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Private tutoring and traditional classes: A comparison of students' learning achievements in chemistry

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Abstract

Private tutoring has been popular among Cambodian students, specifically in urban areas. It is not a compulsory requirement by the government, schools, or teachers. However, it is more generally motivated by several reasons. This study aims to compare the achievements of high school students who attended private tutoring in a chemistry subject and those who did not. To collect the data, the first author divided Grade 11 students into two groups. A total of 30 students from each group were randomly selected for the study. The results of the study revealed that there was no statistically significant difference between the two groups. However, the students who attended private tutoring received somewhat higher mean scores than those who did not. This study recommends that future studies should include a larger sample size with the same or with other subjects at other educational institutions. Studies using a qualitative or mixed-methods design are also recommended.

Keywords: Private tutoring; shadow education; academic achievement; Cambodia

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Introduction

For decades, students' learning achievement has been a vital point of discussion among educational stakeholders. It has been identified as a learned proficiency in basic psychomotor and cognitive domains (Pov et al., 2021). In Cambodia, many issues concern student retention, education quality and equity, and students' low learning achievements (Brehm et al., 2012; Heng & Sol, 2022). The 2006-2007 standardized assessments showed that the students in Grades 6 and 9 could correctly answer 53% and 33.7% of the mathematic problems, respectively. In the 2014 Grade 12 national examination, with strict anti-cheating control, only 26% of those taking the exam passed in the first round (Kelsall et al., 2016), and only 18% of those sitting the exam passed in the second round (Pech, 2015). Before the 2014 examination reform, about 108,288 students, or 86.8% of all the candidates, passed the high school national examination in 2013 (Bredenberg, 2018). Before this, there were 70% in 1994 and 79% in 1998 (UNESCO, 2008). The different pass rates were due to the fact that up to 80% of students were able to pay money to the examiners or proctors directly in order to work out the exercises with other students, copy from the students nearby, or receive cheating answers through different means (Bredenberg, 2018). Sometimes the answer keys were thrown through the windows into the exam rooms, and it was also said that a few years before the 2014 exam reform, the answer keys were also sent through Facebook Messenger to the students taking the exams in the exam rooms (see Brehm, 2016; Maeda, 2019).

This study focuses on the learning achievements in chemistry between two groups of students who took private tutoring and those who did not. It aims to explore the difference in learning achievements between the two groups of students. The results of this study will be of significance to education policymakers, teachers, students, and other concerned stakeholders such as parents and the community.

Literature review

Private tutoring

Private tutoring is the activities run by informal educational establishments where teachers are from students' schools or outside (Baily, 2012; Bray & Silova,

2006; Ünal et al., 2010). Bray (2014) noted that private tutoring refers to tutoring in academic subjects, such as language, mathematics, or science, to increase students' learning achievements, and it is delivered by teachers for additional financial benefits. Lee et al. (2004) found that private tutoring had significant effects on students' academic achievements in both language and mathematics in Turkey and Korea, respectively. However, it did not make any positive changes among Italian students in language subjects (Meroni & Abbiati, 2012). In Cambodia, private tutoring is a very common means that allows teachers to make extra income (Brehm et al., 2012).

Private tutoring, also known as shadow education, is a big business in many countries around the world, especially in developing countries such as Cambodia (Bray, 2006). Some Cambodian teachers may penalize their students who do not attend additional private classes by giving low scores or discriminating against those who do not attend extra classes run by them (Bray, 2006). However, the government seems to have directed the responsibilities of running private classes to teachers because of their low wages. As a result, no critical actions besides the introduction of New Generation Schools (NGS) have been taken (see KAPE, 2020; No, 2020; Sam, 2022). This situation might have caused a high dropout rate for students who could not afford to pay private tutoring fees (Bray, 2006). According to Brehm and Silova (2014), private tutoring strongly contributes to persistent unequal educational outcomes between wealthy and poor students. This stratification was found among Cambodian students in public schools (Brehm & Silova, 2014).

