

Effect of Using Learning Stations Strategy in Teaching Biology

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Abstract

This study explored on the use of learning stations strategy to differentiate instructions while teaching and learning among Biology students of XII Science at Peljorling Higher Secondary School. The study was designed to understand the effectiveness of learning stations strategy as a differentiated instructional approach in a mixed ability classroom. Students were divided into smaller groups based on their learning ability and were allowed to move from station to station carrying out different activities during the lesson. The mixed mode method was used to conduct the study. The study found that learning stations strategy as a differentiated instructional method is effective and had a positive relationship in improving students' interactions, engagement and academic achievement.

Keywords: Differentiated Instruction; Learning Stations; Students' Interactions; Academic Achievement

Introduction

"One size fit all", is no longer the approach of the 21st century education system around the world. The 21st century educators believe in teaching for diversity and teaching for inclusion or teaching for equity. Every learner in the classroom is different from the other and this diversity may exist in the form of cultural and economic background, physical and mental abilities, learning needs and learning styles [12]. Differentiated instructional approach is recognized to be a key teaching approach to engage the diversity in the classroom. Differentiated approach recognizes and also addresses the diverse learning needs and preferences of students. Differentiated instructional approach aim to promote inclusive education, where all the diverse learners have the equal access to learning and can progress academically despite their diversity.

In differentiated instructional approach, classroom teachers try to modify learning process to meet the needs of the individual

or small group of learners in a mixed ability class. Tomlinson [19] describes it as "an approach that promotes high- level and powerful curriculum for all students, but varies the level of teacher support, task complexity, pacing, and avenues to learning based on student readiness, interest, and learning profile". Teacher can differentiate instructions based on content, process, products and learning environment. Differentiating instruction in the classroom helps to nurture an environment that encourages learning among the diverse learners [4].

Learning station is used as one of the strategies in differentiated instructional approach, which is student centered and engages individual students in the learning process. If planned properly, learning station strategy allows teachers to spend more time with individual students and cater to their needs. Fox as cited by Rogayan [17], the teacher can move among the stations, working with individual students and groups to provide support, assess learning and motivate the learners as they work. They can also

help teachers manage classroom materials and resources. Teacher can provide appropriate assistance and guide the individuals in each station. Including a blend of ICT integrated station table in the lesson can greatly enhance the learning among the learners [13].

In this study, differentiation in instruction was carried out in the process of lesson delivery with the aim of engaging students meaningfully in smaller learning groups by adopting learning stations strategy. Students were grouped as per their learning abilities/profile. In their smaller groups, children were expected to be more open for discussion with their peers/group which would have positive impact on their academic performance.

Situational analysis

Peljorling Higher Secondary School is located in Trashicholing Drungkhag under Samtse Dzongkhag. We experience hot and humid weather conditions most time of the year. The air temperature and humidity inside the classroom can affect the learning of students by affecting the degree of fatigue, reading speed and the degree of distraction [15].

The heavy content in higher classes of Bhutanese science curriculum is one of the distinct factors that impedes teachers to deliver lessons as per the curricular intentions [14]. Thus teachers usually resort to lecture method to complete the vast syllabus.

Several studies have already shown that traditional lecture method cannot cater to the needs, preferences and learning abilities of diverse students in the classroom [10]. It is very common to see few students dozing off in the afternoon classes in our school and also to see few non engaged students. This could be due to discomfort caused by unfavorable environmental conditions and monotony of lecture method of teaching [8]. Therefore, teacher researchers have used the learning stations strategy to differentiate instruction and study the impact of it in the classroom participation and academic performance of the learners.

Aim

The aim of this action research is to evaluate the effectiveness of using learning stations as a method of teaching and learning Biology subject for class XII students at Peljorling Higher Secondary School.

Objectives

The objectives of this research are to:

- investigate the impact of learning stations on the level of classroom interactions among XII Science Biology students
- assess the effectiveness of learning stations as a teaching strategy for improving the academic achievement of XII Science Biology students

Research question

How does the use of learning stations strategy enhance learning in classrooms?

