



## **Academic Performance in Stem Subjects Among Secondary Boarding and Day Students in Lhuentse**

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Stem achievement is a predictor of national development since it empowers students with skills and capacities to confront challenges such as climate change, global warming, and unemployment. However, despite its significance and international priority, students' STEM performance has deteriorated in Bhutan. This study aimed to investigate stem subjects' performance and impeding factors by comparing the academic performance of boarding and day students in stem subjects. A convergent parallel mixed-method study was conducted with 301 participants comprising 281 students, 12 parents, and eight teachers in four secondary schools at Lhuentse. The research indicated a statistically significant difference in academic performance between boarding and day students in stem subjects, with day students outperforming boarding students. In addition, day students' self-efficacy was significantly higher than boarding students. Moreover, students' self-efficacy correlated significantly with academic performance in STEM subjects. Some of the recommendations are: to notify the need to upgrade physical structures such as hostels and bathrooms; to inform a proper use of available resources to enable students to use them for studying stem subjects; and to encourage guardians to support students in terms of resources and guidance to perform better academically in stem subjects.

Keywords: academic performance, boarding, day school, STEM, self-efficacy

### **INTRODUCTION**

Boarding schools were thought to have been founded in the early twentieth century by Roman Catholics and Anglicans to improve students' academic performance (Altaf et al., 2019). As per Neagley and Evans (1970), the student's academic performance is better in boarding schools since the students are guided directly by the authority, which enables the authority to identify and guide the low performers. In the same line, Wessel (2015) posits that students have enough time to spend with their friends and learn from

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them because most students feel more comfortable opening up to their friends when teachers are not present because they do not have to face the large group in answering the teacher's question.

On the other hand, there is a dominant school model known as 'day school,' which was predated by boarding schools (Dickson, 2019), and according to Ajaya (2002), day schools arose primarily as a result of low-income parents who were unable to send their children to boarding schools. Academically, Faisal et al. (2016) assert that day students outperform boarding students by 17.6 to 14.6 per cent when the number of students who scored above 80% was examined, which according to Brown (2016), is because day students can focus on their studies at a comfortable pace on their own at home.

Similarly, Bhutan also has a dual model of schooling system; boarding schools and day schools. Moreover, the boarding school system in Bhutan was reformed into central schools (Delma, 2016). She also claims that the establishment of the central school was a strategic school-based reform to address the issue of students having to walk a long distance, poor socioeconomic status of parents, and improve educational quality by providing boarding facilities for 80 per cent of students who live beyond an 8-kilometre radius from the school campus.

All the government school (boarding and day) in the country offers free education. Among all the subjects, STEM subjects are being prioritised because current students need to mitigate emerging national and global issues (Royal Education Council, 2021). Furthermore, His Majesty, the King, mentioned the importance of STEM during the third convocation of the Royal University of Bhutan at Paro on 17th February 2009, where His Majesty stated that the strength of education has been in Mathematics and Science in all countries where progress has been strong (Gelay, 2009).

However, students' performance in Science and Mathematics during PISA-D in Bhutan was 38 to 48 points lower than in PISA reference countries such as China, Singapore, and Macau (China) (BCSEA, 2019). Furthermore, grade X's performance in STEM has been the lowest among other subjects (Table 1.1).

Table 1

The mean marks of STEM subjects from 2016 to 2019 in comparison with other subjects

Year	Mean		
	STEM	Economics	History and Geography
2016	51.4	61.03	59.11
2017	49.99	62.43	56.3
2018	51.85	58.69	55.87
2019	50.9	61.42	57.89

Source: Bhutan Council for School Examinations and Assessment's (BCSEA) pupil performance (2017, 2018, 2019, 2020).

A study conducted in the United States on the factors that influence student performance in STEM subjects pointed out parental involvement and teacher-assisted learning as the most important factors affecting student performance in STEM subjects (Revera & Li,

2020). Furthermore, a similar study in Malaysia revealed that environmental factors such as parents, resources, and peers at home influence students' attitudes toward STEM. However, when carefully examined, these factors are distinct for boarding and day students in Bhutan.

Even though boarding and day students attend the same class, their environment after the academic hour is different, with day students receiving guidance from their parents and boarding students receiving more assistance from teachers during scheduled study hours. Due to these assumed differences in factors such as parental support, environment, social, resource, and time management, there could be a difference in academic performance among boarding and day students, which might have led to poor performance in STEM subjects. Hence, this study examines the difference and impediments to academic performance in STEM among boarding and day students to understand which section of students performs better and why. Since this research is a first of its kind in Bhutan, it will help policymakers, teachers, school administrations, and guardians better plan and create a conducive environment for students to study STEM subjects.