Advantages and disadvantages of private tutoring

Private tutoring has been found to have both advantages and disadvantages. Some of the advantages of private tutoring for students in Cambodia include gaining more knowledge, learning more than what is in the textbook, or familiarizing themselves with the old exam papers to get ready for the coming exams (Edwards Jr et al., 2020). In addition, teachers may search for different sources of tests or additional exercises to teach the students and dedicate more time to explaining in private classrooms (Bray, 2006; Edwards Jr et al., 2020). In this sense, students can have the opportunity to learn more than what is in the curriculum provided by the Ministry of Education, Youth and Sport (MoEYS) (Brehm & Silova, 2014; Edwards Jr et al., 2020).

However, there are some disadvantages to private tutoring as well. Some teachers may dislike students who do not attend their extra classes. As a result, they may give those students low scores because the teachers may have already sold exam preparation sheets or held special tutoring lessons in their tutoring courses before the exams (Edwards Jr et al., 2020). In addition, the problem has happened to those who do not have money to attend private tutoring classes (Brehm & Silova, 2014) and those who are not able to attend private classes because of time adjustments, housework duties, and other work commitments (Brehm et al., 2012). These two groups of students may be left behind in public classrooms. Consequently, they may fail most of the exams because some teachers only use the exercises they taught in the private classes as the monthly tests or semester exams in the public classes. It was found that students who regularly attended private tutoring scored approximately 70% of the total scores, whereas students who minimally attended private tutoring scored 50% of the total scores, and they hardly passed the minimum requirements (Brehm & Silova, 2014).

Reasons for private tutoring

There have been many reasons for the existence of private tutoring across the globe. In a survey of 507 students in Hong Kong, Lee (1996, as cited Bray, 1999) found that 71% of the participants took private tutoring classes because their academic capacity was not satisfying. Other reasons included not fully understand the lessons taught during public classes (14%); preparing for their upcoming examinations (8%); and being asked to do it by their parents (2%); among other reasons.

In Cambodia, a vast majority of students attend private classes run by their teachers. Bray et al. (2018) noted that, among 1,274 student participants, 74.7% of them from Grade 9 and 89.8% from Grade 12 attended private classes because their regular public learning hours were insufficient. During the private classes, their teachers tended to explain each point more clearly, asked if they were not clear about anything, and provided more exercises (Bray et al., 2018). Moreover, Grade 12 students considered their private classes as good preparation for the coming national exam and university entry (Bray et al., 2018). For teachers, they could earn extra income from their private classes.

Negative consequences of private tutoring

There are different consequences of private tutoring. The tutors might have used scores, punishment, unfriendly words, and actions to secure their private tutoring incomes. They even deliberately failed those who did not attend their private tutoring classes (Bray et al., 2018; Brehm et al., 2012). When enrolment rates in private tutoring classes hit high levels, Cambodian students who did not attend private tutoring seemed to feel greatly pressured than when the private tutoring enrolment rates were low (Bray et al., 2018). Likewise, private tutoring could put mental and emotional pressure on students in Nepal as teachers forced them to attend tutoring, and the students felt fearful of failure in all kinds of exams because they got pressured by their parents to get high scores (Subedi, 2018).

In Cambodian schools, many students, especially those who live in Phnom Penh, were charged by their teachers for each class (Bray & Bunly, 2005). Many students' parents believed that many teachers did not do their best to implement all the parts of the curriculum during the formal school timetable and deliberately sent messages to the students that the rest of the curriculum would be taught in their private tutoring classes (Bray, 2006; Bray et al., 2018). According to Bray et al. (2018), among the 1,274 students responding to their survey, 64.9% agreed and 19.3% strongly agreed that payment for private tutoring classes was a monetary burden. Only 15.8% of them felt that private sessions were not a monetary burden.

Impacts of private tutoring on students' learning achievements

Negative impacts

Some studies revealed no statistically significant effect of private tutoring on students' learning achievements. Bray (2006) found that there was no statistically significant correlation between private tutoring and students' learning achievements. Sun et al. (2020) revealed that private tutoring typically had neither positive nor significant relationships with standard scores for language (Chinese and English) and mathematics subjects, and private tutoring was also found to be negatively related to learners' emotions with feelings of being unhappy, blue, sad, and not enjoying life. Other studies have revealed a

negative effect of private tutoring on students' learning achievements in mathematics (Kuan, 2011; Zhang, 2013).