Significance of the study

Bhutan Professional Standards for Teachers (BPST) in Bhutan outlines the standards and expectations of teachers across different career stages in Bhutan. BPST has seven standards and the first one is diversity of learners and it highlights the importance of role of teacher in responding to diversity in the classroom [7].

In this study the teachers have tried to study the diversity of the students based on their learning ability and implement differentiated instruction in the form of learning stations strategy with higher class students.

The study shows that there is improvement in classroom interactions, participation and engagement. There is also slight improvement in academic performance. This strategy has been used by many teachers in lower classes and the present study reveals that this strategy can even be used in the higher classes. Using learning stations strategy, teachers can meet the individual needs of students and also engage every individual learner meaningfully in the class. The study can also serve as a base line data for the future researches in similar topic.

Literature Review

Students in our classrooms today are more diverse than ever. According to Tomilson [20], the schools have to be accommodative to diverse cultures, languages, economics and interests of the nature of 21st century student populations to provide access to robust learning experiences to every one of them. Students with diverse backgrounds and abilities pose new and different challenges as teachers seek to meaningfully include and effectively educate all students [10]. Differentiated instruction is an approach to teaching and learning by which the teachers can meet the individual needs and interest of the students. It involves planning and modifying

teaching strategies and resources to meet the individual needs of students with the aim of enhancing their learning experiences and outcomes. Tomlinson [19] said that differentiated instruction consists of efforts of educators to respond to different levels of learning among their students in the classroom. Whenever a teacher reaches out to an individual or small group to vary his or her teaching to create the best learning experience possible, that teacher is differentiating instruction. Teachers can differentiate at least four elements based on student readiness, interest, or learning profile [19].

- Content—what the student needs to learn or how the student will get access to the information;
- Process—activities in which the student engages to make sense of or master the content;
- Products—culminating projects that ask the student to rehearse, apply, and extend what he or she has learned in a unit; and
- Learning environment—the way the classroom works and feels.

Learning stations strategy is being used by many teachers to differentiate instructions in the class [6]. Station technique is a modern method that helps students learn knowledge permanently as students get chance to study independently and use plenty of tools and equipment. It also saves them from the monotony of the conventional method of instruction. In this method, different activities are designed at learning stations by taking individual differences of learners into consideration, and these activities create a learning platform which enable students to experience various equipment [18]. Learning stations strategy has been associated with many positive benefits to the learners which has contributed to their academic enhancement. Increased peer interaction among children [2], improved cognitive achievement and retention of content learnt [5], enhanced academic achievement [3] and maximizing collaboration on shared product and activities among learners. Students become responsible for their own learning by working in collaborative groups and taking an active role in activities that address all intelligences [5]. Further Bozpolat and Arslan [7] and Alacapinar and Usyal [1] have agreed that students who were taught with station technique applied, developed positive attitude to the course concerned. Pho., *et al.* [16] have used

the learning station strategy to develop students' competencies such as self-study and autonomy competencies, communication and cooperation competencies, problem-solving and creativity competencies. Each station was equipped with teacher designed materials and activities of various formats such as experiments, games, journals, or self-working on papers and the students were allowed to move to different stations independently, solve issues or complete the tasks at stations by themselves/peers/groups. Also Wrights [21] has mentioned that learning station method is an important method in reforming education; it helps children increase their learning time as well as receive more support so that they improve their competencies and get better learning achievement.

According to Aydogmus and Senturk [3] many researches have been carried in the past and it was seen that the learning stations technique has important contributions to academic achievement, retention rates, and attitudes. Furthermore, they also have stated that learning stations are more effective in teaching Science and technology since the technique is more compatible with the nature of the course. The technique also offers great opportunity for students to use knowledge and skills they have learned in science and technology.