#### Research objectives

1. To identify the better performer in STEM subjects between boarding and day students.
2. To identify the impeding factors for academic performance in STEM subjects.
3. To examine the impacts of boarding school on academic performance in STEM Subjects
4. To examine the impacts of day school on academic performance in STEM Subjects
5. To investigate the challenges encountered by boarding and day students.

#### Literature Review

##### **Factors affecting the academic performance of boarding students in STEM subjects**

Day and boarding schools provide very different learning environments, and as a result, the learning experiences will be very different (Coulson, 2020). According to Jagero et al. (2011), boarding schools have favourable impediments such as free time, resources and friends to achieve higher academic performance. Similarly, students enrolled in boarding schools in Bhutan receive free meals, accommodation, and access to school resources after school hours. Additionally, unlike day students, they do not have to walk to school, allowing them to concentrate on their studies (Bhutan's Daily Newspaper, 2020). However, there are issues such as insufficient hostels, lack of internet access, peer pressure, bullying, and homesickness that can hamper academic performance, particularly in STEM subjects perceived as challenging areas of study (Woldeamanuel et al., 2014). Additionally, Aruna et al.'s (2015) study in India revealed that boarding students were commonly sleep deprived, affecting their academic performance in biology. Similarly, Foreman (2007) cautioned that peer pressure in boarding schools with less parental monitoring might affect students' self-efficacy. He also notes that

students attending boarding schools, particularly low-income families, are financially dependent on others, making them even more vulnerable. Another disadvantage of boarding school, as noted by Woolfolk (1998), is that it restricts students' mental growth due to living in a closed or restricted environment, resulting in low academic motivation, which is the foundation of self-efficacy. In addition, the boarding schools have their own set of challenges arising from various sources such as friends, school environment, and homesickness, which could hamper the students' motivation to study.

### **Factors affecting the academic performance of day students in STEM subjects**

The day schools can foster an environment conducive to improved learning experiences when accompanied by adequate guidance and assistance at home, thereby assisting students in developing a high sense of self-efficacy (Liu & Leighton, 2021). In contrast to boarding students, however, factors such as walking a long distance to school and the absence of a companion to discuss abstract concepts were found to have a detrimental effect on students' science learning outcomes (Kenzie, 2019). Additionally, a study of Somali students' academic performance revealed that day students performed poorly in mathematics due to a lack of parental involvement and support at home (Demie, 2008). Further, Ehioghiren et al. (2020) posit that day students lack quality study time at home because they must assist their parents with household chores, negatively affecting their academic achievement in STEM. Similarly, a national newspaper expressed concern about day students' study time while performing household chores (Rinzin, 2020).

Thus, while certain factors favour boarding students, others are in favour of day students. After extensive review, it was found that some factors such as free accommodation, study companions and resource factors favour boarding students. However, the students' self-efficacy favours day students' academic performance in STEM subjects.

### **METHOD**

A convergent parallel design was used in this study. A convergent parallel design enables the researcher to conduct quantitative and qualitative elements concurrently during the same phase of the research process, balance the methods equally, analyse the two components independently, and interpret the results jointly (Creswell, 2014).

The whole population sampling technique was employed for 281 students to avoid guessing. The sample for academic result comparison comprised 218 boardings and 63-day students who appeared for the grade X examination in 2020 from four schools under Lhuentse Dzongkhag. Further, 164 students, comprising 122 boarding and 42-day students, were sampled following the convenience sampling technique to collect students' opinions about impeding factors for academic performance in STEM among boarding and day students. The convenience sampling technique was employed, looking at the convenience of the students because schools have only a few computers connected to the internet, and some students changed schools. Moreover, two STEM teachers from each school were selected and interviewed following the purposive sample technique to collect teachers' views on the impediments of academic performance in STEM subjects.

Additionally, five parents whose children were day students and seven who had their children in boarding schools were interviewed randomly to collect the perspective of the parents about boarding and day students. Multiple sampling techniques were used in this study to validate the findings. While whole population sampling leads to greater breadth in terms of information, purposive sampling leads to greater depth from a small sample. Moreover, the reliability of the survey questionnaire obtained by Alpha Cronbach is  $0.941 > 0.443$ , which as per Saputri et al. (2019), is considered reliable in gathering data.

### Data Analysis

The academic result and the survey questionnaire responses of the students were analysed using SPSS. The student's academic performance in STEM (mathematics and sciences (biology, physics, and chemistry)) was investigated for the significant difference using Welch's t-test analysis. Welch's t-test was carried out as it does not assume equality in the variance (Delacre et al., 2017; Sakai, 2016). Similarly, the Likert scale responses were distributed in a mean range scale adopted from Hussain's formula (Hussain, 2019), as reflected in table 2.