Private tutoring was also found to negatively affect students' learning achievements for male students, students from rural schools, and students whose parents were in disadvantaged groups (Sun et al., 2020). The private tutoring business in Cambodia has led to a hot topic of social criticism and appeared as a threat to education equity and quality in the mainstream school systems (Bray et al., 2018). Therefore, teachers in the NGS were not allowed to offer private tutoring to their students (Nhem, 2022). Surprisingly, compared with the national baccalaureate pass rate of 68%, Sisovath NGS and Hun Sen Kampong Cham NGS obtained 94% and 84% of pass rates for their schools, respectively (Bo, 2021).

Positive impacts

Several studies attempted to analyze which characteristics of private tutoring instruction contributed to increasing students' learning achievements (e.g., Liu, 2012; Zhang & Liu, 2016). Baily (2012), Soeung et al. (2019), and Ünal et al. (2010) found that private tutoring had a significant impact on students' learning achievements in language studies. This means that students attending private tutoring gained higher scores than those who did not.

Examining the correlation between the receipt of tutoring and scores of 22,500 Nepalese students in a Grade 10 school leaving certificate examination, Thapa (2011) found that students in public schools who attended private tutoring had higher scores by 1.74% than those who did not. Liu (2012) surveyed 13,978 Grade 7 students in Taiwan, and after controlling other variables, found significant positive effects of private tutoring on students' critical thinking and mathematics performance. Sohn et al. (2010) reviewed 11 studies in South Korea and found that six of them showed a positive correlation between expenditures on tutoring and students' learning performance. Zhang (2013) studied the correlation between private tutoring classes and state college entrance examination scores of 6,043 upper-secondary school students in China and found significant positive impacts of private tutoring on city students with lower achievements in mathematics and Chinese; however, private tutoring has

a negative correlation with rural students' performance of the national college entrance examination in these subjects.

Other studies have also found a positive correlation between supplementary private tutoring sessions and students' learning achievements in different contexts such as the United States (Buchmann et al., 2010), Brazil (Guimarães & Sampaio, 2013), and Vietnam (Dang, 2007). In Cambodia, Pov et al. (2021) also found that private tutoring classes had a significantly positive effect on students' learning achievements.

As discussed above, many studies have investigated the effects of private tutoring on students' learning achievements. However, very few studies have dug deeper into students' learning achievements as a result of extra private tutoring classes compared with only government classes, especially using the independent samples t-test for data analysis. As a result, the current study aims to explore the difference in learning achievements between the students who attended private tutoring in chemistry and those who did not.

This study seeks to answer the following question:

> Is there a statistically significant difference in terms of learning achievements between the students who attended private tutoring in chemistry and those who did not?

Methodology

Research design

This study employed a quantitative design to investigate Grade 11 students' learning achievements in chemistry. A qualitative design was not considered in the study because statistical analyses were needed. Students' learning achievements based on those who attended private tutoring and those who did not were compared by using an independent samples t-test.

Participants

There were 1,235 students in a public high school in Kampong Speu province,

our research site, and some students received private tutoring classes, whereas some did not. We chose chemistry because the teacher who taught it was very interested in our research and willing to help us with our project. Simple random sampling was adopted to recruit a total sample size of 60 students from a population of 141 Grade 11 students. Of these, 53 students attended private tutoring and 88 students did not. A total of 30 students were then randomly selected from each group.

Data collection procedure

The two groups of students were instructed and were ready to take the same test given by their chemistry teacher for the first group (private tutoring) and by the first author for the second group (non-private tutoring). The time allowed for the test was 60 minutes. Then, the chemistry teacher, the school principal, and the first author carefully observed all the students taking their tests to ensure that all the students were taking the test honestly, with no cheating at all. Finally, all the students returned their paper tests based on the time allowed.

All the collected paper tests were then corrected carefully and honestly by the chemistry teacher in front of the first author and the school principal using the prepared answer keys. All the corrected paper tests were then handed to the first author with the school principal's approval to conduct causal comparisons. To protect the participants' identities, the identity of the school, the teacher, the school principal, and the students were kept confidential.

Research instrument

A second-semester chemistry test of the academic year 2020-2021 for Grade 11 students was written by the chemistry teacher and utilized for data collection. This achievement test covers six major chemistry problems, including the definition of oxidation, semi-electronic equations of paired reduction in acid, and the oxidation of aluminium and nitrogen. Overall, 16.66% of the questions were considered easy, 50% were medium, and 33.33% were difficult. In terms of Bloom's Taxonomy, 16.66% of the questions were for Remembering, 50% were for Application, and 33.33% were for Evaluation.

