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The Impact of Early Child Care and Development Education on Cognitive, Psychomotor, and Affective Domains of Learning

Phub Dorji[1*], Chencho Gyeltshen[1], Geeta D. Sanyasi[1], Phub Sithub[1], Tenzin Dema[1], Yangzom[1] and Yeshi Choden[1]

[1]Gedu College of Business Studies, Royal University of Bhutan, Bhutan.

Authors' contributions

This work was carried out in collaboration among all authors. Authors PD and Yangzom designed the study, managed the literature searches, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors CG, GDS, PS, TD and YC collected the data. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study examined the impact of early child care and development (ECCD) education on psychomotor, affective and cognitive domains of learning in elementary school students.
Study Design: This descriptive study employed qualitative and quantitative methods.
Place and Duration of Study: The study was conducted in five schools under Chukha Dzongkhag for a period of one year (2019-2020).
Sample: This study involved a survey of teachers and observation of students in 5 schools of Chhukha district. Seventy three teachers were selected to fill out the questionnaire using homogenous sampling technique and 6 students were selected as participants for observation using simple random sampling technique.

**Corresponding author: Email: phd8664@gmail.com, phubdorji.gcbs@rub.edu.bt;*

Methodology: Quantitative data were gathered through questionnaires, and documents and artifacts while qualitative data were gathered through observation for this descriptive study. The data collected from questionnaire, document and artifact and observation were triangulated to facilitate validation of data through cross verification and strengthen the findings of the study.
Results: The results indicated positive impact of ECCD on elementary school students' academic performance. In particular, the analysis revealed that ECCD education has the highest level of impact on students' psychomotor performance, followed by affective and cognitive performance.
Conclusion: In view of these findings, the researchers recommend the ECCD education programme developers and instructors to look for a balanced curriculum that ensure equal development of cognitive, affective, and psychomotor domains of learning.

Keywords: Early learning center; early childcare; early education; cognitive; affective; psychomotor; domain.

1. INTRODUCTION

Early education is a critical stage of life for children's physical, emotional, cognitive and social development. It encourages young minds to think and gain new skills and knowledge. A child, at an early age, exposed to the assortment of guided activities, has higher chances for better development of the three domains of learning: cognitive, affective, and psychomotor [1]. Early childcare centers help the children to develop holistically from the young age and also get ready for the formal schooling. Considering these benefits, the Ministry of Education (MoE), Bhutan, has encouraged and pushed forth the development and operation of Early Child Care and Development (ECCD) centers across the country. At present, there are around 340 (282 government and 58 private) ECCD Centers in Bhutan [2]. These centers facilitate in developing basic skills like eating, greeting, singing, dancing, walking, sitting, painting, and many more.

The introduction of ECCD programme is a relatively new phenomenon in Bhutan. The concept of ECCD was necessitated by the need to avail pre-school education to all children in Bhutan [3]. Research indicates that quality of early childhood preschool offers a wide range of benefits to children as well as to their families and their communities. A study on impact evaluation of ECCD in Bhutan carried out by Save the Children [4] shows that there are huge learning gaps between children who have attended ECCD education over those who did not avail such opportunities.

Puhan, Ray, and Das [5] in their study found that the learners who have received the Pre-primary education in their elementary level performed better in their oral and written test in Odia Language subject than the learners in their same class who did not undergo pre-primary education. A significant difference in both written and oral test between the performance of boys and girls with and without pre-primary education was observed in their study, indicating positive impact of pre-primary education in students' performance. Similar results were found by Correia-Zanini, Marturano, and Fontaine [6] in their study. In search of the answers for the impact of early childhood education and its influence on socio-behavioral variables, they have found that children who had attended early childhood education for one more year displayed better achievement and less stress symptoms.

Similarly, a report on the impact of ECCD on learners by Tshabalala and Mapolisa [7] have alluded to the fact that preschool children learn better in an environment that ensures interaction between friends, parents and teachers. This implies that adequate and appropriate care must be provided by the care givers during this stage as it will be difficult to amend the change later [8]. Likewise, a study conducted by World Vision Afghanistan [9] found that the children who have attended ECCD sessions were more ready and better equipped to start the learning process in formal education. They found that those children who participated in such programs had improved in academic field, physical co-ordination and appeared to be more self-confident and demonstrate better social behaviors compared to children who did not attend ECCD education.

