MoEYS's readiness. These ICT infrastructures will strengthen the MoEYS's capacity in supporting teaching and learning if school closure or online education is required in the future crisis.

Practical Experiences and Lesson-Learnt from COVID-19

Indisputably, the COVID-19 pandemics had imposed challenges in Cambodia's education sector; however, with more than two years of experiences in working online, the crisis also provided us with some benefits. From the interviews, most of our respondents agreed that despite the challenges and impacts, MoEYS, teachers, administrators and relevant stakeholders have learnt valuable lessons and gained practical experiences in online working. These experiences will become invaluable benefits for MoEYS, teachers and those working in education if there is a similar crisis happens in the future. This can be seen as major indicator for MoEYS's readiness in the future.

4. DISCUSSION

The prevention of COVID-19 pandemics forced all educational institutions in Cambodia to close down which impact teaching and learning hard. MoEYS had putted a lot of effort to switch from face-to-face learning to distance learning; however, learning loss and quality of education were major concern. As shown in the finding section, during school closure, MoEYS and partners tried to support teaching and learning materials including worksheets and video lessons through MoEYS official media, Open Education Resources and e-learning page, e-learning application and TV broadcast. Bhatta et al. (2022) and MoEYS & ESWG (2021) also reported these MoEYS's significant interventions. It was reported that the intervention helped 70% of students continued their studies through various type of distance learning programs (MoEYS & ESWG, 2021). However, Thy et al. (2023) found that 46.0% of high school teachers experienced difficulties in accessing the e-learning materials from other online

resources such as MoEYS's app, YouTube, educational websites etc.

The study reported that, during this intervention, DIT and TTD had trained 13% of teachers on how to use ICT devices and G-suite. In relation to this, Chea et al. (2022) reported that approximately 20% of school teachers did not receive any form of training program during school closure. With supporting programs both in term of material development and training on ICT technology; however, teachers still experienced certain degree of challenges. Chea et al. (2022) argued that teachers experienced many challenges included how to teach using new methods, lack of ICT skills and related pedagogical skills for the new teaching norm. In relation to this, Chea et al. (2021) revealed that almost all the teachers participated in their study did not gain sufficient skills and knowledge for online teaching from the programs they had attended. A research study by Thy et al. (2023) also reported similar finding, approximately 58.% of high school teachers faced challenges in using online teaching platforms and online teaching technology, for example, Google Classroom, Google Meet, Class Dojo, Telegram, Microsoft Team etc. However, this report did not provide details whether or not those struggled in using online teaching technology received the capacity training provided by MoEYS.

Equipping ICT infrastructure and Internet connect at schools was one of the key tasks provided by MoEYS and in relation to this, MoEYS & ESWG (2021) reported that about 10% of High schools were equipped ICT materials cover with WIFI to use in online learning. Moreover, Thy et al. (2023) mentioned that 65.7% of their research participants reported that they lacked of school support with necessary devices or teaching materials for delivering teaching.

It was reported that other than the interventions provided by MoEYS to support distance and online learning, MoEYS also faced with some challenges, especially how to work online and how to ensure the quality of work. It could be evidenced that the sudden changes in working norms not only affected how the teachers teach, how the students learn but it also affected how staff at ministry level work. Lack of ICT skills, rapid adaption with online working environment seemed to be common problem for all involved people within the educational sectors.

In term of MoEYS's future readiness, it was reported that the availability of e-materials developed during school closure, the technological platforms assisting teaching and learning, the ICT infrastructure at school, knowledge and experienced MoEYS, teachers and relevant staff gained would become key assets for MoEYS's readiness if similar situation happens in the future. However, the question remains on how are those materials should be used effectively for the purpose of teaching and learning if school closure is required. A lot of materials developed require Internet connect to access, while large number of Cambodian teachers and students faced challenges with Internet issues. In relation to this, Heng & Sol (2020) revealed that Cambodian educational institutions, teachers, and students were not ready for online teaching and learning due to lack of resources. As reported in Thy et al. (2023), 79.9% of school teachers and 70.6% of students faced challenges in their teaching and learning activities due to Internet connection.

5. CONCLUSION

5.1. Conclusion

The objectives of this study were to identify the intervention programs issued by MoEYS during COVID-19 in the support of teaching and learning, the challenges MoEYS faced and the MoEYS's readiness in dealing similar situation in the future. It was evidenced from the study that thousands of video lessons and e-learning resources were developed, distributed and put for use in MoEYS's e-learning platforms such as YouTube, websites and mobile applications. Approximately 17% of schools were equipped with computers and internet network connections and necessary ICT infrastructure. 13% of teachers received capacity trainings in ICT, especially on how to use or teach online. In addition to these intervention programs, MoEYS and partners also experienced several challenges in online working, meeting, developing online monitoring tools and educational quality. The new-developed distance and online learning materials, knowledge gained from training programs, experiences during COVID-19 had been viewed as key assets for MoEYS's future readiness.

5.2. Recommendations

Based on the study from various countries, the literature, insights from key informants, and the lessons learned from Cambodia's own experiences, as presented in the findings section above, the authors make the following recommendations. These recommendations aim to address the challenges identified in the study and enhance the preparedness of MoEYS and its stakeholders for future crises that may disrupt traditional education systems.

MoEYS

- *Sustain E-Learning Initiatives:* Continue the development and enhancement of e-learning materials, ensuring they cover all grades and subjects. Regularly update and improve the quality of online resources to meet the educational needs of students.

- *Expand ICT Infrastructure:* Invest in expanding ICT infrastructure at schools, especially in rural and disadvantaged areas. Ensure that schools have reliable internet connections, computer labs, and necessary devices to facilitate effective online learning.

Educators and School Administrators

- *Continuous Professional Development:* Engage in ongoing pedagogical and technological training to enhance the capacity of teachers to conduct online lessons effectively. Focus on addressing challenges such as lack of ICT skills and limited access to online teaching platforms.

- *Adaptation of Teaching Methods:* Encourage teachers to adapt their teaching methods for online and distance learning. Foster creativity in delivering lessons through digital platforms and address the specific needs of students using mobile phones for online learning.

Students

- *Digital Literacy Training:* Provide students with training on digital literacy and the effective use of online learning platforms. Ensure that students, especially in rural areas, have access to devices suitable for online learning.

- *Enhance Engagement:* Develop interactive and engaging online content to maintain student interest and participation. Address challenges related to the use of small-screen devices for effective learning.

DIT and TTD

- *Expand Teacher Training Programs:* Collaborate with each other to expand training programs for teachers on ICT devices and online teaching tools. Ensure that training programs are accessible to a larger percentage of teachers, including those in rural areas.

GSED

- *Curriculum Development:* Continue the development of digital teaching materials, covering a wide range of subjects and grades. Focus on creating materials that align with the digital context and can be easily accessed through various platforms, including mobile apps, websites, and TV broadcasts.

Policy Makers and Government

- *Long-term Planning:* Develop long-term plans for the integration of technology in education. Consider digital infrastructure as a critical component of the education system and allocate resources for its continuous improvement.

- *Equity in Access:* Implement policies that ensure equitable access to digital resources, considering the socio-economic disparities among students. Address issues related to internet connectivity and device accessibility.