Table 2  
The level of agreement

Sl no	Mean range	Level of agreement
1	1-1.75	Strongly disagree
2	1.76-2.5	Disagree
3	2.6-3.25	Agree
4	More than 3.26	Strongly Agree

After an in-depth literature review, themes were drawn to analyse the difference in the performance and impeding factors between boarding and day students. The themes include academic performance, self-efficacy; social factors; resource factors; time management, and challenges. The participants' confidentiality was maintained by coding their names as BS1 for boarding student one, DS1 for day student one, T1 for teacher one, DP1 for day student's parent one, and BP1 for boarding student one. Moreover, the schools' names were coded as School A, School B, School C, and School D.

### FINDINGS

The academic performance and impediment factors of studying STEM subjects between boarding and day students of sample schools based on themes drawn from the literature review are discussed in detail in the following sections.

#### Academic Performance in STEM

In this context, performance in STEM subjects refers to the mean marks obtained by grade X students in mathematics and science (chemistry, Biology, and Physics) during Bhutan Council for School Examinations and Assessment, 2020. Welch's test was performed to statistically prove the difference in the academic performance in STEM among boarding and day students. Even though there was no substantial evidence to prove the inequality in variance by Levene's test for equality of variances ( $p > 0.5$ ),

Welch's t-test was used as per (Delacre et al., 2017). Table 3 shows the details of the test performed.

Table 3  
The test result

		Levene's Test Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed)
STEM grouped	Equal variances assumed	0.001	0.974	-2.478	279	0.014
	Equal variances not assumed			-2.476	100.515	0.015

The test revealed a significant difference in the scores of Day students ( $M=3.1746$   $SD=1.37418$ ) and Boarding students ( $M=2.6881$   $SD=1.37252$ ) condition;  $t(100.516) = -2.48$ ,  $p=0.015$ . These results suggest that day students performed better than the boarding students. The better performance of the day students was found mainly due to the high students' self-efficacy of the day compared to boarding students. Moreover, the high self-efficacy of the day students was attributed to parental guidance self-paced learning environment at home.

#### Perception of Impeding Factors for Academic Performance in STEM

The perception of the differently treated factors for boarding and day students was assessed by four themes: self-efficacy, social factor, resource factor, and time management. The means of Likert scale responses in each theme were compared for significant differences between boarding and day students using the Mann-Whitney U test. The particular test was chosen since the data did not follow the standard distribution curve.

##### Self-efficacy

Table 4  
The U-test result

	Boarding/Day- students	N	Mean Rank	Mann- whitney U	Sig. (2 tailed)
Self- efficacy	Boarding	122	76.4	1817.5	0.005
	Day-students	42	100.23		

Table 4.6 indicates that day students have a higher mean rank ( $r=100.23$ ) than boarding students ( $r=76.40$ ). From this data (Table 4), it can be concluded that day- students' rating in self-efficacy was statistically significantly higher than boarding students ( $U=1817.500$ ,  $p=0.005$ ).

In the same line, analysis of the qualitative data revealed similar results. While most of the students were happy, some boarding students expressed their concern about being bullied by seniors (BS118, BS1, BS33, BS80, BS15, BS77). The majority of the students also mentioned that they missed their parents and wanted to go home, especially when issues such as fighting amongst friends (BS83, BS35, BS89. BS 90),

exhaustion due to superfluously scheduled activities (, BS 100, BS 56, BS 60, BS 78). However, the parents of the boarding students voiced that boarding schools provide all the enabling factors for them to feel happy and perform better than their counterparts (BP5, BP3, BP1).

The Pearson product-moment correlation analysis was then used to investigate the relationship between students' self-efficacy and academic performance in STEM subjects. The test revealed a significant ( $P=0.05$ ) relationship between self-efficacy and academic performance in STEM subjects (see Table 5). The positive correlation indicated that students' self-efficacy was a predictor of academic performance in STEM.

Table 5  
The relation between self-efficacy and performance in STEM subjects

Correlation	R	sig.
Self-efficacy and STEM performance	.200*	.010

#### Social Factor

The social factor opinion of the students was collected by seven indicators that assessed the peer influence on learning which impacts academic performance in STEM. The statement '*I have friend/s with whom I study STEM Subjects often*' showed a significant ( $P=0.05$ ) difference in the mean rank between boarding and day students when Mann Whitney U-test of mean rank comparison was conducted. Though there was a difference in the mean rank between boarding and day students in one indicator, it was not significant enough to alter the mean ranks of the social factor. Table 6 contains the details of the indicators and the difference in the mean ranks.