Most of the earlier literature is concerned with measuring the duration and the effects of early childcare and education on children. These studies, specifically, looked into the impact of early childcare and education on children's academic performances. As the present scenario of early childcare and education pays more attention on the quality of ECCD education, the

current study is one of the few in this area attempting to unveil its impacts on three different domains: cognitive, psychomotor and affective domains of learning.

1.1 Research Questions

This study attempted to answer the following research questions:

What is the impact of ECCD education on primary school students' performance (cognitive, affective and psychomotor) in Bhutan?

Are there differences in performance between ECCD graduates and students enrolled without taking ECCD course in primary school?

1.2 Conceptual Framework of the Study

Learning can generally be categorized into three domains: cognitive, affective, and psychomotor. A conceptual framework is devised to conduct and interpret research processes to examine the impact of ECCD education on primary school performance. Within each domain are multiple levels of learning that progress from basic to more complex learning. The thought behind the idea of performance is derived from Bloom [10], Harrow [11] and Anderson and Krathwohl's [12] taxonomy for learning, teaching and assessing, and a revised work of Bloom's Taxonomy of educational objectives. To examine the impact of ECCD on primary students' performance, an illustration is presented in the Fig. 1.

1.3 Three Domains of Learning

Studies by Benjamin Bloom (on cognitive domain), David Krathwohl (on affective domain) and Anita Harrow (on psychomotor domain) are included in the three domains of learning in this study. In particular, this study examined the impact of ECCD education on primary students' performance on the three domains of learning. Under cognitive domain, children's thinking and learning skills were accessed. Social-emotional skills were assessed under affective domain while psychomotor domain was assessed through fundamental movements or behaviors related to walking, running, jumping, pushing, pulling and manipulating.

Cognitive Domain: The cognitive domain also referred to as 'thinking' domain deals with how we acquire, process, and use knowledge. It is involved in acquiring knowledge and developing intellectual skills such as, recalling or recognition of specific facts, procedural patterns and concepts that serve the development of intellectual abilities and skills [10].

Affective Domain: The affective domain as 'valuing' domain deals with attitude, values, and emotions. Affective domain includes the way within which we tend to influence things emotionally, like feelings, values, appreciation, enthusiasms, motivations and attitudes [13].

Psychomotor Domain: The psychomotor domain or 'doing' domain deals with manual or physical skills. The psychomotor domain includes physical movement, coordination and use of the motor skills areas. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures or techniques in execution [11, 14].

2. METHODOLOGY

In this section, research design, research setting, population and sampling, data collection process and data analysis is presented.

2.1 Research Design

This descriptive study examined the impact of ECCD education on elementary school students' performance in Bhutan. Mixed-method approach was used as it combines both qualitative and quantitative features and maximize the strengths of the study which otherwise would not be possible with a single research approach [15].The quantitative data were gathered through questionnaires, and documents and artifacts while qualitative data were gathered through observation.

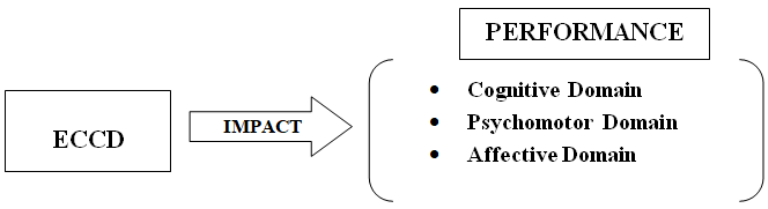

Fig. 1. Conceptual framework of the study

2.2 Research Setting

Five primary schools accepting ECCD graduates for Pre-primary admission under Chukha Dzongkhag were selected as research sites. The site of the study was chosen by administering the standard of simple random sampling based on Creswell's [16] notion of abundance of information and capability in representing the larger population. Moreover, these schools were selected because of their location and accessibility.

2.3 Population and Sampling

This study involved a survey of teachers in 5 schools of Chhukha district. In addition, students were also selected as participants. Homogenous sampling technique was used to generate samples. According to Creswell [16], homogeneous sampling as a purposive sampling technique aims at achieving a sample with similar characteristics or traits. 73 teachers fulfilled these criteria. Thus, the teachers who were teaching grade one student at the time of data collection or have taught them in the past made the sample of this study. A total of six (three ECCD graduates and three non-ECCD students) were selected as participants for observation using simple random sampling technique. In addition, following the simple random sampling technique, a total of 20 students' (10 ECCD graduates and 10 Non-ECCD graduates) progress reports were collected to assess the differences in academic performances.