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APPENDIX

No.	Interview Questions	Addition
1	ក្នុងកំឡុងពេលបិទសាលារៀន ទាក់ទងនឹងការបង្រៀន និងរៀននៅមធ្យមសិក្សា តើនាយកដ្ឋានបានធ្វើកិច្ចការអ្វីខ្លះ? ជួបបញ្ហាប្រឈម ឬផលវិបាកអ្វីខ្លះ? During the school closure, regarding teaching and learning support, what did the department do? Did the department face any challenges or difficulties?	
2	តើដំណើរការនៃប្រព័ន្ធបង្រៀន និងរៀន online ឬពីចម្ងាយមានអ្វីខ្លះ? តើវាមានយន្តការ ឬដំណើរការយ៉ាងម៉េចដែរ? What were the online/distance teaching and learning modalities? How did they work or run?	
3	ដោយសារសិស្សត្រូវបានតម្រូវឱ្យរៀនពីចម្ងាយ ជាគោលការណ៍ តើការប្រឡងត្រូវបានធ្វើឡើងយ៉ាងដូចម្តេចខ្លះ? មានបានរៀបចំប្រព័ន្ធប្រឡង online ដែរឬទេ? បើមាន តើវាមានយន្តការដូចម្តេចដែរ? តើប្រព័ន្ធនេះមានដំណើរការយ៉ាងម៉េចដែរ? តើនាយកដ្ឋានបានជួបបញ្ហាប្រឈម ឬជាផលវិបាកអ្វីខ្លះ? Did the department involve in online testing/exam? How did it work? Did the department face any challenges or difficulties?	
4	ដោយសារសិស្សត្រូវបានតម្រូវឱ្យរៀនពីចម្ងាយ ជាគោលការណ៍ តើការប្រឡងត្រូវបានធ្វើឡើងយ៉ាងដូចម្តេចខ្លះ? មានបានរៀបចំប្រព័ន្ធប្រឡង online ដែរឬទេ? បើមាន តើវាមានយន្តការដូចម្តេចដែរ? តើប្រព័ន្ធនេះមានដំណើរការយ៉ាងម៉េចដែរ? តើនាយកដ្ឋានបានជួបបញ្ហាប្រឈម ឬជាផលវិបាកអ្វីខ្លះ? How may the department evaluate teaching and learning (or test and exam) during the school closure?	
5	នៅពេលដែលសិស្សត្រឡប់ចូលរៀនក្នុងសាលាវិញ តើប្រព័ន្ធនេះបានក្លាយជាយ៉ាងណាហើយ? When school re-open, how are these systems?	
6	ឆ្លងកាត់វិបត្តិលើកនេះ តើនាយកដ្ឋានបានរៀនសូត្រអ្វីខ្លះ? What are lessons learnt that the department learnt from working amid Covid-19 outbreak?	
7	ដើម្បីជាការបង្ការ ឬក៏ត្រៀមខ្លួនសម្រាប់វិបត្តិស្រដៀងគ្នានៅថ្ងៃអនាគត តើនាយកដ្ឋានមានគោលនយោបាយ ឬទស្សទានដូចម្តេចដែរ? For future prevention to the similar issue, what do the department do or prepare?	
8	តើនាយកដ្ឋានបានប្រមើលមើលឃើញមានកាលានុវត្តភាពអ្វីខ្លះដែរ? តើនាយកដ្ឋានចាប់យកកាលានុវត្តភាពយ៉ាងដូចម្តេចដែរ? Do the department find any opportunities from this issue?	
9	ជាការជួយគាំទ្រដល់ការបង្រៀន និងរៀនតាមសាលា តើនាយកដ្ឋានមានផែនការ ឬក៏ជាទស្សនទានដូចម្តេចដែរ? To support teaching and learning at the school level, what is the vision of the department?	

កាលិកបត្រស្រាវជ្រាវមនុស្សសាស្ត្រនិងវិទ្យាសាស្ត្រសង្គម

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A small-scale Survey of the Cambodian Public's Views of Chinese Presence: Business and/or Investment and Financial Loan and/or Aid

ការសិក្សាអំពីទស្សនៈសាធារណជនកម្ពុជាចំពោះវត្តមានរបស់ចិន៖ ពាណិជ្ជកម្ម/ការវិនិយោគ និងកម្ចី/ជំនួយហិរញ្ញវត្ថុ

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ABSTRACT

The purpose of this study was to explore Cambodian public's views on China's presence in Cambodia. Chinese business and investment as well as its loan/aid provided to Cambodia were the focal point of China's presence in the study. The study employed online survey which involved 339 Cambodian publics. The research found that large proportions of people agreed that the presence of China in term of its business and investment as well as loan/aid did contribute to Cambodia's development. Along with the benefits; however, the participants also agreed on the negative impacts imposed by the presence of China in the kingdom. To tackle the negative impacts brought by the China's presence, the participants suggested should take practical measures and strategic actions to the issues that may arise. Relying on the kingdom's context and demands, it is recommended that future Chinese business and investment should focus on (i) agricultural product processing, (ii) technology and artificial intelligence, (iii) clean and sustainable energy and (iv) textile and automation. Moreover, future China's financial assistance should cover (i) agricultural infrastructure development, (ii) enhancing agricultural skills and innovation, (iii) technology know-how on development

sectors such as education, health …, (iv) research and development (R&D) and (v) vocational training and development.

KEYWORDS: Cambodian, public view, China's presence, business and investment, loan/aid

សង្ខិត្តន័យ

គោលបំណងនៃការសិក្សានេះគឺផ្តោតជាសំខាន់ទៅលើទស្សនៈរបស់សាធារណជនកម្ពុជាទាក់ទងទៅនឹងវត្តមានរបស់ចិននៅកម្ពុជា ក្រោមរូបភាពពាណិជ្ជកម្មនិងការវិនិយោគ និងជំនួយ/កម្ចីអភិវឌ្ឍន៍។ ការសិក្សានេះប្រើប្រាស់វិធីស្រាវជ្រាវបែបស្ទង់មតិតាមអនឡាញ ដោយក្នុងនោះមានប្រជាពលរដ្ឋកម្ពុជាចំនួន៣៣៩នាក់បានចូលរួមក្នុងការស្រាវជ្រាវនេះ។ ជាលទ្ធផល យើងរកឃើញថា មានប្រជាពលរដ្ឋដែលចូលរួមក្នុងការសិក្សានេះជាច្រើនបានយល់ស្របទៅនឹងមតិថា វត្តមានរបស់ចិននៅកម្ពុជាក្នុងទម្រង់ពាណិជ្ជកម្មនិងការវិនិយោគ ក៏ដូចជាជំនួយ/កម្ចីអភិវឌ្ឍន៍ ពិតជាបានចូលរួមចំណែកយ៉ាងសំខាន់ក្នុងការអភិវឌ្ឍរបស់សេដ្ឋកិច្ចកម្ពុជា។ ជាមួយនឹងអត្ថប្រយោជន៍នេះ ក៏មានសមាត្រអ្នកចូលរួមយល់ឃើញថា វត្តមានរបស់ចិនក៏បាននាំមកផងដែរនូវគុណវិបត្តិមួយចំនួនដែលអាចប៉ះពាល់ដល់សង្គម។ ដើម្បីការពារបញ្ហាអវិជ្ជមានកើតចេញពីពាណិជ្ជកម្មនិងការវិនិយោគ ក៏ដូចជាកាត់បន្ថយនូវវិបត្តិនានាដែលអាចកើតមានចេញពីជំនួយហិរញ្ញវត្ថុរបស់ចិន ក្រុមគោលដៅស្រាវជ្រាវក៏យល់ឃើញថា រាជរដ្ឋាភិបាលកម្ពុជាគួរមានវិធានការ ឬយន្តការយុទ្ធសាស្ត្រឱ្យបានសមស្របនិងទាន់ពេលវេលា។ ការសិក្សានេះក៏មានផ្តល់ផងដែរនូវគំនិតអនុសាសន៍មួយចំនួនទាក់ទងនឹងពាណិជ្ជកម្មនិងការវិនិយោគរបស់ចិន ក៏ដូចជាសំណើកម្ចីអភិវឌ្ឍនាពេលអនាគត។ ការទាក់ទាញវិនិយោគចិននាពេលអនាគតគួរផ្តោតទៅលើវិស័យមួយចំនួនដូចជា (១) ការកែច្នៃផលិតផលកសិកម្ម, (២) បច្ចេកវិទ្យានិងបញ្ញាសិប្បនិម្មិត, (៣) ថាមពលស្អាតនិងមានចីរភាព និង (៤) វិស័យវាយនភណ្ឌនិងយានយន្ត។ បន្ថែមពីលើនេះ អនុសាសន៍ទាក់ទងនឹងសំណើកម្ចីនាពេលអនាគតគួរផ្តោតលើ (១) ការអភិវឌ្ឍហេដ្ឋារចនាសម្ព័ន្ធកសិកម្ម, (២) ការពង្រឹងជំនាញកសិកម្មនិងនវានុវត្តន៍, (៣) ដំណោះស្រាយដោយប្រើបច្ចេកវិទ្យាជាពិសេសក្នុងវិស័យអប់រំ និងសុខាភិបាលជាដើម, (៤) ការស្រាវជ្រាវនិងការអភិវឌ្ឍ និង (៥) ការបណ្តុះបណ្តាលជំនាញវិជ្ជាជីវៈដែលជាតម្រូវការទីផ្សារការងារ។