Table 6  
Social factor analysis

Indicators	Mann-Whitney U	Wilcoxon W	Z	Asymp Sig. (2-tailed)
1 I have friend/s with whom I study STEM subjects often	1875.5	2778.5	-2.785	0.005
2 My friend/s are interested in pursuing career in STEM related fields (Engineer, Doctor, Nutritionist, Programmer)	2273.5	9776	-1.183	0.675
3 I also learn STEM subjects from friends	2443	3346	-0.504	0.614
4 My friend/s encourage me to study STEM subjects	2390.5	3293.5	-0.702	0.483
5 I understand more when learn from my friends	2238.5	9741.5	-1.335	0.182
6 Learning by discussing with friend is more effective than learning in the class	2401	3304	-0.657	0.511
7 My friend/s do not distract me when I am studying	2504.5	10007.5	-0.236	0.813

The indicator that showed a significant difference in the mean ranks was separately tested to determine which type of school had the higher rating. Table 7 indicates that boarding students have a higher mean rank ( $r=88.13$ ) than day students ( $r=66.15$ ). From

this data, it can be concluded that boarding students' rating in the indicator '*I have friend/s with whom I study STEM Subjects often*' was statistically significantly higher than day students ( $U=9320.500, p=0.005$ ).

Table 7  
The difference in the mean rank

	Boarding/Day-students	N	Mean Rank	Man W.U	Asymp. Sig (2-tailed)
I have friend/s with whom I study STEM Subjects often	Boarding	122	88.13	9320.5	0.005
	Day-students	42	66.15	4209.5	
	Total	164			

The qualitative analysis revealed that teachers and parents support the findings where they shared that boarding students have more friends to study with (BP6, BP1, T1) and learn from each other (BP4, BP5, T3, T5). Similarly, most boarding students share a common consensus of having a study friend. However, they also shared that having more friends impacted the quality of time used for studying by engaging in other activities such as chatting, playing (BS 109, BS 105, BS112, BS 80, BS 58, BS 45, BS 80, BS 34, BS 51, BS 46). Students also pointed out that their study hours are disturbed due to noise when the teacher on duty moves to another room (BS1009, BS 56, BS40, BS 50, BS25, BS70)

Furthermore, as shown in Table 8, the Pearson product-moment correlation analysis showed a negative correlation between the social factor and academic performance, although it was not statistically significant (0.658).

Table 8  
Relation between social factors and academic performance in STEM

	R	Sig (2 tailed)
Self-efficacy and academic performance in STEM	-0.035	0.658

These findings indicate that, while parents and teachers perceived boarding students to have a social advantage over day students, students perceived no difference in its impact on STEM academic performance.

#### Resource Factor

Table 9 shows the analysis report of the Mann-Whitney u-test on resource factor between boarding and day student's perception of resource factor. Again, only one factor from nine indicators revealed a statistically significant difference.

Table 9  
Indicators for a resource factor

Indicators for resource factor	B/D	N	Mean Rank	Asymp. Sig (2-tailed)
I have a comfortable room to study STEM subjects	Boarding	122	79.27	0.105
	Day	42	90.34	
I have all the required materials to study STEMM subjects	Boarding	122	80.36	0.274
	Day	42	88.71	
I get to visit the library after school/holidays/weekends to learn STEM subjects	Boarding	122	80.76	0.384
	Day	42	77.55	
The use of various library resources makes the learning of STEM subjects easier	Boarding	122	84.13	0.4
	Day	42	77.77	
I have a personal computer/shared computer/phone at home	Boarding	122	78.95	0.071
	Day	42	92.82	
I know how to make use of computers for learning purposes	Boarding	122	79.43	0.122
	Day	42	91.42	
I use the computer for learning STEM subjects after school/holidays/weekends	Boarding	122	77.32	0.009
	Day	42	97.56	
I use the internet to learn STEM subjects after school/holidays/weekends	Boarding	122	76.1	0.471
	Day	42	80.56	
I make use of computer simulations in learning STEM subjects	Boarding	122	82.69	0.923
	Day	42	81.95	
Resource factor	Boarding	122	79.61	0.142
	Day	42	90.89	

In contrast to the findings, the qualitative data analysis revealed that boarding students' parents believe that boarding students get access to necessary resources to learn STEM subjects after the academic hour (BP 1, BP2, BP3, BP4, BP5). However, boarding students assert that they do not get any additional opportunities to learn after the academic hour as all the resources such as computer laboratories, science laboratories, and libraries are closed after the academic hour (90% of the boarding students) which is also agreed by the STEM teachers (T1, T2, T4, T5, T6, T7). Surprisingly, day students expressed that they get enough time with STEM learning resources such as computers, the internet and mobile phone to explore more information on STEM subjects (DS1, DS 5, DS 7, DS8, DS 13, DS 15, DS 17, DS 20, DS 21, DS22). It was also revealed that day students' parents supported STEM learning resources such as data vouchers, computers, and mobile phones to support the study of STEM subjects at home (DP1, DP 3, DP4).