2.4 Data Collection Tools

Three kinds of data collection tools (questionnaire, observation and analysis of artifacts and documents) were used in this descriptive study. An independent questionnaire and the analysis of artifacts and documents (progress reports of the students) were used to collect quantitative data in addition to the observation report. A total of 10 survey questions were prepared under each domain of learning in the questionnaire in line with the research questions and pilot-tested to establish its validity and reliability. Experts (professors) were consulted to ensure the usability of the questionnaire. In addition, Ab Latif, Dahlan, Abdul and Mat's [17] interpretation of Likert Inventory (Table 1) was used to interpret the 5 point Likert scale.

Table 1. Interpretation of likert scale

Mean score	Level
4.51-5.0	Highest
3.51-4.50	High
2.51–3.50	Medium
1.51–2.50	Low
0.00–1.50	Lowest

Ratings for strongly disagree fall in the range between 1.00-1.50, showing the lowest level of impact of ECCD on the three domains of learning. The ratings for disagree fall in the range between 1.51-2.50. It shows the low level of impact of ECCD on the three domains of learning. Ratings for neutral or medium level of ECCD on the three domains of learning fall in the range between 2.51-3.50. Ratings for agree fall in the range between 3.51-4.50, indicating high level of impact of ECCD on the three domains of learning habits while the highest level of impact of ECCD on the three domains of learning fall in the range between 4.51-5.00.

2.5 Data Collection Process

The participants were also advised to participate as per their willingness. Permission for classroom observations and collection of progress reports was sought from the relevant authorities through written application. After receiving the permissions from the authorities concerned, the researchers administered the survey questionnaires, observed the classes and collected progress reports from students identified for the study.

2.6 Data Analysis

The Statistical Package for Social Science (SPSS) software version 22 was used to analyze the data to answer the research questions. The researchers received all the 73 questionnaires distributed to the teachers filled out as expected. There were no missing data in any of the questionnaires. Descriptive statistics (mean and standard deviation) were calculated to answer research question one and two. Similarly, descriptive statistics (mean and standard deviation) were calculated for the documents and artefacts collected from the schools to answer the research questions. As content analysis is regarded as a flexible method of analyzing text data [18] as it describes a group of analytic approaches such as intuitive, interpretive, systematic, and strict textual analyses [19], content analysis was performed to analyse the

data gathered from observation. The researchers labelled, transcribed data, compared, contrasted, and grouped into categories using the concept of content analysis. After grouping the data, the researchers put the information under related categories. Finally, the data collected from questionnaire, document and artefact and observation were triangulated to facilitate validation of data through cross verification and strengthen the findings of the study.

3. RESULTS and DISCUSSION

The quantitative data gathered through questionnaire and documents and artifacts (progress report) were analyzed using descriptive statistics. The qualitative data gathered through observations were analyzed using content analysis technique.

In this section, demographic data and results as per the research questions are presented.

3.1 Demographic Details

Under demographic details, numbers of participants with their professional qualifications are presented (Fig. 2).

There were 73 respondents (29 Male and 44 female) with varying professional qualifications. Majority of the respondents had Bachelors in Education as their professional qualification (25.6%) while the least number of participants (6 teachers) were from Primary Teaching Certificate (PTC) professional category (PTC, 8.3%).

3.2 Work Experience in Years

The highest number of participants had the work experience in between 1 to 5 and 6 to 10 years (27.4% respectively). Only 15 participants (20.5%) had the work experience more than 15 years as shown in the Table 2.

3.3 Descriptive Statistics on Cognitive Domain

To answer research question 1 and 2, descriptive statistics (mean and standard deviation) were computed as presented in Table 3, Descriptive Statistics on Cognitive Domain. Item number 1 (ECCD graduates are better in visual discrimination, such as matching, comparing, sorting, and organizing) was rated highest (M=4.34, SD=.786), indicating high level of impact of ECCD education on this area under cognitive domain, whereas item 6(understand cause and effect) has lowest mean value of (M=3.59, SD=.897). This lowest mean score also indicates high level of impact of ECCD education on understanding causal relationship by the children.

