
Using Science and Technology- Based Community Learning Model Through the Natural Environment Exploration Approach: Increasing the Motivation and Positive Science Attitude

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Abstract: This aims to explore students' motivation and scientific attitudes using the learning model of STC through the natural environment exploration approach in Senior High School 1, Kampar. It is an action research which was conducted from April to June 2018. Participants of this research were 34 students of the tenth grade, Mathematics and Natural Science students, odd semester, comprising 8 males and 26 females. The parameters of this research were motivation and attitudes. The result of this study demonstrates that the motivation and attitudes towards science have significant improvements. It shows that the student's learning motivation has improved from 6,41% in the first cycle to 10,56% in the second cycle. At the average, in the first cycle, the score of scientific attitudes was 3,58 (category A- (B)). In the second cycle, it had increased to 3,90 which was categorized into A. Based on the result of this study, it can be concluded that the application of the learning model of STC using the natural environment exploration strategy is effective to improve the motivation and positive attitudes towards science of the tenth grade students of Mathematics and Natural Science, State Senior High School 1, Kampar.

Keywords: Science and Technology-Based Community, Motivation, Students' Attitudes

1. Introduction

International Commission on Education for the 21st Century which was established by UNESCO reports that in this global era education is implemented by relying on the four pillars: *learning to know, learning to do, learning to be, and learning to live together* (Delors in Simpen, 2014). In connection with education, technology development is inseparable from the development in the sphere of science. The science development processes, which has been practised by scientists, has resulted in a positive effect on technology development. It has been evident in the form of technology equipment which is the product of technology itself. Such products, in turn, may accelerate the significant progress in the field of science (Krista Septiawan et al, 2014).

Science underlies technology development. Meanwhile, technology supports the science development (Mahmuddin, 2009). Biology is one of the science instructions that plays a core role in science education (Puspita, 2012). An instructional process does need an effective interaction (teacher-learners, learners-learners and learners-environment) to build up a comfortable learning atmosphere and help learners to be active in the course of the lesson (Sumarmo in Yuli, 2011).

Based on an interview with Biology teachers, grade X of Mathematics and Natural Science student, State Senior High School 1, Kampar, it was found that the learners' learning minimum passing grade has not been achieved. The minimum passing criteria as stipulated in the 2013 Curriculum is B. The minimum score to reach (B) is 2,88 which is equal to 72. However, most of the learners still gained 2,84 (B) which is equal to 71.

The Biology teachers had observed that there were eight learners who still experienced to be less motivated as they were not committed to doing tasks, less of a spirit of overcoming difficulties, lack of interest in encountering challenges, unable to defend their stance, less confident and less creative. On the part of the teachers, they were aware of their weaknesses for not giving opportunities to the learners to learn outside of the class or to be exposed to their own natural environment which could facilitate the students to acquire hands on experiences. Such condition might have contributed to the lack of curiosity and lack of motivation of the learners. These conditions will automatically lead to their low academic achievement.

The aforementioned illustration demonstrates that any alternatives and efforts need to be taken into account as the ways of developing learners' motivation and positive attitudes towards sciences. One of the efforts that needs to be realized is the STC program by applying a learning model in the form of exploration of the natural environment. The advantage of this model is to provide learners with the extension of learning allocated time both inside and outside of the school.

The science and technology-based community (STC) is one of the innovative learning models that makes use of environmental issues in the course of instruction, which is theoretically powerful and potential to form individual whose competence to think critically, creatively and innovatively (Agustini, et al, 2013). Exploring natural environment implies that learners are motivated to learn issues on their surrounding environment so that they acquire hands on experiences rather than abstract concepts. Briefly, they are allowed to obtain a real exposure during the instructional process. The hands-on experiences enable learners to be more motivated and to understand the materials they have been learning which in turn achieve the objective of the learning targets (Indah et al, 2012). This study is aimed at improving learners' motivation (interest, relevance, expectation and scientific attitudes through the application of Natural Environment Exploration approach.