ពាក្យគន្លឹះ: កម្ពុជា, ទស្សនៈសាធារណជន, វត្តមានចិន, ពាណិជ្ជកម្មនិងការវិនិយោគ, កម្ចីអភិវឌ្ឍន៍

1. INTRODUCTION

Over the last decade, the People's Republic of China (PRC) has increased its investment and influence in the neighboring countries and other parts of the world. Through regional and global cooperation and partnership, the Sino-centric development and investment have been remarkable, attracting more and more countries tilting closer to China, particularly the Southeast Asian countries. Most Southeast Asian countries have long traditionally been supportive of the US policies in the region. However, the rising Chinese influence in the region have been considered a remarkable disruption to traditional relations of the region with the US (Acharya, A., 2017). It is widely believed that the greater demands of the region for Chinese investment trade and financing assistance will eventually push the countries into the China's sphere of influence and ultimately create a split, one faction with pro-US and the other one with pro-China (Soong, J. J., 2023).

It is a fact that some lower economies in the Southeast Asia region cannot afford to be more reluctant towards Chinese penetration in terms of investment trade and loans. Cambodia has also been included. In this regard, there are also concerns put forwards by international relations experts about the potential alliance of the country that simultaneously generate a basic leverage for China's strategic interest in the region despite the country's diplomats and leader have long considered the claim 'flawed'. This can demonstrate with the fact that Chinese's presence in the country is desirable in general. However, the decreasing intensity is provided during and after Covid-19 outbreak. In 2022, for instance, the trade

volume between Cambodia and China already reached USD$14.5 billion, a significant increase of 19 percent, and the amount would have expanded in the following years to come (Khmer Times, December 2022).

Some observers have noticed that Cambodia has a consistent policy towards China. It is consistent in the sense that, economically, the kingdom has welcomed economic engagement with China both in both bilateral and regional means in the form of multilateralism. This dynamic, as argued by some analysts, is likely to provide more economic benefits to the kingdom while the other have warned that Phnom Penh has become more dependent on Beijing, thereby generating contradictions in the relations with the Western counterparts (Po, S., & West, L., 2021).

The other analysts of China's relations with Cambodia have noted that recent latter's relations with the former are becoming warmer, particularly since the outbreak of Covid-19. While China stood as the leading supplier of vaccines against the COVID-19 pandemic for the kingdom, the latter had shown its sincere friendship to stay with China in a hard time. The Prime Minister Hun Sen's visit to Beijing in February 20121 at the most critical point amid Chinas' effort to fight against the COVID-19 outbreak is an illustration. Since then, there have been several important diplomatic visits between the two countries, which have profoundly impacted on the mutual relations even more consistent and friendly. However, it is the Cambodia's foreign policy to engage with the major economic power like China to harness its national interests, economically and politically.

A number of scholars have contended that Cambodia is seen by the Chinese counterpart as the important strategic place in regional and global politics for strengthening its dominant position to confront the Western powers, particularly the US (Chheang, 2017c). The bilateral and regional economic frameworks and cooperation, taking examples of the Belts and Roads Initiative (BRI), Regional Comprehensive Economic Partnership (RCEP) and other free trade agreement, actively engaged by China have prompted and encouraged the kingdom to strengthen its bonds with Beijing. This has created different opinions among Cambodian people. While the positive image of the Chinese's influence over Cambodia is generated, some public opinions have diverted. Some factions are concerned about the Kingdom's over-reliance and dependence on a single power that could affect its sovereignty and independence. Moreover, they are worried if the Chinese's presence creates benefits that are not fairly shared among all common Cambodian people (Mackenzie, Milne, Van Kerkhoff & Ray, 2022).

1.1. Research Problem

The rising China's political and economic clouts have been considered to be a long-term challenge to the Western powers, in particular the US (Kim, M. H., 2019). In the light of this, there have been ongoing debate, discussion and studies on how China's rise and influence is perceived in regional and global contexts. This continuum has made academics and researchers even more curious to learn and explore the public perceptions of any individual country whose Chinese influence is remarkably noticeable.

Even though public view does not directly translate into the latter's foreign policy with the former, it is certainly one of the factors that policy makers and implementers should focus on when forming and implementing the policy towards China (Chu et al., 2014). As far as it is concerned, China has put a lot of resources into its public diplomacy, using Confucius Institutes and tourism to influence the global perceptions of the public towards China (Chen & Duggan, 2016). It is true that as China's global power is rising its government continue using the soft power diplomacy to make itself attractive to people in other countries (Nye, 2005). Cambodia is no exception. This has become questionable if Cambodian publics do have a benign view of China, given the increase of Chinese business and trade, people and financing assistance in the kingdom as well the other regional China-initiated economic cooperation and partnership welcomed by Cambodia.

To the present, there have been only several academic attempts in assessing the Cambodian public's views towards the foreign power's influence and relations with the country. The studies were just done in specifically separated context and case studies. On the regional context, the study using the comparisons of elite's opinion, public's views on the rise of China

were popular in other regions of the world (Green & Szechenyi 2014; Aldrich et al. 2014; Chu et al. 2014). Unfortunately, there was not much consideration in Cambodia's context.