Data analysis

This casual comparative study used an independent samples t-test to analyze the data. In this study, there were two groups of students. One group attended private tutoring, while the other did not. These groups of students were categorical variables, and the test scores were dependent variables. The independent samples t-test was used to examine if the test scores of the students who attended private tutoring were higher than those who did not. For the statistical treatment in this study, the significant level was at $p<0.05$, and the confidence interval of the difference was 95%.

Results

Participants' demographic information

Table 1. *Participants' demographic information (N = 60)*

Demographic	Value	N	Percentage
Gender			
	Male	31	51.67
	Female	29	48.33
Age			
	16-20	60	100
Grade			
	11	60	100

As shown in Table 1, 60 students (31 were females) participated in the study. All of them were Grade 11 students. Their age range was between 16 and 20.

Casual comparative results

Table 2. *Results of the independent samples t-test*

Variables	Participants	M	SD	T	df	Sig.
Private tutoring						
	30	57.77	11.96	3.52	58	0.059
Non-private tutoring						
	30	41.57	16.72			

As shown in Table 2, there was no statistically significant difference between the level of students' learning achievements in chemistry of those who attended private tutoring and those who did not, t (58) = 3.25, p>0.05, Sig. = 0.059. The results mean that the students from the two groups had similar abilities in chemistry. However, the group who attended private tutoring had descriptively higher scores than those who did not (M = 57.77, SD = 11.96).

Discussion

This study investigated the difference in learning achievements between Grade 11 students who attended private tutoring and those who did not in a high school in Kampong Speu province. The results showed that there was no statistically significant difference in terms of their learning achievements.

These results are in line with previous studies. For example, a longitudinal survey study with a sample size of 10,013 Grade 9 students in Taiwan showed that the average treatment effect of students who attended mathematics cramming school was very small (Kuan, 2011). Similarly, a study with 660,000 Chinese students also showed that students attending private tutoring did not have statistically higher scores on National College Entrance Exam for the entire sample and the subsample in the rural area (Zhang, 2013). Byun and Park (2012) also found an insignificant impact of private tutoring on different ethnic groups of students in America in their longitudinal study.

However, the results of this study are different from those of Pov et al. (2020) who found that private tutoring had significant effects on Grade 7 students' learning achievements in rural Cambodia. This study's results are also different from those of other studies reviewed earlier that found significant impacts of private tutoring on students' learning achievements (e.g., Buchmann et al., 2010; Dang, 2007; Guimarães & Sampaio, 2013).

Conclusion and recommendations

The results from this study revealed that there was no statistically significant difference between chemistry students who attended private tutoring and those who did not. These results showed that private chemistry tutoring in the studied context did not have a notable effect or almost had no effect on

students' learning achievements. However, many high school students, especially those in the studied context, still attend private tutoring. Hence, there may be other reasons behind the private tutoring trend as discussed in other studies (see Donaher & Wu, 2020; Nhem & Kobakhidze, 2022).

Since there has not been a noticeable effect of private tutoring on students' learning achievements, we do not recommend reforming the situation in the studied context. However, we would like to recommend that teachers and school principals should use all the public schooling hours to teach students with care and effort. Teachers should give more homework to students but carefully check the given homework. They should also create cooperative learning groups so that the students can learn by themselves and add extra learning hours via group discussions inside and outside schools, not only for chemistry classes but for all subjects (see Chan et al., 2021).

Moreover, we also recommend that teachers should not discriminate against those who do not attend private tutoring. We do not ban them from providing students with extra classes for some supplementary benefits, but with professional ethics. In the studied context, there exists no form of discrimination. However, we only share our recommendations for future learning and for some other places that might have some forms of discrimination. Additionally, as Em et al. (2021) noted, teachers should focus on their professional development to attract students' interest in learning. That means that teachers should continuously develop their professional competencies in order to become qualified teachers in the 21st century rather than focusing on gaining additional benefits from students.

Like other previous studies, this study has some limitations. As the number of participants was small, generalizing the results is impossible. Therefore, future studies with a larger scope and a bigger sample size are recommended. Qualitative research is also recommended to find out the many issues vis-à-vis private tutoring. Future studies employing mixed-methods design are also suggested.

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