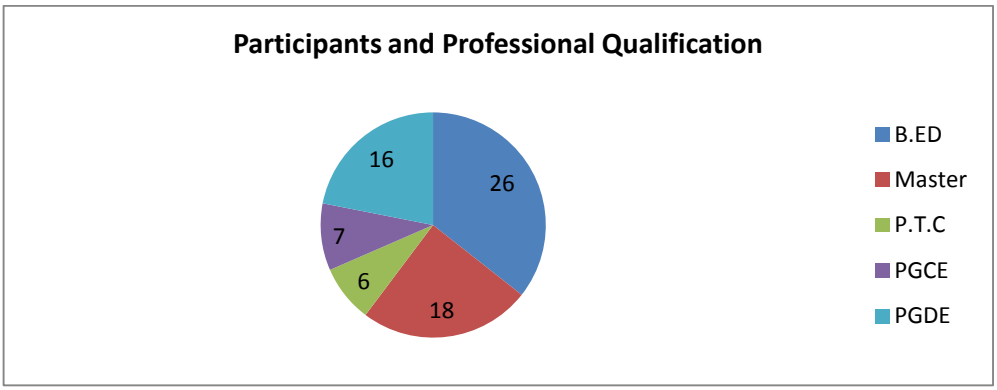

Fig. 2. Participants' professional qualification

Table 2. Work experience

Work experience		Frequency	Percent
Valid	1-5	20	27.4
	6-10	20	27.4
	11-15	18	24.7
	>16	15	20.5
	Total	73	100.0

Table 3. Descriptive statistics on cognitive domain

Item	N	Mean	Std. deviation
Q1 ECCD graduates are better in visual discrimination, such as matching, comparing, sorting, and organizing.	73	4.34	.786
Q2 ECCD graduates ask interesting questions.	73	4.05	.797
Q9 ECCD graduates remember an idea or fact in somewhat the same form in which it was learned.	73	4.04	.934
Q10 ECCD graduates are good at applying the things learned in the classroom to new situations.	73	3.89	.951
Q7 ECCD graduates are good at problem solving.	73	3.86	.887
Q8 ECCD graduates are good at reasoning.	73	3.84	.882
Q3 ECCD graduates have developed an increased attention span.	73	3.79	.799
Q5 ECCD graduates love taking risks and trying new things.	73	3.77	.921
Q4 ECCD graduates know the difference between a truth and a lie.	73	3.73	.902
Q6 ECCD graduates understand cause and effect.	73	3.59	.895
Valid N (list wise)	73		

3.4 Descriptive Statistics on Affective Domain

Descriptive statistics was computed to assess the impact of ECCD education on affective domain as presented in Table 4, item number 2 (spend time with friends) was rated highest (M=4.21, SD:.781) whereas item 7 (are understanding and exhibit tolerance when necessary) value lowest mean value of (M=3.68, SD:.831). In both the cases, it is indicative that ECCD education has high level of impact on students' affective domain of learning.

3.5 Descriptive Statistics on Psychomotor Domain

Descriptive statistics to evaluate the impact of ECCD education on psychomotor domain of learning was also computed. As presented in Table 5, item number 10 (ask permission and enter or exit the classroom without any problem) was rated the highest (M: 4.22; SD: .94), whereas item 5 (always demonstrates respect and care for school property) has the lowest mean value of M=3.77. However, the mean scores of all the items under psychomotor domain suggest that there is a high positive impact of ECCD education on this domain.

Table 4. Descriptive statistics on affective domain

Item	N	Mean	Std. deviation
Q2 ECCD graduates spend time with their friends.	73	4.21	.781
Q1 ECCD graduates have strong sense of belonging to the class and the school.	73	4.15	.828
Q6 ECCD graduates follow teacher's instructions or directions all the time.	73	4.11	.756
Q4 ECCD graduates listen and respond to teachers and friends' questions or queries.	73	4.10	.748
Q9 ECCD graduates are alert in class and ready for learning activities	73	4.08	.846
Q5 ECCD graduates act consistently in accordance with the classroom/school rules.	73	3.99	.858
Q10 ECCD graduates make connections to past teaching and real-world situations.	73	3.90	.900
Q8 ECCD graduates are prepared for class and read ahead of time.	73	3.82	.977
Q3 ECCD graduates take responsibility for the development of a class as a whole.	73	3.74	.986
Q7 ECCD graduates are understanding and exhibit tolerance when necessary.	73	3.68	.831
Valid N (list wise)	73		