Even though public view does not directly translate into the latter's foreign policy with the former, it is certainly one of the factors that policy makers and implementers should focus on when forming and implementing the policy (Toch, S., & Ly, T., 2022). Understanding the public views in relation to Chinese influence or presence allows policy maker a better room to recapitalize and maneuver foreign policy, particularly in the status quo amid power rivalry. Utilizing various methodologies to explore the issues provides practical benefits in speculating more details information about the issues. This research aims to fill the gap in the existing insight and scholarly ongoing discussion about the Cambodia public views towards Chinese presence in specific and Cambodia's foreign policy or relations issues in general.

1.2. Research Objectives

China's presence and the views from the public were the focuses of this study which aiming at exploring how Cambodian publics perceive the practical benefits and shortfalls of the Chinese presence in the country in terms of its business/trade and financial loans. This research is guided by the following objectives:

- To explore Cambodian public's views on the practical benefits of the China's presence in Cambodia.
- To explore Cambodian public views on the challenges and issues imposed by the China's presence in Cambodia.
- To explore Cambodian public views on the strategic measures for the government to deal with negative impacts imposed by the China's presence in Cambodia.

1.3. China's Presence in Cambodia

Chinese Businesses and Investment

Over the past decade, China has risen to become Cambodia's largest investor, aid provider and a key political ally. China's presence as a major investor began to develop in 2006, after a state visit from then Premier Wen Jiabao, which resulted in the signing of several bilateral agreements and commitments in loans and grants from that moment on. The relation between two countries has strengthened significantly and then upgraded it to a "comprehensive strategic cooperation partnership".

As the China-initiated Belt and Road Initiative (BRI), a project to embellish trade and investment connectivity between China and other parts of the world, launched (Copper, 2017 & Tekdal, 2018), Cambodia become a strong supporter of the BRI, standing to gain immense economic benefits. It will offer Cambodia great opportunities to drive its economic development so that it can catch up with other countries in the region. Moreover, as it is complementary to Cambodia's national development strategy, the BRI will help Cambodia to realize its vision to become a middle-income country by 2030 and a high-income country by 2050 (Chheang, 2017b). Even though economic gains for Cambodia seem to prevail, the BRI has also raised concerns among critics. There have been pressing issues related to China's growing influence in Cambodia, Chinese exploitation of the natural resources, and other social and human rights issues arising from Chinese aid and investment.

In light of regional connection, trade relations between China and ASEAN countries have been prominent over the past two decades, with the region predicted to be imminent for 'One Road' plan to succeed (Li & Yongke, 2017). More importantly, the two-way relationship between the region and China has proved to be efficacious; the Indochina Peninsula benefiting from steep infrastructure developments and huge influx of foreign direct investment (FDI). As China regards ASEAN as being a key partner to advance its agendas, thus crafting packages to tailor every country's needs seems to be benevolent on hindsight (Yi, 2017). There is no exception for Cambodia. Being viewed as the main China's ally in the region, Cambodia's trade relation with China has since blossomed due to the country's attractive nature of market access with untapped low-cost labour and more encouraging trade and investment policies. Moreover, Lin (2018) highlights the country's political stability calibrating the huge influx of FDI into its transport network and hydropower plants, with "more than $7.5 billion in accumulated capital generating enough power to radically transform the

country's energy infrastructure". The nation's granted concessional finance has seen tremendous increases over the past years, given its compelling nature of infrastructure investment (Chan, 2017; Jeldres, 2012).

Through bilateral agreements and engagement between the China and Cambodia, the significance of the former's foray into the latter's trade results in a potential remuneration for the diminishing aid from the West. The decrease in likelihood of aid from the European Union and the United States, however so, envisages the opportunity for the reinstatement of China's geopolitical position in ASEAN through Cambodia (Touch, 2018). It is understandable that countries with higher trade surplus purports for a deeper embracement of the BRI, conversely the domestic politics of a nation affects the nation's disapproval of such initiatives. According a study, it asserts that Cambodia's willingness in their support towards BRI is so strong compared to other countries in the region (Chen, 2018). So, it has been obvious that China's participation in Cambodia's FDI has stimulated more increase in investment, making China itself the largest investor in the country. However, bilateral trade creates a huge imbalance for the kingdom, overwhelmingly dependency on China's good importation is by far larger than its agricultural products and goods exportation to China (Dongmiao, 2017). China's openness to Cambodia's exports might seem to revolt the notion of Western politicization of Eastern commodities for years. Its focus on the promotion of regional interests and its 'openness' towards multilateralism has helped shaped the modern China, creating layered dependence between itself and participating countries (Khmer Times, 2018). Cheong (2018) argues that the interdependence, when unveiled, falls heavily on the participating countries, a case of Cambodia, leaving major debt dents in the long-term. Hence, what might be initially be viewed as a positive bilateralism should there upon be accordingly questioned?

Under the leadership of the Cambodian People's Party (CPP), the Cambodian government is attempting to readjust its foreign policy in an attempt to adapt to the rapidly changing global geopolitics and geo-economics (Chheang, 2017a). The BRI has been portrayed as a tool for China to expand its soft power which entails greater regional connectivity (Albert, 2018). Upon which, China has already taken several steps to develop their soft power through the promotion of the Chinese language, media expansion, and educational exchanges (ibid). Cambodia has already viewed China as their most important strategic and economic partner, with the elaboration of Cambodia's Prime Minister, Hun Sen China as the country's "most trusted friend".

One of the many development projects under the BRI includes the establishment of a Cambodia-China Cultural Village in Beijing and the opening of Cambodia's Trade Center in various provinces of China (Heng and Po, 2017). There are some setbacks in terms of cultural understanding. Cultural imperialism originates from the hegemonic theory of media effects and is built on a foundation of a system constructed on both political and economic fields (Iancu & Mustățea, 2014). Concern over the worsening of morals in the upcoming generation due to globalisation and the uncontrolled flow of foreign culture is inevitable (Chandara, 2000). Furthermore, Cambodian politics stray far away from the ideals of liberal democracy that is practiced by the West. Therefore, China is perceived as a crucial ally to Cambodia's ruling elites to offset pressures from the West pertaining to human rights and democracy criticism (Calabrese, L., Borodyna, O., & Nadin, R., 2022).

Despite positioning on its national interest, Cambodia's foreign policy has been scrutinized for favouring Chinese diplomatic and political interests (Lin, 2018). This has triggered concerns over China's burgeoning political and economic leverage over Cambodia which may lead to a future Cambodian policy that is simply an extension of Chinese regional authority (Lin, 2018). Statements such as "without Chinese aid, we go nowhere" by Council of Ministers spokesman indicates the magnitude of country's reliance on China (Hutt, 2016). It was most evident in Sihanouk Ville, a port city on the Gulf of Thailand, where many casinos had been built as the result of Chinese investments (Fifield, 2018). Besides the slowing down of local businesses, The Cambodian publics have been worried about crime and rising occurrences of drunken violence. After the COVID-19, the government has opened the country hoping the return of the Chinese to country to start their actual business but it has not been promising as before.

China's Financial Assistance to Cambodia

China has been providing billion dollars of aid to recipients who are willing to receive and come in line with Beijing's interests. However, unconditional China's aid is attractive to authoritarian regimes because it appears respectful of national sovereignty (Lum, Fischer, Gomez-Granger, & Leland, 2009). Within this context, unconditional 'authoritarian aid' from China is perceived as the most favourable source of finance Cambodia's government needs in order to advance its political agendas as well as economic interests. There are some possible reasons which drive Cambodia to be receptive to China's aid.

