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Teachers' Perception for the Issue with Effective Science Teaching and Learning

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Abstract: This study aimed to find out how secondary school teachers perceived successful science instruction and learning. A descriptive survey design was therefore employed in the study. The sample size for the study included 14 secondary-level science teachers who worked in five public schools in the districts of Kathmandu, Lalitpur, and Bhaktapur. A structured questionnaire of the 5-point Likert type designed by the researcher was the tool used to collect data. After the instrument was validated, the reliability coefficient, which was calculated using Cronbach alpha, was found to be 0.84. The questionnaires were distributed by the researcher using Google Forms, and to ensure 100% return, they were then collected. The frequency distribution analysis and the percentage of responses provided by the teachers to each item were used to analyze the data. The results were also tallied up and collected in order to provide answers to the research question.

Key Keywords: *Effective teaching, Effective learning, Perception, Science, Secondary school*

Introduction

The study of science and technology is a key element of the school curriculum. From the basic level to secondary levels of the educational system, they are essential subjects. These subjects hold a significant place within the school curricula due to the role they play in the advancement of technology and science as a prerequisite for or essential for national development. Therefore, the effective use of science and technology determines a major deal of any country's progress (Hassan, 2008). In fact, scientific knowledge benefits people from all walks of life. According to Reeves (2002), the

application of scientific knowledge is viewed in a distinctive way, i.e., through intuition despite diversion. Similarly, the education sector is not an exception.

The art of education is pedagogy. Its goals encompass everything from skill development to human progress in its entirety. Student learn in stages and it requires time for them to do so. In order for all students to learn, teachers should establish a safe and compassionate learning atmosphere (Shaheen, Kayani, & Shah, 2015). Teachers can act as a source of learning, facilitators of learning, managers of learning, demonstrations of learning, instructors of learning, motivators of learning, and evaluators of learning in the implementation of a strong integrated science learning strategy (Noviandini, Marwoto, Rido, Iswari, & Priyambodo, 2020). The ability to grasp a variety of learning methodologies is a crucial skill for teachers who want to implement learning with a scientific approach. The effectiveness of science learning is significantly influenced by the quality of the teachers who deliver the lessons. The teacher's capacity to supervise classes, organize lessons, and present lessons creatively must all complement the teacher's position as a facilitator (Bhargava & Paty, 2010). Learning results are highly correlated with teachers' instructional abilities and students' enthusiasm to learn. Student motivation and teacher teaching abilities are positively correlated (Arlianti, Hastin, Ramatni, Wahyuni, & Susmita, 2022; Safitri, 2016).

Many of the problems experienced by students in learning science concepts are learner-dependent. Bahar and Polat (2007) posited that the views of science held by students contribute to the difficulties they perceive about certain science concepts and topics. Nwona and Akogun (2015) also opined that learner experience learning difficulties that may be connected to their learning environment, background knowledge and study habits.

Science and technology teachers' perceptions have been extensively documented in the literature because their beliefs about what they teach have received noteworthy attention. According to Ahmad and Aziz (2009), collected data from students/learners who are Sciences and Technology teachers yields valuable results because these individuals have "demanding and exciting skills that enable them to perceive teaching and learning etiquette more so than their Technology and Science teachers." Further, Ahmad and Aziz (2009) claimed that if students regard their science and technology teachers' classroom environments as cooperative rather than competitive, they will gain a clear understanding of the concepts being presented by them. In addition, Rawnsley (1997) argued that students would develop a more positive attitude toward instruction

if they felt that their science and technology teachers were highly supportive of them and provided opportunities for them to participate in important aspects of science and technology teaching and learning.

The researcher found numerous issues with science education in Nepal. The central problem with Nepal's educational system is that it is practice-based and teacher-driven, with the teacher being viewed as the core of the teaching-learning process (Koirala, Gurung, & Wagle, 2020). Science researchers have shown that the majority of students in schools have no interest in learning the subject, which has led to low achievement on final exams (Semela, 2010). Experiences throughout the years have demonstrated that teachers frequently rely on verbal expression to convey concepts, ideas, or facts during the teaching-learning process. The "chalk-talk approach" is the name given to this technique (Onasanya & Omosewo, 2011). In the classroom, the researcher saw a mismatch between the teacher's teaching methods and the students' learning strategies, which led to the problem. In this regard, a variety of factors have been found to support students' poor science performance in particular. Therefore, the study aims to learn how secondary school teachers in Kathmandu, Lalitpur, and Bhaktapur districts perceive on the issue of effective science teaching and learning.