Table 5. Descriptive statistics on psychomotor domain

Item	N	Mean	Std. deviation
Q10 ECCD graduates ask permission and enter or exit the classroom without any problem.	73	4.22	.946
Q8 ECCD graduates observe the teacher and imitate his/her action wherever necessary (Example: Learning rhymes)	73	4.21	.726
Q2 ECCD graduates hold pencil in an acceptable manner.	73	4.18	.822
Q1 ECCD graduates repeat after the teacher in choral reading without mistake.	73	4.16	.727
Q9 ECCD graduates copy a diagram or an illustration from the board or book with a high degree of precision and accuracy.	73	3.97	.833
Q7 ECCD graduates complete the task following the verbal or written instruction of the teacher.	73	3.96	.824
Q4 ECCD graduates move around or sit in the classroom as expected.	73	3.93	.822
Q6 ECCD graduates complete the class work or task assigned in the class quickly.	73	3.82	.918
Q3 ECCD graduates successfully perform individual activities without supervision.	73	3.78	.917
Q5 ECCD graduates always demonstrate respect and care for school property.	73	3.77	.890
Valid N (list wise)	73		

3.6 Descriptive Statistics on Cognitive, Affective and Psychomotor Domain

A general descriptive statistics on all the domains was computed to compare ECCD education and its impact on all the domains as shown in Table 6 below.

Table 6. Descriptive statistics on cognitive, affective and psychomotor domain

	N	Mean	Std. deviation
Psychomotor	73	4.00	.64
Affective	73	3.97	.59
Cognitive	73	3.89	.63
Valid N (list wise)	73		

From the results, the researchers found that ECCD education has the highest impact on children's psychomotor domain of learning (M: 4.00, SD: .64) compared to affective (M: 3.97, SD: .59) and cognitive domain (M: 3.89.00, SD: .63). All in all, the results indicate that ECCD education has high level of impact on all the domains of learning.

3.7 Progress Report Analysis Result

Apart from questionnaire, progress reports were collected to assess the impact of ECCD education on children's academic performance. As presented in the figure below (Fig. 3), students who have undergone ECCD education have performed better than the ones who did not undergo ECCD education. Therefore, it can be concluded that the ECCD education impacts students' academic performance.

3.8 Observation

Writing a qualitative observation paper involves four steps [20]. First, the researcher plans and prepares for observation. Second, field notes are prepared while observing a particular setting or situation. Next, the notes are interpreted according to relevant criteria. Finally, a write-up is prepared to present the observation and interpretation to answer the research questions.

In this study, the researchers began their observation by planning on what they will be observing, where they will conduct their observations, and the methods they will use for collecting and recording the data. Recording, note taking and taking pictures were used as observation techniques to capture the happenings and events. Observation reports were maintained based on the themes identified under performance variables (cognitive, affective, and psychomotor domains).

3.8.1 Impact of ECCD on primary school performance (Cognitive Domain)

Researchers observed some of the classes to assess the impact of ECCD on Cognitive Domain. When the teacher assigned class work