The explicit unconditionality of China's aid provides Cambodian government safe haven against Western and multilateral institutions donors' criticisms and pressures for fealty reforms. Whenever criticisms or pressures for reforms fall from traditional donors, China undertakes symbolic steps to voice its political support for Hun Sen's government and increase aid to offset the losses of aid suspension from those donors (Ciorciari, 2013). Whenever being pressured and condemned by the Western, China rejects but extends its economic and political support to Cambodia. Against this backdrop, Cambodia seized the opportunity and increasingly embraced China to maintain its political prowess (Ciorciari, 2013). China has been pouring tremendous aid to Cambodia than all other donors combined over the past years.

The priority of China's aid on infrastructure projects aptly mesh with Cambodian government's priority. Suffering from decades of civil wars, peace and stability are the prime concern of people. Cambodia's government has deciphered these concerns clearly and managed to marshal its legitimacy by propagandizing the achievements it made in finding peace, maintaining stability and building social infrastructures such as roads, bridges, schools or irrigation systems. These activities won Cambodian People's Party (CPP) consecutive landslide electoral victory from 1998 through 2018, except the 2013 election where CPP lost bundle of seats to the opposition party. At any public events, Hun Sen always praises China publicly stressing that China shows "respect" for recipient country and that "China always responds to projects judged to be Cambodia's priority". To date, China is the largest donor in infrastructure development in Cambodia (Menon, 2022). The decrease in likelihood of aid from the European Union and the United States, however so, envisages the opportunity for the reinstatement of China's geopolitical position in the Southeast Asian region through Cambodia (Touch, 2018).

Last but not least, unconditional Chinese aid has enabled Cambodian ruling party to consolidate its power built on patron-client networks. The Cambodian state is structured by "interlocking pyramids of patron-client networks" built throughout 1980s and consolidated during the 1990s, and through various compromises and coalitions, these networks become more intertwined and complicated (Un, 2019). Even today, ruling Cambodian People's Party's political power depends largely on the financial arrangement flowing through these networks. The party has managed to use the networks and the control of Chinese support to repress political dissents out of the play field (Ciorciari, 2013). In addition, Beijing has been indifferent and more than willing to accept the status quo as long as Cambodia does not hurt its interests. The influx of China's aid and willingness to engage in corrupt practices help the Cambodian ruling party consolidate the patronage networks given the "no strings-attached" and the absence of concrete scrutiny from Beijing. Thus, pressure for fealty reforms, respect for human rights, rule of laws and complicated procedures required by traditional donors appear less alluring to the government. More importantly, as Cambodia enthusiastically supports China's BRI and continue to receive China's -no string attached aid and loans, its foreign policy will be undermined and formulated in favour of China's broader interests and influence in the regional and international arena. With this regard, it is worth considering that aids with string attached are not necessarily bad for the kingdom.

2. METHODOLOGY

The present study centred on Cambodian public's views on practical benefits and challenges of the Chinese presence in Cambodia, mainly focusing on its businesses/investment and financial assistance (loan/aid). Quantitative research method (Creswell & Creswell, 2018) with online survey questionnaire was used to collect the primary data. Qualitative desk

review was also conducted to supplement the quantitative analysis in the study.

2.1. Sample and Data

The study's sample was selected using a combination of convenient, snowballing and volunteer sampling technique illustrated below:

- Firstly, the researchers used personal connection and professional network to approach the respondents by filling the questionnaire using Google link. It started with some colleagues, friends and relatives, then we asked them to pass on the link to other people they know. The process kept going like snowballing method.
- Secondly, the questionnaire link was posted on Facebook and we requested Facebook's users to help fill the questionnaire. We also requested those who helped fill the questionnaire to further share the link in any of their social media platforms to reach more participants.

The data collection started in two time periods. The initial step was made before Cambodia-China Free Trade Agreement (CCFTA) while the second round was conducted after the official CCFTA signed. Each data collection period extended for 60 days. People who volunteered to fill questionnaire were regarded as the study's sample. A total of 339 people filled the questionnaire with 212 (62.5%) of them took part before CCFTA and 127 (37.5%) after CCFTA officially signed.

2.2. Research Instrument

The survey questionnaire consists two parts with 17 items totally. The first part consists of five items about personal information including gender, age, education, profession and their overseas experiences. The second part consists of 12 items with the first eight items aimed at exploring the participants' views on both positive and negative impacts of Chinese business and/or investment and Chinese loans and/or aids in Cambodia. Other four items were exploring the participants' views concerning strategic measures the Cambodian government should have in order to tackle challenges and issues that may arise due to the China's presence in the country.

2.3. Data Analysis

The quantitative data analysis approach was employed in the IBM SPSS Version 25. Descriptive statistics with graphical presentation, statistical tables and statistical numerical measures with mean values and standard deviations were presented. Chi-square tests were utilized to study the associations between the participants' views on each agreement item with some demographic variables such as time of data collection (Data), gender, profession and the participants' overseas experience (Overseas).

3. RESEARCH FINDINGS

3.1. Participants' Information

A total of 339 Cambodian people participated in this study. 67.8% of the participants were male while female comprised of 32.2% of the sample. More than half of the participants (51.6%) aged between 27 and 40 while those aged between 18 and 27 accounted for 38.9%. The ones between 40 and 60 comprised of 9.4%, the smallest portion. Additionally, 50.7% of the research respondents finished bachelor's degree while those obtained postgraduate level accounted for 45.4% of the sample. Respondents with TVET and/or below Grade 12 made up less than 4% of the sample.

In terms of profession, 42.5 % of the respondents were employed at either at private company or non-governmental organization (NGO) compared to its government civil servant with only 31.3%. Among the sample, 18.0% were unemployed while those reported to be self-employed accounted for 8.3%. In term of overseas experience including living, studying/training and travelling, the data showed that 65.2% of the respondents had overseas experience before while 34.8% of them reported having no overseas experiences.

3.2. Public's Views on Chinese Presence in Cambodia

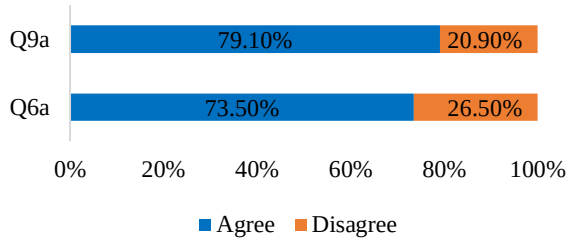
This section presents the research findings about the respondents' views on practical benefits, challenges and issues brought by the Chinese presence in Cambodia.

Public's views on practical benefits

Overall, the finding from Figure 1 below showed that 73.5% of the participants agreed that Chinese business and investment provided practical benefits to Cambodia's development while 79.1% of them agreed that Chinese loan and/or aid contributed significantly to the kingdom's socio-economic development.

Figure 1

Descriptive information of Cambodian people's view on the benefits of China's presence in Cambodia.



Q9a Do you agree that Chinese loans/aids has partly contributed to Cambodia's development?

Q6a Do you agree that more Chinese business and investment become important for Cambodia's economy?

Table 1 below presents the findings related to the associations of people's views on practical benefits of the Chinese presence with some demographic variables such as data collection period (Data [1]), gender, profession and the respondents' overseas experiences.

Table 1

Association between the participants' views on practical benefits of China presence with some demographic variables.