Table 10 shows Pearson product-moment correlation between resource factor and academic performance in STEM between boarding and day students. The result showed a positive correlation (0.0866). However, it was not statistically significant ( $p=0.273$ ).

Table 10  
The relation between resource factor and performance in STEM subjects

Correlation	R	Sig.
Resource factor and performance in STEM subjects	0.0866	0.273

These findings conclude that boarding students do not have an advantage over day students regarding resource factor, as believed by boarding parents. However, the

findings revealed that day students have some advantages in Information and Communication Technology (ICT) related resources over their counterparts at home which is also indicated by a modest positive correlation with academic performance.

#### *Time Management*

Even though the time management factor did not reveal any significant difference when Mann-Whitney U-test was performed between boarding and day students, it was found that one of the indicators that collected the opinion of students about whether captains, teachers or parents monitored their study hours, boarding students (Mdn=87.98) ranked significantly above day students (Mdn=66.60);  $U=1894, 0.007$ . This result indicates that both boarding and day students get an equal amount of time for studying STEM subjects, with the only difference in monitoring the study hours found more prevalent for boarding students.

Opposed to the findings, the analysis of qualitative data, all the parents expressed that boarding students get enough time to study STEM subjects since they do not have to walk home or do household chores at home. However, some teachers (T1, T2, T3) shared that boarding students were always involved in extracurricular activities such as gardening, cleaning, and playing after an academic hour or at weekends, leaving only limited time for students to study. Most of the boarding students (95%) asserted they get enough time in boarding school. However, they could not convert it to study time as they are either involved in extracurricular activities or due to disturbances caused by friends during study times.

On the other hand, day students expressed that they make good use of the limited time they get reaching home (DS6, DS7, DS9, DS11, DS17, DS 20, DS 22), and they can study at their own pace without disturbances at home (DS1, DS2, DS5, DS7, DS8, DS19, DS20, DS22). These findings conclude that although day students get less time than boarding students, they could fully use it for their studies. Therefore, the time management factor revealed no significant difference in the mean ranks between boarding and day students.

Although not significant, the Pearson product-moment correlation (-0.093) between time management and students' performance in STEM subjects found a negative correlation ( $p=0.24$ ). Table 11 contains the details.

Table 11

The relation between time management and performance in STEM subjects

Correlations	R	Sig.
Time management and performance in STEM subjects	-0.093	0.239

The negative correlation indicates that although boarding students get enough time, they could not use it to study STEM subjects and hence could not perform well in examinations, whereas day students made wise use of the limited time to score good grades.

#### **DISCUSSION**

The findings of this study are compared and interpreted to the existing literature in this session.

### **Academic performance of boarding and day students in STEM subjects**

The comparative analysis of the academic performance of boarding and day students in STEM subjects revealed that day students outperformed boarding students. The better performance of the day students was found mainly due to high students' self-efficacy of the day compared to boarding students. Moreover, the high self-efficacy of the day students was attributed to parental guidance and a self-paced learning environment at home. This study's findings are consistent with existing studies that found that day students perform better than boarding students (Aruna et al., 2015; Dambudzu, 2013; Khursid et al., 2012; Hannum & park, 2007). For instance, Saracosti (2019) found that parental involvement positively impacts the academic performance of the day students. Similarly, Aruna et al. (2015) asserted that day students performed better academically since boarding students were mostly engaged in extracurricular activities.

### **Perception of the Students on Impediment Factors**

This section discusses the students' perspective on impediment factors in the academic performance of STEM subjects among boarding and day students.

#### *Self-efficacy*

This study found higher self-efficacy in day students. This study also revealed students' self-efficacy as the predictor of academic performance in STEM subjects. These findings align with various studies (Zeldin et al., 2008; Young-Jones et al., 2014; Bandura & Locke, 2003; Fager & Brewster, 1999; Bandura, 1997; Seymour, 1995; Eccles, 1994). For example, Fager and Brewster (1999) found a positive association between parental involvement and students' self-efficacy. Similarly, self-efficacy predicted students' academic performance in science (Zeldin et al., 2008). Moreover, Eccles (1994) and Seymour (1995) posit that students with high self-efficacy see complex tasks as challenges rather than threats, motivating them to learn, whereas those with low self-efficacy will give up.

#### *Social Factors*

The study revealed that, while parents and teachers perceived boarding students to have a social advantage over day students, students perceived no difference in its impact on academic performance in STEM. Moreover, a negative correlation was observed with academic performance. This study's findings are consistent with those of studies elsewhere (Caviola et al., 2021; Shah & Inamullah, 2012). The consequences of a noisy environment in boarding school during study hours might have caused disruptions in the study of STEM subjects. Caviola et al. (2021) stressed the negative impact of a noisy environment on academic performance in STEM subjects.