The following was the research question that this study addressed:

What are teachers' perceptions for the issue with effective science teaching and learning?

Methods

Research Design: The study examined secondary school teachers' perceptions of effective science instruction and learning using an online survey methodology. The data was gathered via a questionnaire.

Population of the Study: The study's target population was the secondary schools in Kathmandu, Lalitpur, and Bhaktapur districts. Five public secondary schools contributed the sample population for the study, which was chosen at random from these districts.

Sample and Sampling Techniques: The sample for the study was constituted of fourteen science teachers from five public secondary schools in Kathmandu, Lalitpur, and Bhaktapur using simple random sampling approaches.

Research Instrument: The data collection method used to discover how secondary school science instructors perceived the issue of thorough scientific teaching and learning was a structured questionnaire. The responses to the questions were weighted

on a five-point Likert scale as Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD), with weights of 5, 4, 3, 2, and 1 respectively. There were 15 questionnaires used to assess teachers' perceptions of the problems with learning and teaching science in their individual classrooms. In fifteen questionnaires, the first five questions looked at teachers' perceptions as a result of student-related factors, the second five looked at teacher-related factors, and the last five looked at other facets.

Validity and Reliability of the Instruments: Two professors from the science education department of Tribhuvan University validated the questionnaires. For the purpose of improving the validity of the instruments, they examined them and changed, added, or restructured some of the questions as well as assessed the relevance of the research questions. The instrument's reliability index was calculated using SPSS version 20.0.0, and it was found to be 0.84.

Method of Data Collection: The researcher introduced himself to the principals, classroom teachers, and students at the selected schools before informing the reason of his visit to respondents and the school authorities. The researcher then used a Google Form to distribute the questionnaire to the required number of science teachers and their email addresses for the study, along with brief guidelines on how to respond to each question. The questionnaires were distributed online by the researcher, who then collected them to ensure a thorough response. The respondent also advocated collecting and reviewing the responses.

Analysis and Interpretation: The data obtained from science teachers was analyzed using SPSS in version 20.0.0. Frequency distribution analysis and percentages of teachers' responses to each item were calculated and tallied to provide answers to the research question.

Question for research: What are teachers' perceptions for the issue with effective science teaching and learning?

Table 1 divulges the elements that affect effective instruction and learning of science, including: (1) 71.5% of respondents agreed that students have an inadequate foundation in science, while just 21.4% disagreed with this statement; (2) 14.3% of respondents disagreed with the finding that students experience a psychological dread of science, contrasted to 71.4% who agreed; (3) 71.4% of respondents, compared to 21.4% who disagreed, agreed that students had trouble solving science issues even when relevant

examples are supplied; (4) 42.8% of respondents disagreed, while 35.7% of respondents felt that students were no longer driven by their own hard work; and (5) the lack of a mentor prevents students from completing science homework at home had a 50.0% percentage score for agreed respondents compared to a 42.9% percentage score for disagreed respondents. From these results, it was concluded that, with the exception of item four (4), which is about students' alleged lack of enthusiasm in doing their best work, all of the issues stated are problems.

Table 1: *Students-related Factors*

Students-related Factors	SD	D	N	A	SA	% of agreement	% of those who disagree
Students' science foundations are weak	1	2	1	4	6	10	3
	7.1%	14.3%	7.1%	28.6%	42.9%	71.5%	21.4%
Students have psychological fear of science	0	2	2	8	2	10	2
	0.0%	14.3%	14.3%	57.1%	14.3%	71.4%	14.3%
Science problems are challenging for students to answer, even when examples are provided	1	2	1	3	7	10	3
	7.1%	14.3%	7.1%	21.4%	50.0%	71.4%	21.4%
Students are less motivated to work hard now	1	5	3	3	2	5	6
	7.1%	35.7%	21.4%	21.4%	14.3%	35.7%	42.8%
Due to the lack of a tutor, students do not attempt to solve their science problems at home	2	4	1	6	1	7	6
	14.3%	28.6%	7.1%	42.9%	7.1%	50%	42.9%

Table 2 illustrates that the teachers' views of teacher-related factors responsible for problems with science teaching and learning include: (6) the percentage of respondents who claim science teachers don't link theoretical concepts to real-world applications is 64.3%, whereas the opposite is true for 21.4% of respondents; (7) the percentage of respondents who agreed that teachers do not welcome student queries was 64.3%, while 28.6% of respondents disagreed, (8) the percentage of respondents who agree that there aren't enough science teachers in schools, both in terms of quantity and quality, is 78.6%, while the percentage of respondents who disagree with this assertion is 7.1%; (9) teachers' inadequate teaching approaches received a 64.3% agreement

rating from respondents, compared to a 28.6% disagreement rating; and (10) they also concurred, scoring 71.4% in favor of those who disagreed (14.3%), that teachers do not adequately plan science lessons because of their heavy workload. The study showed that all of the above-mentioned problems provide a barrier to effective science teaching and learning.