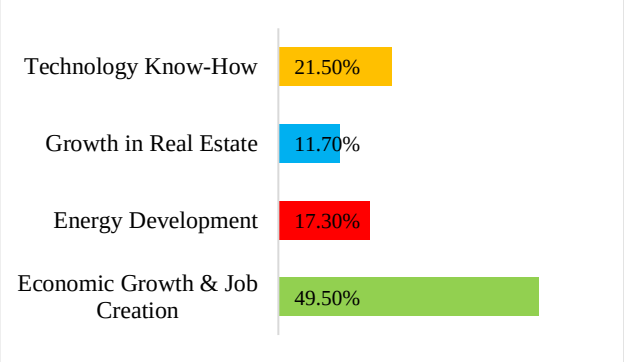
Item	Sample	Data	Gender	Profession	Overseas
Q9a	$n = 339$	*.001*	*.961*	*.117*	*.841*
Q6a	$n = 339$	*.146*	*.780*	*.004*	*.228*

It was revealed that Cambodian people's views on practical benefits of the Chinese business and/or investment in Cambodia was significantly associated with their profession. Evidently, unemployed people (82.0%) and those working in public sector (82.1%) expressed more favorable views compared to people working in private business or NGOs institutions (66.7%) and self-employed individuals (57.1%). Moreover, the people's views on practical benefits of Chinese loan and/or aid brought to Cambodia were found to have significantly association with the time of data collection. The data revealed that 88.2% of people participated after the CCFTA officially signed tended to agree more on the positive impacts of Chinese loan and/or aid for Cambodia's development compared to those participated before CCFTA with 73.6%.

We asked the respondents to express their views on the practical benefits brought by the Chinese business and/or investment. The finding was generated from the multiple-choice question basis and it revealed that 49.5% of the responses were economic growth and job creation and 21.5% were technological know-how. Energy infrastructure development made up of 17.3% the responses while growth in real estate sector accounted for 11.7% the total responses.

Figure 2

Participants' views on practical benefits of Chinese business and/or investment in Cambodia (total responses[2]=392).



In addition, regarding the positive impacts of the Chinese loan and/or aid, 51.2% of the responses were

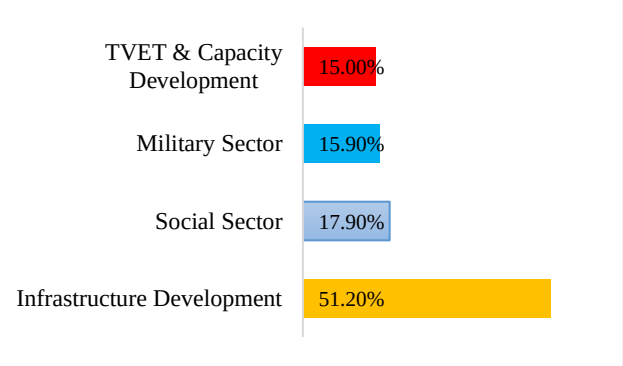
[1] **Data**: refers to the time of data collection which took place before and after the Cambodia-China Free Trade Agreement (CCFTA) was officially signed.

[2] It should be note that the nature of this item is 'multiple response question' where each participant could choose more than one options. The 'total responses' here is the accumulation of all responses; therefore, the number is logically more than the research sample size or more than the sample size for that particular item. The subsequent items follow the same rule for such 'multiple response analyses.

on infrastructure development, 17.9% on social sector while military sector and TVET & capacity development accounted for 15.9% and 15.0% respectively (Figure 3).

Figure 3

Participants' views on the contribution of Chinese loan and/or aid (total responses=492).

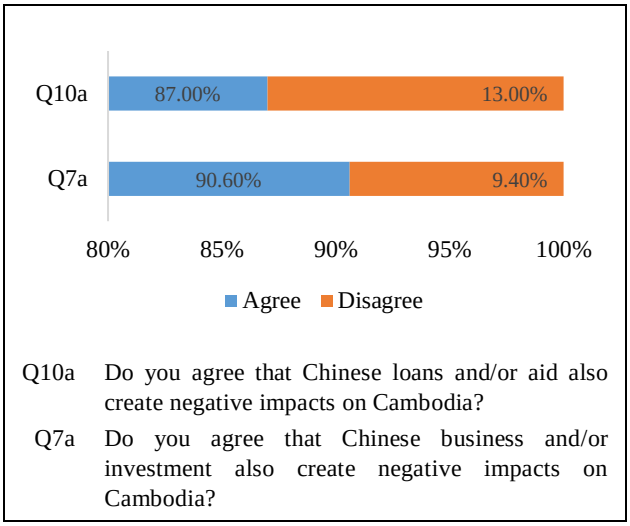


Public's Views on Challenges and Issues of Chinese's Presence for the Kingdom

The findings below presented the participants' views on the negative impacts of Chinese presence on Cambodia. Overall, besides the practical benefits presented above, 90.6% of the participants viewed that the Chinese business and investment also created challenges and issues while 87.0% of them agreed that the Chinese loan and aid provided to Cambodia generated negative impact on Cambodia in general (Figure 4).

Figure 4

Descriptive information about people's view on the negative impact of China's presence in Cambodia.



Q10a Do you agree that Chinese loans and/or aid also create negative impacts on Cambodia?

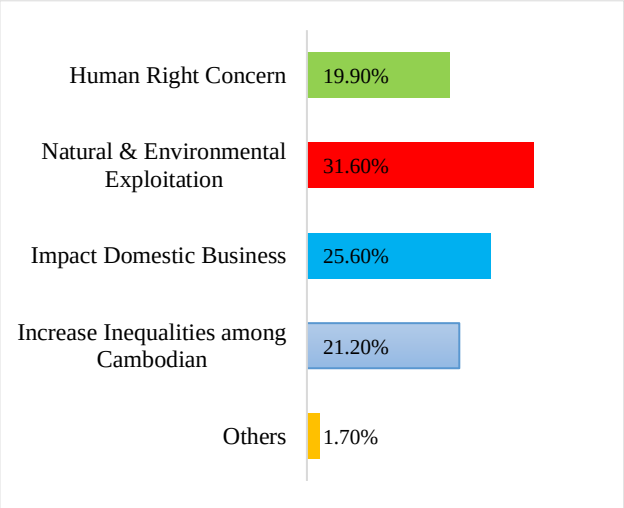
Q7a Do you agree that Chinese business and/or investment also create negative impacts on Cambodia?

In addition, the participants' views regarding the negative impacts of the Chinese presence were found to be no significantly associated with any of the demographic variables, that is, the respondents' views were common across different subgroups demarcated by those demographic variables.

We asked about what would be the negative impacts brought by the Chinese presence in Cambodia, the findings revealed that, in terms of the challenges and issues conceivably caused by the Chinese business and/or investment, 31.6% of the responses fell on natural and environmental exploitation, 25.6% were the negative impact on domestic businesses, 21.2% on widening social and economic inequalities among Cambodian citizens while human right concerns accounted for 19.9% of the responses (Figure 5).