The finding contrasts with Omotere's (2011) study, which revealed that students improve academically when they study in a group. In addition, this study found no significant relationship between academic performance in STEM and social factors, contradicting the findings (Jarrett, 2018; Barroso, 2020; Robnett & Leaper, 2012). The discrepancy in the results could be due to teachers who monitor study hours not being able to monitor effectively, as students reported they became distracted by other activities when the teacher was not present during study hours.

### *Resources factor*

This study revealed no statistically significant difference in the resource factor between boarding and day students studying STEM subjects. Although not significant, a slight positive correlation was found between resource factors and STEM subjects' academic performance. These findings are consistent with the findings of various studies (Freeman et al., 2014; Jaleel & O.M., 2017; Sulaiman & Harpiansi, 2018; Yekeen, 2021). All these studies backed the resource factor as a predictor of academic performance in STEM subjects. Although boarding students' parents thought boarding students to have an advantage over their counterparts, the finding did not reveal any substantial difference since the resources such as laboratories and libraries were closed after the academic hour.

### *Time Management*

The study concludes that the time management factor showed no significant difference in the mean ranks between boarding and day students. Similarly, no statistically significant relationship was found between time management and academic performance in STEM, though a slight negative relationship was found. This study's findings contradicted the findings of some studies (Sithole et al., 2017; Ng et al., 2014). For instance, Sithole et al. (2017) found a strong correlation between time management and academic performance in STEM subjects. However, in the case of this study, although boarding students get more time, they were found mostly engaged in extracurricular activities, which might have impacted their academic performance.

This study's findings are consistent with Putnick and Bornstein's (2016) study. Rai (2020) also found that day students were engaged in household chores at home. Moreover, Brown (2015) asserts that day students walk a long distance to school, limiting them from getting enough study time. However, this study revealed that day students could make good use of the available time without disturbance for study, which could have resulted in a better academic performance than boarding students.

### **CONCLUSION**

The findings of this study indicated that boarding and day students perform significantly differently academically in STEM subjects, with day students outperforming boarding students. The study also revealed that the better performance of the day students was due to high self-efficacy compared to boarding students, as self-efficacy revealed a statistically significant correlation with academic performance in STEM. In addition, the qualitative data analysis suggested that day students were more connected to their parents and therefore motivated them to learn. Finally, this study also revealed that although day students got much less time to study than boarding students, they could use the time more efficiently with minimal disturbances at home.

### **RECOMMENDATION**

Based on the findings of this study, the following recommendations are proposed:

- Ministry of Education to enrol all students in boarding schools to provide a safe environment for all students to study and perform better.
- School leaders to improve study monitoring to enable students to learn without distraction.

- Parents or guardians support their children with resources and limit involvement in household chores.

## REFERENCES

- Altaf, B., Rehman, A., & Ali, F. A. (2019). Comparison of academic performance among boarders and Day-Scholars. *Journal of Aziz Fatimah Medical and Dental College, 1*(2).
- Ajaya, B.D., 2002. Nutritional evaluation of molluscan seafood. Ph.D. Thesis, Annamalai University, India. pp: 129.
- Aruna, T., Srirupa, H., & Vangaveti, S. (2015). Assessing altered sleep patterns among medical students. *Journal of Pharmaceutical & Scientific Innovation, 4*(1), 59–64. <https://doi.org/10.7897/2277-4572.04114>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. York: W. H. Freeman and Company.
- Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology, 88*, 87–99.
- Barroso, N. C. (2020). Solo, paired, group: A phenomenological dimension on the learning situations of STEM students in Pre-Calculus. *International Journal of Pedagogical Development and Lifelong Learning, 1*(2), ep2007. <https://doi.org/10.30935/ijpdll/8426>
- Bhutan Council for School Examinations and Assessment. (2020). *Pupil performance report 2020* (No. 13). School Examination Division, BCSEA.
- Bhutan's Daily Newspaper. (2020, February 18). A long walk to school. *Kuenselonline*. Retrieved October 12, 2021, from <https://kuenselonline.com/a-long-walk-to-school/>
- Brown, A. (2015, 11th September). *The long march: Children go to school*. UNICEF East Asia & Pacific. Retrieved 20th October, 2021, from <https://blogs.unicef.org/east-asia-pacific/the-long-march-cambodian-children-go-to/>
- Caviola, S., Visentin, C., Borella, E., Mammarella, I., & Prodi, N. (2021). Out of the noise: Effects of sound environment on maths performance in middle-school students. *Journal of Environmental Psychology, 73*, 101552. <https://doi.org/10.1016/j.jenvp.2021.101552>
- Coulson, J. (2020, 8th October). *Boarding school vs day school*. Boarding Schools Expo. Retrieved 28th October, 2021, from <https://www.boardingexpo.com.au/choosing-a-boarding-school-or-a-day-school-is-a-personal-decision/#:%7E:text=Boarding%20schools%20are%20residential%20schools,but%20return%20home%20every%20day.>
- Creswell, J. W. (2014). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research, enhanced pearson eText --standalone access card (5th edition) (voices that matter)* (5th ed.). Pearson.