In the year 2019, Rogayan carried out study to test the effects of Biology Learning Station Strategy (BLISS) to the academic achievement and attitude of junior high school Science students and found a positive relationship between them [17]. Many studies have been done in Science and Biology subject on junior high school students but there are limited studies done on the effectiveness of learning stations strategy on Biology in higher classes. In this study, the students were divided into four groups based on their performance and attitude towards learning in their first term. Then they were taught lessons using differentiated instruction in the form of learning station strategy. Observation records, test marks and survey questionnaires and interviews have been used to collect data. An earnest effort has been put to study the effectiveness of using learning stations strategy to differentiate instruction and compare its relation to students' academic achievement and attitude towards classroom learning of the subject.

Method

The mixed mode method was used to conduct a study on the effectiveness of using learning stations in class XII Science at Peljorling Higher Secondary School. Mixed method research is an approach to inquiry that combines or associates both qualitative and quantitative forms [9]. In this study, 21 children were divided into 4 different groups based on their ability; Group 1 consisted of better performers, Group 2 consisted of students who were little better than mediocre students, Group 3 consisted of average ones and Group 4 consisted of students who were performing little below average in studies. Classroom participation, annual examination score of grade XI and class test scores were used to study their abilities. The study employed four research tools, namely survey questionnaire, focus group interviews, class tests marks and observation. The questionnaires were distributed to 21 students (11girls and 10 boys) of XII Science who had chosen Biology as one of their optional subjects and 8 students were interviewed in focus group interview. The survey questionnaire and class test marks were analyzed along with data of focus group interviews and observation.

Findings and Discussions

Survey questionnaire

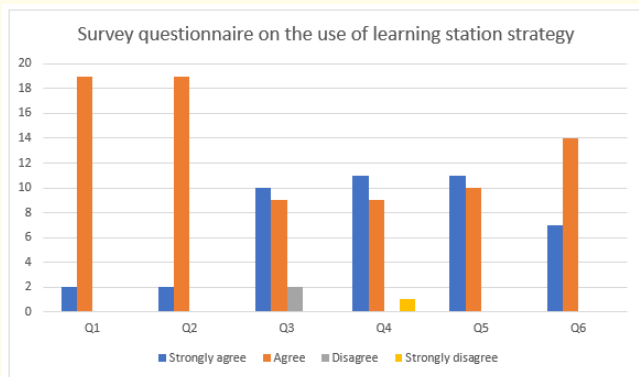


Figure 1

For Q1, all the students agreed that they preferred to learn in smaller groups and similarly for Q2, all agreed that they enjoyed learning by the learning stations strategy over the traditional classroom instruction. There were only 2 students who did not

feel free to share their ideas to their peers in smaller groups (Q3) but for Q4, only 1 student disagreed that it was easy to discuss with peers of similar ability. For Q5, all the students agreed that the teacher was more attentive to their needs when they were in smaller groups. For Q6, again all agreed that resource sharing is easier while implementing this strategy.

Comparison of test scores

Figure 2

There is a small increase of mean marks by 3.29 (Pretest score: 21.4 and posttest score: 24.69) however, about 85.7% of the students have performed better in test after the intervention and this is a positive outcome.

Classroom observation records

All the children were seen more active during the lessons when learning station strategy were used. Two students (Student 1 and Student 10) who used to be found sleeping most of the time during the traditional instructional classes, were never seen sleeping during the modified lessons. Rather, student 1 was found to be guiding and leading his group members in the learning stations. It was observed that the student was extra attentive and energized in the different stations. Students of group 4 were more involved in discussion and had many questions to ask to the teacher as compared to the normal classes. There was less hesitation from the students to clear their doubts when they were in smaller groups. Some students were seen tutoring their friends. In groups 1, 3 and 4 students were conscious about the group’s behaviour and were actively monitoring each other and ensuring that everyone was involved in the activities. However, they would ask other groups to hurry, if they completed their activities before allocated time.

Students were more involved in discussions related to the activities in stations than in normal classes and they were also more cautious about their behaviour and completion of tasks. They showed more accountability and responsibility towards each other and learning activities.

Focus group interviews

The learning environment was more conducive during the use of learning stations as compared to the normal classes

The use of learning stations strategy was found to be more conducive than traditional classroom instruction, as reported by the children who participated in the interview. The children felt more active and engaged as they moved from station to station in smaller groups. They enjoyed carrying out different activities in different stations that saved them from boredom. Participant no. 3 responded, "When the learning environment changes, the sense organs get stimulated which helps them to remain engaged and inspires them to think creatively".