Figure 5

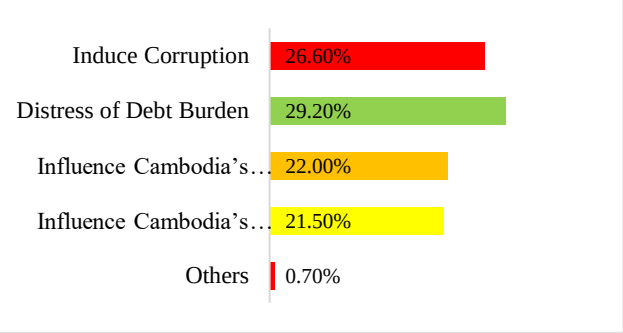
Participants' views on specific challenges and issues of Chinese business and/or investment in Cambodia (total responses=753).



Moreover, with regard to challenges and issues imposed by the Chinese loan and/or aid, 29.2% of the participants' responses focused on distress of debt burden on Chinese loan, 26.6% were on inducing more corruption while the concerns about the increases of Chinese influence on Cambodia's politics and influence on Cambodian foreign policy accounted for 22.0% and 21.5% respectively.

Figure 6

Participants' concerns about challenges and issues of Chinese loans and aids provided to Cambodia (total responses=749).

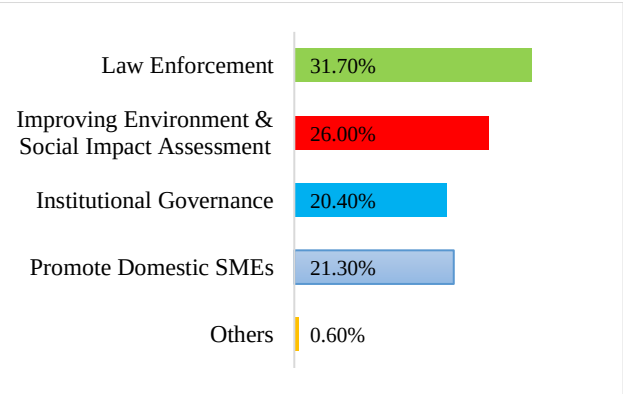


Public's Views on Strategic Action and Solution

The below findings presented the overall view of Cambodian publics on the practical measures and/or strategic actions the Cambodian government should take to tackle the challenges and issues imposed by the Chinese presence in Cambodia. In term of practical measures to tackle Chinese business and/or investment malpractices, it was revealed that 31.7% of the responses focused on strengthening law enforcement, 26.0% fell on improving the assessment of environment and social impact. Moreover, promoting domestics SMEs made up of 21.3% while improving institutional governance accounted for 20.4% of the participants' responses (Figure 7).

Figure 7

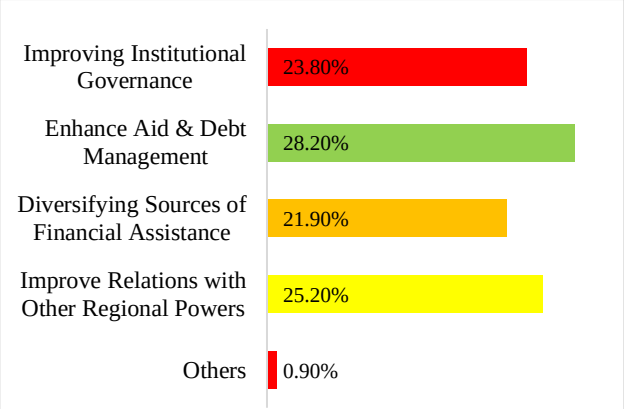
Participants' views towards the government specific measures and actions over Chinese malpractice in business environment (total responses=828).



With regard to the public's views towards the strategic measures and actions over negative impacts of the Chinese loan and/or aid, the finding revealed that 28.2% of the responses were on enhancing the effective management of aid and debts, 25.2% focused on improving the relationship with other regional great powers, 23.8% were on improving institutional governance, while the remaining 21.9% of the responses were on diversifying sources of financial assistance.

Figure 8

Participants' views on effective government measures to deal with negative impact of Chinese loans and aids (total responses=755).



4. DISCUSSION

As China's global power has risen, so is the global view towards this second largest economy becoming crucial for its public diplomacy matter. As far as it is concerned, China has put a lot of resources into its public diplomacy, using business and/or trade, Confucius Institutes and tourism as well as state-controlled media to influence the global perceptions of the public towards China (Chen & Duggan, 2016; d'Hooghe, I., 2015; Pan, S. Y., 2013; Schliebs, M., Bailey, H., Bright, J., & Howard, P. N.,2021). It is true that as China's global power is rising the government continue using the soft power diplomacy to make itself attractive to people in other countries (Breslin, S., 2011; Kurlantzick, J., 2007; Nye, 2005; Shambaugh, D., 2015). In Cambodia, China's influence has become remarkable, making the former 'an ironclad friendship' stated by the foreign media and experts quite often. This has become questionable whether Cambodian publics do have a benign view of China, conceivably due to the increase of Chinese business and/or trade, people and financial assistance as well as the other regional China-initiated economic cooperation and partnership including Belt and Road

Initiative (BRI), Mekong-Lancang Cooperation (LMC), Regional Comprehensive Economic Partnership (RCEP), and so on.

As presented in the finding section, regarding the public' opinion towards the practical benefits of the Chinese presence in term of its business and/or investment and financial assistance to Cambodia. The data showed favorable trends due to the high proportions of the respondents agreed on the practical benefits brought by the Chinese business and/or investment as well as its loan and/or aid provided to Cambodia. This finding can be illustrated by the fact that Chinese business, investment and trade have been remarkable and noticeable compared to the other Cambodia's major trade partners, thanks to its improved political and economic relations with Cambodia (Ly, 2018). This would have been well informed among the Cambodian publics working in different professions, particularly those who have been able to access the necessary information about Chinese business and/or investment in the country.

It is widely said that Chinese business and investment have brought more capital and technology and simultaneously stimulate growth of the local businesses and enterprises, thereby creating more jobs and benefits for Cambodian citizens in general (Heng & Chheang, 2019; Verver, 2020). Cambodia has been supportive of and welcomed to China-established initiatives and other cooperation frameworks, both on the regional and global agendas hoping that more Chinese businesses and investors come to invest in the kingdom. While the Belt and Road Initiative (BRI) and Regional Comprehensive Economic Partnership (RCEP) and so on are the example, Cambodia-China Free Trade Agreement (CCFTA) is another milestone of the improved relations between the two countries, economically and politically (Neak, & Sok, 2021).

It has been widely believed that China, in the future, will become a potential market for the kingdom's agricultural products and goods. In addition, China has become a major financial source for the kingdom, both in the forms of financial loan and aid (Chen, 2018). Over the last decade, China's financial assistance to Cambodia has dramatically risen and surpassed the Western counterparts as well as Japan.

Despite the Cambodian public's views towards the positive image of the Chinese business and/or investment and financial loan and/or aid with regard to the country's different sector development appeared to be more favorable, the views towards the negative image cannot be overlooked. This finding is paralleled with the other scholarly arguments saying that over reliance on a single dominant power, especially China, might possibly lead the country to have contradictions with the Western counterparts as well as fall into the China's domination, thereby harming the country's foreign policy (Leng, 2019; Ciorciari, 2013). Regarding this, there has been growing public concern about the huge influx of the Chinese presence to the country, albeit the significant interests prevail in the meantime.

Last but not least, the analysis showed interesting results. The public's views towards the strategic measures and actions the Cambodian government should to prevent the likely negative impacts resulted from the malpractices of the Chinese business and/or investment in the country were significant. The findings tend to respond the public perpetual concern, as mentioned above, and suggest to the government to take practical measures and actions over the malpractices of the Chinese business and investment in Cambodia (Pordié, 2020; Young, 2019; Zhao, 2018).