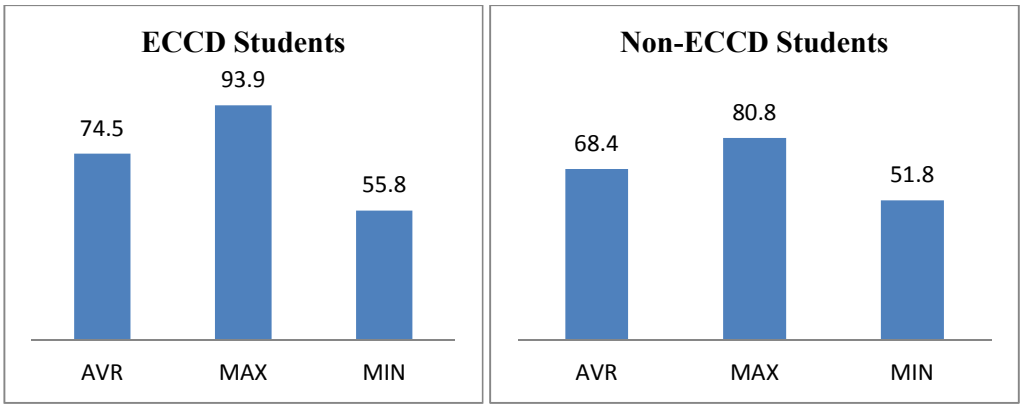

Fig. 3. Progress report analyses

to the students, the observers found that ECCD graduates were better in visual discrimination, such as matching, comparing, sorting, and organizing. Similarly, when chances were provided, ECCD graduates asked interesting questions and remembered the lessons learned in the previous classes better than the non ECCD graduates. Moreover, risk taking attitude and learning through trial was found in the ECCD graduates. It can therefore be concluded that ECCD education impacted the performance of the learners positively.

3.8.2 Impact of ECCD on primary school performance (Affective Domain)

Observation report revealed that ECCD education impacted primary school students' performance in positive ways. It was observed that ECCD graduates took responsibility for the development of a class as a whole. Likewise, ECCD graduates spent more time with friends than non ECCD graduates. They followed teacher's instructions all the time while non ECCD graduates hardly followed the instructions of the teachers.

3.8.3 Impact of ECCD on primary school performance (Psychomotor Domain)

From the observation, it was found that the preprimary students who had the ECCD education experience were holding pencils and writing better than the ones without experience. In addition, the way they moved around and the way they sat were found better than the non ECCD graduates indicating positive impact of ECCD education on primary school students' performance in Psychomotor Domain.

3.9 Data Triangulation

The data gathered through questionnaire, observation, and documents and artifacts were merged and triangulated. According to Mariam [21], triangulation is "using multiple investigators, multiple sources of data, or multiple methods to confirm the merging of findings" (p. 204). The qualitative data in this study were triangulated through the coders' analyses. To ascertain the impact of ECCD on Primary School Performance, these analyses were cross-checked with the data gathered through documents and artifacts. As revealed by the analysis report, all three data indicated positive impact of ECCD on elementary students' cognitive, affective and psychomotor domains of learning and performance.

4. CONCLUSION

This mixed method study examined the impact of ECCD education on elementary school students' cognitive, affective and psychomotor domains of learning. The findings of this study corroborates the findings established in other researches conducted around the globe (Puhan, Ray, & Das [5]; Correia-Zanini, Marturano, & Fontaine [6]; Tshabalala & Mapolisa [7]; World Vision Afghanistan [9]) which were discussed in the introduction part. The findings also support the recent findings on the impact of early childcare education, where elementary level learners receiving early childcare education outperformed the learners who did not receive the same in oral and written language tests, performed better in other domains of learning, and were effective in preparing the learners for success in school [22, 23, 24].

The findings from the three different data collection tools used in this study revealed positive impact of ECCD education on primary school children's performance. In particular, the analysis revealed that ECCD education has the highest level of impact on students' psychomotor performance, followed by affective and cognitive performance.

This mixed method study gathered data from 73 teachers and 20 students of five different schools under Chukha Dzongkhag. To authentic and further consolidate the findings; it is advisable to involve more number of schools located at different places. Similarly, more generalizable findings could be achieved if more teachers as well as ECCD instructors are involved in future studies.

In view of the findings from this study, the researchers recommend that ECCD education programme developers and instructors must look for a balanced curriculum that ensure the equal development of cognitive, affective, and psychomotor domains of learning. Moreover, the government must come up with ECCD centers with infrastructure and resources ensuring maximum safety of the children and high quality education. In addition, the parents must be encouraged to enroll their children to ECCD centers. Finally, as children have higher chances for better development of the three domains of learning through early education and engagement, ECCD educators must be provided with skills and trainings to offer better care and education.

CONSENT AND ETHICAL APPROVAL

After receiving the approval for the proposal from the college research committee, the researchers sought consent from all the participants as well as the authorities concerned. The objectives of conducting this research were mentioned in the informed consent form. Survey questionnaires were sent along with the consent forms. The participants were also advised to participate as per their willingness. Permission for classroom observations was sought from the relevant authorities through written application.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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