Table 2: *Teacher-related Factors*

Teacher-related Factors	SD	D	N	A	SA	% of agreement	% of those who disagree
Science subjects are not applied in the classroom to practical circumstances	1	2	2	4	5	9	3
	7.1%	14.3%	14.3%	28.6%	35.7%	64.3%	21.4%
Teachers do not entertain questions from students	2	2	1	3	6	9	4
	14.3%	14.3%	7.1%	21.4%	42.9%	64.3%	28.6%
Both the quantity and caliber of science instructors in schools are insufficient	0	1	2	4	7	11	1
	0.0%	7.1%	14.3%	28.6%	50.0%	78.6%	7.1%
Poor teaching/conventional methods are used by science teachers	2	2	1	3	6	9	4
	14.3%	14.3%	7.1%	21.4%	42.9%	64.3%	28.6%
Due to heavy workload, teachers don't prepare their science classes in a moderate manner	2	0	2	5	5	10	2
	14.3%	0.0%	14.3%	35.7%	35.7%	71.4%	14.3%

Table 3: *Miscellaneous Factors*

Miscellaneous Factors	SD	D	N	A	SA	% of agreement	% of those who disagree
Crammed classroom	2	1	3	6	2	8	3
	14.3%	7.1%	21.4%	42.9%	14.3%	57.2%	21.4%
Lack of educational resources	0	2	0	4	8	12	2
	0.0%	14.3%	0.0%	28.6%	57.1%	85.7%	14.3%
Absence of library	2	2	0	2	8	10	4
	14.3%	14.3%	0.0%	14.3%	57.1%	71.4%	28.6%
The cost of providing children with science education materials is beyond the means of the parents	4	4	0	6	0	6	8
	28.6%	28.6%	0.0%	42.9%	0.0%	42.9%	57.2%
Lack of motivation	4	0	8	2	0	2	4
	28.6%	0.0%	57.1%	14.3%	0.0%	14.3%	28.6%

Table 3 includes a number of factors that influence the teaching and learning of science at the secondary level, including (11) crowded classrooms, which received a score of 57.2% from respondents, as opposed to 21.4% who disagreed; (12) lack of educational

resources receives a score of 85.7% from agreed respondents, compared to a score of 14.3% from disagreed respondents; (13) lack of a library, 71.4% of respondents agreed with the statement, compared to 28.6% who disagreed; (14) the percentage of respondents who concur that parents cannot afford to purchase science learning materials for their children is 42.9%, whereas the percentage of respondents who disagree with this statement is 57.2%; and (15) lack of motivation receives an agreement rate of 14.3% from respondents, compared to an opposition rate of 28.6%. These findings show that all of the listed issues, with the exception of items fourteen and fifteen, have an impact on teachers' perceptions of how effectively science is taught and learned.

Discussion and Results

The findings of the survey showed that, although being a key topic at the secondary level, science is not one that students enjoy learning. This study has prompted the research into teachers' perceptions of the science at secondary level in their inability to understand the basic subject matter content, principles of science. These results tend to contradict the results obtained by Afzal, Safdar, and Ambreen (2015) who explored the modern technologies made education no longer limited in the boundaries classroom. but are in agreement with findings of Dorji, Jatsho, Choden, and Tshering (2022); Agommuoh (2014) who explored teachers' perceptions on the problems of effective teaching and learning due to abstract nature of subject unrelated with real life situations and conventional ways of teaching and learning.

Thus, this study gives the negative perceptions of teachers towards science in terms of the students factors itself, pedagogical factors, and academic facilities. These factors lead to the creation of problems in science learning among student. To overcome these obstacles, each student should be given the ample time and opportunity to solve the science problems during the process of learning science.

Conclusion

The study's findings showed that students' foundations in science are weak from earlier grades, they lack commitment and eagerness to learn, the teaching and learning is not conducive, the majority of science teachers have weak teaching backgrounds, and many teachers don't moderately plan for the science class due to a heavy workload. To be capable of preparing students for the 21st century and a global competition in their chosen fields, science teachers must receive frequent training. Moreover, in order to

improve educational pedagogical practices, science teachers could work to connect their lessons to real-world scenarios.

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