Furthermore, the discovered views towards the strategic measures and actions to deal with the negative image of the China's financial loan and aid in the country were significant. In light of this, the finding also appears to be favorable if the government cautiously and wisely acts with regard to its foreign aid and debt policy, neither over-relying on a single source of donor's financial assistance nor letting the debt going beyond its ceiling. This really corroborates with some scholarly arguments and media manipulation about the other country's debt distress, particularly in the case of Sri Lanka (Var, & Po, 2017).

5. CONCLUSION

5.1. Conclusion

This small-scale study employed quantitative survey whose objectives were to explore on how Cambodian

public's views towards the Chinese presence in Cambodia. The results revealed both benefits and negative impacts brought by the Chinese presence in the kingdom. Large proportions of people agreed to the practical benefits bought by the Chinese business and investment as well as its loan/aid. The benefits from Chinese business and investment could be seen as economic growth and job creation, technological know-how, energy infrastructure development and growth in real estate sector. The practical advantages contributed to Cambodia's development in term of Chinese financial assistance were infrastructure development, improvement in social sector, military sector and TVET & capacity development.

Along with the benefits; however, a large proportion of participants agreed on the negative impacts imposed by the presence of China's business and investment and its financial assistance. The challenges and issues brought by the Chinese business and investment could be seen as natural and environmental exploitation, negative impact on domestic businesses, widening social and economic inequalities among Cambodian citizens and human right concerns. The challenges and issues imposed by the Chinese loan and/or aid were distress of debt burden on Chinese loan, inducing more corruption, the increases of Chinese influence on Cambodia's politics and foreign policy.

To tackle the negative impacts brought by China's presence in Cambodia, the participants suggested several key strategic actions and measures. To prevent the Chinese business and investment malpractice, strategic actions and measures should focus on strengthening national law enforcement, improving environment and social impact assessment, promoting domestics SMEs and improving institutional governance. Key strategies to improve the condition of negative impacts imposed by Chinese financial assistance were improving aid and debts management, improving the relationship with other regional powers, improving institutional governance and diversifying sources of financial assistance.

5.2. Recommendation

Since the China's presence in Cambodia bound in the forms of business and/or investment and financial loan and/or aid has become significant with regard to the latter's development, it has become obvious that the relations between two countries will be stronger. The former is likely a major source of the latter's financial assistance. Relying on the kingdom's context and demands, the authors recommend that, in term of future Chinese business and investment, the Cambodian government should focus on the following key areas:

- agricultural product processing
- technology and artificial intelligence
- clean and sustainable energy
- textile and automation

Moreover, future China's financial assistance should be expanded to the following aspects:

- agricultural infrastructure development
- enhancing agricultural skills and innovation
- technology know-how on development sectors such as education, health …
- research and development (R&D)
- vocational training and development that fit the demand of country's job market

5.3. Further Study

The research presented significant findings related to the public opinions on the influence of major power country in Cambodia; however, research sample put undeniably limitation to the representation of the views. To capture more significant inputs in this issue, more sample size is needed. It is recommended that future study should cover more sample size and include people from various background, for example, different geographical areas and diverse professions etc.

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APPENDIX

SURVEY QUESTIONNAIRE

A Small-Scale Survey of Cambodian Public's Views on China's Presence: Business/Investment and Loans/Aids

Introduction

This survey intends to assess public's view on 'China's presence' in Cambodia, mainly reflecting on business and investment and loans and aids. With the structured questions provided below, you are appreciated to take on your voluntary response to the survey. The study is part of our personal research project aiming at exploring the Cambodian public's view towards the China's presence in the kingdom. On top of that, I believe that the finding of this study will also significantly contribute to the development of research sector in Cambodia in general, and provide further discussion and argument in particular with regard to the Cambodian public's view on China's growing influence in Cambodia. Your support to fill out this survey questionnaire is invaluable.

We really appreciate your kindness if you could pass this Questionnaire Link to more friends, relatives, colleagues and those you know so that they could also take part in this study.

SECTION I: RELEVANT INFORMATION	
Q1: Age ☐ Below 18 ☐ 18-27 ☐ 27-40 ☐ 40-60 ☐ Over 60	Q2: Education Level ☐ Grade 12 or Below ☐ Technical Training ☐ Undergraduate ☐ Postgraduate Degree
Q3: Gender ☐ Male ☐ Female	Q4: Occupations ☐ Unemployed ☐ Self-Employed ☐ Government Sector ☐ Private Business/NGO Staff ☐ Other.....
Q5: Have you ever experienced living or traveling abroad? ☐ Yes ☐ No	

SECTION II: CHINA'S PRESENCE IN CAMBODIA		
Q6a	Do you agree that more Chinese business and investment become important for Cambodia's economy?	☐ Disagree (Go to Q7a) ☐ Agree (Go to Q6b)
Q6b	If you agree (in Q6a), in what sectors that Chinese business and investment become significant?	☐ Economic growth and job creation ☐ Energy development ☐ Growth in business/enterprises and real estate ☐ More technological know-how ☐ Others
Q7a	Do you agree that Chinese business and investment also create negative impacts on Cambodia?	☐ Disagree (Go to Q8a) ☐ Agree (Go to Q7b)
Q7b	If you agree (in Q7a), what are the negative impacts of Chinese business and investment?	☐ Human rights concerns ☐ Environmental and Natural exploitation ☐ Challenge the domestic small businesses ☐ Increase inequality among Cambodians

		☐ Others
Q8a	Do you agree that the government should take on measures to prevent Chinese business/investment malpractices which result in negative impacts as soon as possible?	☐ Disagree (Go to Q9a) ☐ Agree (Go to Q8b)
Q8b	If agree (in Q8a), what should be the effective measures to prevent Chinese business/investment malpractices in Cambodia?	☐ Corporate law enforcement and compliance ☐ Improve environmental and social impact assessment ☐ Effective institutional governance ☐ Promote domestic small enterprises ☐ Others
Q9a	Do you agree that Chinese loans/aids has partly contributed to Cambodia's development?	☐ Disagree (Go to Q10a) ☐ Agree (Go to Q9b)
Q9b	If agree (in Q9a), which sectors that Chinese loans/aids has contributed?	☐ Infrastructure development (bridge, road and building...) ☐ Social sector (education and health) ☐ Military sector ☐ Vocational skill and capacity development ☐ Others
Q10a	Do you agree that Chinese loans/aids also create negative impacts on Cambodia?	☐ Disagree (Go to Q11a) ☐ Agree (Go to Q10b)
Q10b	If agree (in Q10a), what concern you?	☐ Induce corruption in the government ☐ Distressed due to more debt burden ☐ Influence Cambodia's political development ☐ Influence Cambodia's foreign policy decision ☐ Others
Q11a	Do you agree that there are measures the government should take on to reduce the negative impacts due to Chinese loans/aids?	☐ Disagree (Go Submit Form) ☐ Agree (Go to Q11b)
Q11b	If agree (in Q11a), what are the effective measures the government should take on to curb on the negative impacts?	☐ Improve institutional governance ☐ Enhance aid governance and debt management ☐ Diversify sources of financial assistance ☐ Keep up improving relations with other regional powers ☐ Others

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