There were more interactions among the students in learning stations in smaller groups

All children agreed that smaller groups led to more interactions. All the interviewees felt comfortable and confident in discussing concepts and asking questions in their smaller differentiated groups. However, participant 7 expressed a preference for heterogeneous grouping rather than grouping based on ability. The participant said, "I did not like us being grouped as per our capability. I like to work in small groups but there should have been heterogeneous grouping". This suggests that not all students feel comfortable being grouped solely based on their ability.

Being in smaller groups of same ability, children could have more interactions among themselves because they did not feel any type of inferiority complex. They were more comfortable to bring forth their doubts, ask and discuss questions with group members and teacher. They were more confident to ask doubts to teacher when everyone in the group had a similar doubt.

More support provided by the teacher

All students responded positively to gaining more support from teacher during the learning station except for participant 7, who felt that their group was given less attention. As per the participant, the teacher was more focused on the high and low achievers so the

focus on the mediocre group was little less. However, participant 6 shared that learning was effective in smaller groups since the students had more easy access to teacher's attention. Participant 6 said, "The interaction was effective as ma'am could reach out for everyone and help individually. At times there are times where we would not dare to ask questions as we are shy to speak out in front of everyone but in smaller group ma'am would easily reach out and we could clear our doubts without hesitation". Participant 1 also shared that teacher attended more to every individual in smaller groups than in a normal instructional class.

Conclusion

Meeting the needs of diverse learners in today's classrooms is one of the challenges that teachers teaching all grades face in the schools. Differentiating instruction is an effective way to address this challenge, and one way to do this is through the implementation of learning stations strategy. Learning station strategy can be used to engage learners in different learning activities at different learning stations by providing enough time and guidance from the teacher's side.

Learning stations provide students the opportunities to learn through interactions with peers in smaller groups. The strategy helps removing the embarrassment to discuss and share, as students feel more comfortable and confident in interacting with peers who share the similar abilities. Students who may be hesitant to participate in whole-class discussion can feel more confident in sharing their ideas in smaller groups.

Furthermore, moving from station to station allows students to develop curiosity as they enjoy carrying out various types of activities in the classroom. They are more receptive to learning when they are working in different environments. This keeps them motivated and interested in the lessons.

The teacher's role in learning stations is critical. Teacher can support the individual learning needs of children by carefully designing appropriate classroom activities for each station. This will provide opportunities for students to work independently allowing them to develop their critical thinking and problem-solving skills. Teacher should provide feedback and guidance to students in smaller groups. Individual attention is essential for students who may struggle with particular concept or need additional guidance.

Learning stations are an effective strategy for differentiating instruction in the classroom. By providing students with a variety of learning activities and individualized support, teachers can meet the diverse needs of their students. Learning stations foster better engagement, enhanced interactions, and removal of inhibition to discuss and share, and teacher support which will help students improve their academic achievement.

Limitation

One potential limitation to consider is that only a small sample size of 21 students who opted biology as their subject was used in this study, and therefore the findings may not be generalizable to a larger population or to other subject disciplines.

Recommendations

Following recommendations can be made based on the findings

- Teacher should consider heterogeneous grouping to accommodate the preferences and needs of all the learners. Teachers should also provide equal support to the mediocre students for their better academic performance.
- To increase the students' engagement during the implementation of the strategy, teacher may consider setting up at least one learning station outside the classroom in addition to those inside. Further, teacher should include a variety of activities at different stations, including at least one ICT-based station to make learning more enjoyable and inquisitive. An extra station can be created for fast learners to explore contents with increasing difficulty.
- Teachers can focus on changing the learning environment to promote student engagement and creativity.
- Teachers should encourage all forms of smaller discussions in the class as these help children build confidence and learn concepts better.
- A potential research recommendation could be to investigate the impact of implementing a buddy system teaching practice in schools, including its potential benefits for enhancing professional learning communities, particularly for beginner teachers.

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