



Science Learning in Nepal (Case at Vaishnabi Secondary School)

Bangkit Tri Nugroho, Sri Ngabekti¹✉

¹Biology Department, FMIPA, Universitas Negeri Semarang, Indonesia

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Abstract

Science learning can be implemented with various approaches, strategies, models and learning methods. Vaishnabi Secondary School (VSS) is a public school in Nepal that accommodates students at the level of kindergarten, primary education (grades 1-5), and secondary education (grades 6-10). This study aimed to describe the interaction variables and their constraints in teaching science class at VSS. In this study, three interaction variables were observed, namely the sign variable (teacher), the context variable (students & schools), and the process variable (teacher-student interaction). The method used is a qualitative descriptive research method with a case study research design. Observations were carried out in science learning activities in grades 8, 9, and 10. Data collection used four data collection techniques, namely observation, interviews, questionnaires, and documents. The results of the research on the sign variable indicate that VSS has 8th, 9th, and 10th grade science teachers who are already competent in education and experience. The teacher's ability to use English is quite good. The problem of teaching science in VSS lies in two interaction variables, namely the context variable and the process variable. The context variable shows that student attendance and students' opportunities to study at home are constrained by the economic background of their parents who are less well off, forcing students to help their parents earn money. In addition, there is no science laboratory and supporting equipment for experimental activities. The process variable shows that the teacher has made plans for science learning in personal notes with students-centered learning. The lecture teaching method used also does not support 21st century education because today's education demands student activity in the learning process.

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✉ Correspondence Address:
D6 Building 1st Floor Jl Raya Sekaran Gunungpati Semarang
E-mail: sri.ngabekti@mail.unnes.ac.id

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INTRODUCTION

Learning is a combination of human elements, material facilities, equipment and procedures that influence the achievement of learning objectives. While the learning process is a sequence of events that includes teachers, students, school facilities, and procedures with specific learning objectives (Hamalik, 2011). Classroom teaching is different from the types of activities that usually take place in the operating room, at military staff conferences, at family dining tables, in the boxing ring. Each of these places has its own unique pattern of activities, its own equipment, its own cast of characters that usually appear. Neither is the classroom, and it will help build our model if we consider it from the start.

Science can be found in almost every aspect of life. Science has a role in developing the education system. Science learning can be implemented with various approaches, strategies, models and learning methods. The public view of science and literature is that they can contribute to a meaningful worldview. Across countries and over the centuries, various world views on the meaning of science have developed well (Gauch, 2009).

Nepal is a small country with a population of 29 million people located at the top of the world. The country is home to eight of the ten highest mountains in the world, including Mount Everest. Nepal is located between two big countries namely China and India. The mountainous terrain of the landlocked country presents tremendous challenges to socio-economic development and makes it difficult and costly to build infrastructure in Nepal. In 2015, Nepal remained one of the least developed countries in Asia and was ranked 144 out of 188 countries in the UN Human Development Index (2016). According to the Asian Development Bank (2015), about 25 percent of the population in Nepal lived on less than USD \$ 1 per day in 2010/11.

Just like in another countries, in general Nepal has two types of schools, public schools and private schools. Public schools in Nepal are categorized again into two types: (i) community-assisted schools (public schools), which receive regular government grants for teacher salaries and for other administrative purposes, and (ii) unassisted community schools (community schools), which do not receive regular government grants, but financed with support from the community, donations from other sources, and the school's own resources (Ministry of Education of Nepal, 2010).

Vaishnabi Secondary School (*VSS*) is a public secondary school in Kirtipur Municipality, Nepal. These schools receive regular government grants for teacher salaries and for other administrative purposes. Therefore, *VSS* is one of the assisted public schools. This school accommodates students from kindergarten (nursery), basic education (primary school), to secondary education (secondary school).

Prior to this study, researchers had made preliminary observations in two schools in Nepal. The two schools are one public school, *VSS*, and one private school, Salvinia Academy. After observing the two schools, the researchers were interested and had the opportunity to carry out research at *VSS*.

RESEARCH METHOD

This study aimed to describe the interaction variables in teaching science class in *VSS* and describe the constraints in the science classroom teaching in *VSS*. The research was conducted at *VSS*, located in Kirtipur City, Nepal. Data collection activities were carried out from August to September 2017. The social situation observed consisted of three components: place, actor, and activities. In this research, the place is *VSS*. Then the actor were students in grades 8, 9, and 10 and a science teacher. While the activity is Natural Sciences teaching. The research method used is descriptive qualitative research. In this study, the technique triangulation used through data sources to test the credibility of the data. The research instruments used in this study were observation, interviews, questionnaires and documents.