- Dambudzo, I. I. (2013). Factors in Academic Achievement: Do Moderator Variables Account for any Significant Differences in Emotional Self-Concepts and Academic Achievement of Adolescents in Secondary Schools? *Greener Journal of Social Sciences*, 3(9), 410–422. <https://doi.org/10.15580/gjss.2013.9.280913866>
- Delacre, M., Lakens, D., & Leys, C. (2017). Why psychologists should by default use welch's test instead of student's *t*-test. *International Review of Social Psychology*, 30(1), 92. <https://doi.org/10.5334/irsp.82>
- Delma, T. (2016, 25th October). Central school's benefit rural youth and the poor. *The Bhutanese*. <https://thebhutanese.bt/central-schools-benefit-rural-youth-and-the-poor/>
- Demie, F. (2008). Raising the achievement of Somali pupils in British schools. *Race Equality Teaching*, 26(3), 42–47. <https://doi.org/10.18546/ret.26.3.11>
- Eccles, J. S. (1995). Understanding women's educational and occupational choices: Applying the Eccles et al. Model of achievement-related choices. *Psychology of Women Quarterly*, 18, 585–609.
- Ehioghiren, E., Izehiuwa, A., I., Obosa, A., & Ogugua, G. U. (2020). The impact of school environment and peer influences on students' academic performance in edo south senatorial district of edo state implication for counselling. *Global Scientific Journal*, 8(7), 399–418. [https://www.globalscientificjournal.com/researchpaper/The\\_Impact\\_of\\_School\\_Environment\\_and\\_Peer\\_Influences\\_on\\_Students\\_Academic\\_Performance\\_in\\_Edo\\_South\\_Senatorial\\_District\\_of\\_Edo\\_State\\_Implication\\_for\\_Counselling.pdf](https://www.globalscientificjournal.com/researchpaper/The_Impact_of_School_Environment_and_Peer_Influences_on_Students_Academic_Performance_in_Edo_South_Senatorial_District_of_Edo_State_Implication_for_Counselling.pdf)
- Fager, J., & Brewster, C. (1999). Parent partners: Using parents to enhance education. *Northwest Regional Educational Laboratory*. Published.
- Faisal, R., Shinwari, L., & Izzat, S. (2016). Academic performance of day scholars versus boarders in pharmacology examinations of a medical school in Pakistan. *J Pak Med Association*, 66(9), 1094–1097.
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 111(23), 8410–8415. <https://doi.org/10.1073/pnas.1319030111>
- Gelay, G. (2009, 17th February). *King's speech at the 3rd convocation of the Royal University of Bhutan*. Thus Spoke The King. Retrieved 2nd December, 2021, from <http://no.dou.bt/2009/02/17/convocation-royal-university-bhutan-2/>
- Hannum, E., & Park, A. (2007). *Education and reform in China*. Routledge.
- Jagero, N., Ayodo, T., & Agak, J. (2011). Cost effectiveness analysis between boarding and day secondary students in Kenya. *Africa Education Review*, 8(3), 529–550. <https://doi.org/10.1080/18146627.2011.618711>
- Jaleel, S., & Anuroofa, O. M. (2017). A study on the relationship between self directed learning and achievement in information technology of students at secondary level.

*Universal Journal of Educational Research*, 5(10), 1849–1852.  
<https://doi.org/10.13189/ujer.2017.051024>

Jarrett, C. (2018, 4th May). *Learning by teaching others is extremely effective – a new study tested a key reason why*. Research Digest. Retrieved 20th October, 2021, from <https://digest.bps.org.uk/2018/05/04/learning-by-teaching-others-is-extremely-effective-a-new-study-tested-a-key-reason-why/>

Khurshid, F., Tanveer, A., & Qasmi, F. N. (2012). Relationship between Study Habits and Academic Achievement among Hostel Living and Day Scholars' University Students. *British Journal of Humanities and Social Sciences*, 3(2), 34–42.

Liu, Y., & Leighton, J. P. (2021). Parental Self-Efficacy in helping children succeed in school favors math achievement. *Frontiers in education*, 6. <https://doi.org/10.3389/educ.2021.657722>

Neagley, R. L. S., & Evans. (1970). *Handbook for effective supervision of instruction*. Englewood Cliffs, NY: Prentice Hall Inc.

Ng, S. F., Zakaria, R., Lai, S. M., & Confessore, G. J. (2014). A study of time use and academic achievement among secondary-school students in the state of Kelantan, Malaysia. *International Journal of Adolescence and Youth*, 21(4), 433–448. <https://doi.org/10.1080/02673843.2013.862733>

Omotere, T. (2011). The influence of peer group on adolescents' academic performance: A case study of some selected schools in state. *Ogun: Ego Booster Publishers*, 81–84.