Figure 1 Map of the Kirtipur Municipality (Source: Sangeeta Singh, 2016)

RESULTS AND DISCUSSION

The results of this study are based on the theory about classroom teaching which states that classroom teaching is based on four interaction variables. The four variables are presage variables, context variables, process variables, and product variables. The results of the interpretation of the presage variables, context variables, and process variables are presented in Table 1. Meanwhile, the product variables were not observed.

Table 1. Science Learning at the VSS

Variable	Interpretation
Presage Variable (Teacher)	Educators qualified as high school teachers
Context Variable (Student)	Students come from poor families, so sometimes there are students who don't attend to school to help earning money for their parents
Context Variable (School Facility)	Schools have inadequate facilities to support science learning, especially for conducting experiments in the laboratory
Process Variable (Lesson Plan)	Most of the lessons in the classroom have been planned by the teacher, although only in the personal notes belonging to the related teacher
Process Variable (Teacher-Student Interaction)	The interaction between teachers and students tends to take place in one direction, that is from teacher to student

Of the four interaction variables, the researcher used three variables, they are presage variable, context variable, and process variable. Whereas in the fourth variable, that is product variable, data collection was not carried out due to the limited research time. In addition, community observations on context variables were not carried out for the same reason. Each of these variables has components that can be observed more specifically.

A. Presage Variable

The component of the presage variable is the educator or teacher. The quality of educators is one of the factors that determine learning activities. Evidence shows that teachers who have obtained advanced

degrees have a positive impact on students' mathematics and science achievement in secondary schools when the degrees earned are compatible with related subjects (Rice, 2003). The qualities of the teacher itself can be seen from the level of education that has been taken.

Table 2. Teacher Education in *VSS*

No.	Last Education	Total
1	Senior High School	9
2	Bachelor Degree	2
3	Master's Degree	4
TOTAL		15

From the Table 2 above, there are 15 teachers in *VSS* with 10 female teachers and 5 male teachers. A total of 4 teachers are postgraduates, two teachers only have undergraduate degree, and the rest of 9 teachers are high school graduates. This shows that 60% of teachers are only high school graduates. Teachers who teach at the equivalent level of senior high school are teachers with undergraduate and postgraduate degree. Thus, there are only 6 teachers who can be said to be competent according to their graduates.

Table 3. Teacher Age in *VSS*

No.	Age	Total
1	31-40	1
2	41-50	7
3	51-60	7
TOTAL		15

Seen from the Table 3, the average teacher was 48.7 years old, with the youngest teacher being 32 years old and the oldest being 56 years old. This shows that 93% of teachers are over 40 years old and have considerable experience as teachers. Goe & Stickler (2008) stated that experience is one of the many factors that must be considered when recruiting teachers and determining appropriate assignments. This shows that in fact, educators are qualified when viewed from their educational history and ages.

English has been taught and used in Nepal for the past half decade in schools and colleges along with several other local and regional languages. The teacher's ability to communicate in English at *VSS* is not very good. Of all the teachers, only 2 of them were fluent in English, where both teachers were postgraduates. The fluency of the teacher in communicating using English is evidenced by the use of the two teachers as interviewees in this research. According to Bista's (2011), there is a strong need for the use of English in Nepal and the country needs well-trained teachers.

B. Context Variable

Observations on this context variable were carried out on two components, students and schools. There are 30 students in *VSS* grades 8-10 based on documents obtained from the school. When the researchers made observations, the total number of students who entered the school was only 19 people. The results of teacher interviews revealed that 90% of students came from poor families. Eleven students who do not attend school because they are told to help their parents work to earn money. Although there are still many students who can attend to school, according to the same teacher, they simply do not have time to study because most of the time at home is also used to help their parents to work. The results of research conducted by Kuru Cetin & Taskin (2016) show that parents who have good socioeconomic status are more willing and active in the procedure to follow the educational process. This kind of student economic background affects student attendance at school and study time at home, which in turn also affects student learning opportunities.

School facilities are one of the main supports in science learning activities at schools. School facilities are the strongest determinants of academic achievement and facilities in terms of qualifications of personnel who are directly involved in pedagogy include laboratories and libraries (Owoeye & Yara, 2011). *VSS* already owns facilities such as tables & chairs, toilets, playgrounds, computers, and libraries. However,

based on observations, tables and chairs are obsolete and the existence of a small library is still combined with the computer laboratory. School documents state that the school does not yet have a dedicated computer laboratory, science laboratory, experimental equipment, and an internet connection for the computers. The same thing was conveyed by school teachers who stated that school facilities were still inadequate. Schools need a science laboratory, instructional media, radio, television, and more computers for students. As a result of these conditions, science teachers never conduct experimental activities in science class.

C. Process Variable

The process variable components observed in this study were the lesson plans by the teacher and the interaction between teachers and students in science learning. The existence of a plan in an activity is certainly necessary if you wish to carry out these activities in an organized and systematic manner. According to Kunandar (2018), making learning plans aims to simplify, expedite and improve the results of the teaching-learning process and assist in seeing, observing, analyzing, and predicting learning programs as a logical and planned framework. Based on the results of interviews with teachers, most schools in Nepal do not make lesson plans. If there is any, the teachers at VSS make lesson plans on personal notes. Other teachers also stated that they often make lesson plans, but sometimes they don't. This shows that even if they don't have a neatly written lesson plan, the teacher still has a plan of what to teach on a personal note for most of the lesson.



Figure 2 One-way Learning Process in the VSS

The use of teachers for interactive or direct teaching practices is positively associated with student achievement (Goe & Stickler, 2008). The interaction between VSS teachers and students in the classroom tends to take place in one direction, from teacher to student. Based on the observations, the teacher taught using the lecture method. In addition, the teacher immediately delivers the material at the beginning of the lesson without giving students the opportunity to express their opinions. Students also did not ask questions until the end of the lesson even though according to the questionnaire, students were given the opportunity by the teacher to ask questions. At the time of the interview, the teacher admitted that in learning, the teacher often delivered material directly to students rather than giving students the opportunity to have an opinion.

Whereas for the fourth variable, product variable, data collection was not carried out due to the limited

research time. In addition, community observations on context variables were not carried out for the same reason.

The three variables above can provide a comprehensive picture of science learning in *VSS*. Starting from the presage variable, namely the teacher. If viewed from a document perspective, teacher education and the age of teachers who teach in grades 8, 9, and 10 at *VSS* are quite competent in their fields. Coupled with the ability to speak English, the teachers who teach science at that level are quite good. The second variable is the context variable, namely students and school facilities. In this variable, if the number of students is matched based on the School Improvement Scheme document and the attendance of students in class during observation, it is found that there are significant differences in the number of students. In the school documents, the number of students in grades 8, 9, and 10 is 30 students. Meanwhile, only 19 students attended the school. The absence of a third of students at school was conveyed by the teacher in the interview due to the unfavorable economic condition of the parents. So, this forces students to help their parents to earn money and not come to school. This economic condition also affects students who attend school. Since the majority of parents at *VSS* are from the poor, students who attend school will also help their parents earn money after school. This results in students losing time to study at home. The facilities owned by the school were said by the teacher in the interview to be insufficient to support learning in the 21st century. The absence of an integrated computer laboratory with an internet connection and a science laboratory along with supporting equipment for experimental activities was enough to make *VSS* a lagging school. These two things become obstacles in the variables of science teaching in *VSS*. The last variable is the process variable in the form of teacher-student interaction. This variable observed three things, namely the existence of a lesson plan, teacher teaching methods, and student activity. Teachers at *VSS* are quite good at planning lessons because they stated in interviews that they already have lesson plans in their personal notes. The teaching method used in science learning uses the lecture method. This condition was followed by passive student interaction in the absence of students asking questions during the learning process. This causes learning to run in one direction and tends to be passive. The passive teaching method of teachers and students in the classroom is another constraint in the variables of science teaching in *VSS*.

Three interaction variables in teaching science class in *VSS*, namely presage variables, context variables, and process variables, provide an overview of the continuity of science learning in *VSS*. The majority of the interaction variables are quite good. However, there are several variables that become obstacles, namely the context variable and the process variable. In the context variable, constraints occur because of the economic conditions of students and school facilities. The economic conditions of students have an impact on students' opportunities to study and attend classes at school. Then school facilities affect the absence of science practicum activities which results in a lack of student experience. While in the process variable, the problem occurs in the teacher's teaching method using the lecture technique. Although the lecture method has its own advantages, this method is becoming less relevant in the field of 21st-century education which demands student activity in the learning process.

CONCLUSION

The presage variable indicates that Vaishnabi Secondary School has 8th, 9th, and 10th-grade science teachers who are already competent in education and experience. The teacher's ability to use English is quite good. The context variable shows that student attendance and students' opportunities to study at home are constrained by the economic background of poor parents, forcing students to help their parents earn money. In addition, there is no science laboratory and supporting equipment for experimental activities. The process variable shows that the teacher has made plans for science learning in personal notes and the teacher is still teaching with the lecture method in one direction, namely from teacher to the student which causes students to be passive in learning.

The problem of teaching science in *VSS* lies in two interaction variables, namely the context variable and the process variable. The context variable is about the economic condition of students and

school facilities. The economic conditions of students affect school attendance as well as student learning opportunities at home. School facilities have an impact on the absence of practical activities that will reduce the experience and abilities of students. The process variable is constrained by the teacher's teaching method. The lecture teaching method does not support 21st-century education because today's education requires students to be active in the learning process.

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