Putnick, D. L., & Bornstein, M. H. (2016). Girls' and Boys' labor and household chores in low- and middle-income countries. *Monographs of the Society for Research in Child Development*, 81(1), 104–122. <https://doi.org/10.1111/mono.12228>

Rai, R. (2021, 22nd July). Teachers find sponsors to help needy students get phones for online classes. *Kuensel Online*. <https://kuenselonline.com/teachers-find-sponsors-to-help-needy-students-get-phones-for-online-classes/>

Rinzin, Y. C. (2020, 5th November). Students say household chores impede study. *Kuensel Online*. <https://kuenselonline.com/students-say-household-chores-impede-study/>

Rivera, H., & Li, J. T. (2020). Potential factors to enhance students' STEM college learning and career orientation. *Frontiers in Education*, 5. <https://doi.org/10.3389/educ.2020.00025>

Robnett, R. D., & Leaper, C. (2012). Friendship groups, personal motivation, and gender in relation to high school students' STEM career interest. *Journal of Research on Adolescence*, 23(4), 652–664. <https://doi.org/10.1111/jora.12013>

Royal Education Council. (2021a). *New normal school mathematics curriculum framework (PP – XII)* (Provisional edition 2021 ed.). Royal Education Council, Royal Government of Bhutan.

- Sakai, T. (2016). Two sample t-tests for IR evaluation. *Proceedings of the 39th International ACM SIGIR Conference on Research and Development in Information Retrieval*. Published. <https://doi.org/10.1145/2911451.2914684>
- Saputri, A. C., S., Rinanto, Y., A., & Prasetyanti, N. M. (2019). Improving students' critical thinking skills in Cell-Metabolism learning using stimulating higher order thinking skills model. *International Journal of Instruction*, 12(1), 327–342.
- Seymour, E. (1995). The loss of women from science, mathematics, and engineering undergraduate majors: An explanatory account. *Science Education*, 79, 437–473.
- Shah, J., & Inamullah, H. M. (2012). The impact of overcrowded classroom on the academic performance of the students at secondary level. *International Journal of Research in Commerce, Economics & Management*, 2(6), 9–12. [https://www.researchgate.net/publication/273124645\\_the\\_impact\\_of\\_overcrowded\\_classroom\\_on\\_the\\_academic](https://www.researchgate.net/publication/273124645_the_impact_of_overcrowded_classroom_on_the_academic)
- Sithole, A., Chiyaka, E. T., McCarthy, P., Mupinga, D. M., Bucklein, B. K., & Kibirige, J. (2017). Student attraction, persistence and retention in STEM programs: Successes and continuing challenges. *Higher Education Studies*, 7(1), 46. <https://doi.org/10.5539/hes.v7n1p46>
- Sulaiman, M., & Harpiansi, H. (2018). The correlation between reading habit and students' reading comprehension achievements. *ALSUNA: JOURNAL OF ARABIC AND ENGLISH LANGUAGE*, 1(2), 78–86. <https://doi.org/10.31538/alsuna.v1i2.87>
- Wessel, A. (2015). Peer learning strategies in the classroom. *Journal on Best Teaching Practices*, 2(1), 14–16. <http://teachingonpurpose.org/wp-content/uploads/2015/03/Wessel-A.-2015.-Peer-Learning-Strategies-in-the-Classroom.pdf>
- Woldeamanuel, M. M., Atagana, H., & Engida, T. (2014). What makes chemistry difficult? *African Journal of Chemical Education*, 4(2), 31–43. <https://www.ajol.info/index.php/ajce/article/view/104070>
- Woolfolk, R. L. (1998). *The cure of souls: Science, values, and psychotherapy*. Jossey-Bass
- Yekeen, B. (2021). Applying Self-Directed learning strategies on reading comprehension among junior secondary school students in offa Kwara state, Nigeria. *International Journal of Social Sciences & Educational Studies*, 8(2). <https://doi.org/10.23918/ijsses.v8i2p118>
- Young-Jones, A., Fursa, S., Byrket, J. S., & Sly, J. S. (2014). Bullying affects more than feelings: The long-term implications of victimisation on academic motivation in higher education. *Social Psychology of Education*, 18(1), 185–200. <https://doi.org/10.1007/s11218-014-9287-1>
- Zeldin, A. L., Britner, S. L., & Pajares, F. (2008). A comparative study of the self-efficacy beliefs of successful men and women in mathematics, science, and technology careers. *Journal of Research in Science Teaching*, 45(9), 1036–1058. <https://doi.org/10.1002/tea.20195>