2. Methodology

This study was conducted at State Senior High School 1, Kampar, from April-June 2018. The participants were the learners of the 10th grade, Mathematics and Natural Science student. It was an action research using a cycling model. Trianto (2007) states that action research concept consists of the four phases: planning, action, observation and reflection. The researcher had prepared research instruments: instructional materials and the data collection instrument. The former included syllabus, lesson plan, students' worksheets (LKPD,) post-test and daily quizzes. The latter was applying data collection: scientific attitude sheet report and learners' motivation questionnaire.

3. Result and Discussion

At cycle I, the learners explored the nearby natural environment in the paddy field area. Cycle II focused on the instructional material, i.e. the changes and preservation of the environment which were held two times in a meeting. In this cycle, the learners explored the nearby market and river areas.

CYCLE I

Learners' Motivation

During the cycle I, there had been improvements in terms of the learners' motivation after the application of the science learning model of STC using exploring natural environment approach. The improvement can be seen in the following Table 1.

Table 1. Learners motivation score of Biology class, the 10th grade, Mathematics and Natural Science student, State Senior High School 1 Kampar before and after cycle 1

NO	Motivation Indicators	Learners' motivation scores				The Increasing of Motivation in Cycle 1 (%)
		Before		After		
		Score	Category	Score	Category	
1	Interest	3,39	High	3,51	High	3,54 %
2	Relevance	3,43	High	3,56	High	3,79%
3	Expectation	3,16	High	3,40	High	7,59 %
4	Achievement	2,89	High	3,19	High	10,38 %
The Mean Score		3,22	High	3,42	High	6,41 %

Table 1 explains that there is an increase of the learners' motivation score, where the score after cycle 1 is 3,42 (high category) which is higher than the score gained before cycle 1: 3,22 (high category). The total learners' motivation progress reaches 6,41%.

There has been a significant progress in the motivation of the interest category, both in the learners' attention and curiosity. The score of learners' motivation grows higher in the interest indicator (3,54%) compared to the obtained score before cycle I, which is 3,39 (high category). Whereas, after cycle 1, the increasing score reaches 3,51 (high category).

The improvement of the learners' interest after the implementation of cycle 1 was caused by the active learning system of STC in the form of natural environment exploration of nearby paddy field area. At the time of the natural environment exploration was put into practice, learners gained hands-on experiences and empirical data from their own observation that would be discussed in the class. It was manifested through a participation of someone's activity - who is interested in certain objects - tends to have a greater interest than before (Mustamir et al, 2012).

Motivation score of the relevance indicator has shown significant growth at every sub-indicator such as goal-oriented program, commitment to gain achievement and the perceived functional value. Before cycle 1 activity was conducted, the relevance indicator score was 3,43 (high category). After the implementation of cycle 1, it reached a higher score, 3,54 (high category). In terms of the percentage, the increase of motivation may achieve 3,79%. According to Sardiman (2007), motivation usually arises from someone's self. However, its emergence is triggered or stimulated by the other aspects.

The expectation of the learners' motivation has shown significant progress which reaches 7,59%. Before cycle 1, the obtained score was 3,16 (high category) and after cycle 1, the gained

score was 3,40 (high category). After the cycle 1 was administered, the score became higher, 3,40 (high category). The increase in learners' awareness to gain success, self-esteem and someone's feeling have contributed to the score's increase in expectation indicator. Hamzah in Dwi (2011) argues that learning without expectation may result in less effective instruction. With the desire and expectation, learners will be serious to learn the instructional material through the application of learning model in the form of STC which, in turn, provides the best result of the expectation indicator.

The increase of the achievement gains 10,38%. There was an increase of sub-indicator which enables to maximize the instruction and satisfied feeling so that 3,19 score can be gained (high category) in the 1st cycle. Conversely, before the implementation of cycle 1, the obtained score was only 2,89 (high category).

Learners' Scientific Attitudes

The evaluated indicator in the attitude sheet was the learners' teamwork performance. It was peer assessment where the learners evaluate each other performance working in a team

Table 2. Learners' Attitude in Cycle I

Meeting	INDICATORS			Ranges of Attitude (Category)/ Grade
	Cooperative attitude (Category)/ Grade	Discipline (Category)/ Grade	Responsibility (Category)/ Grade	
1	3,56 (E)/A-	3,38 (G)/B+	3,21 (G)/B+	3,38 (G)/B+
2	3,56 (E)/A-	3,47 (G)/B+	3,44 (G)/B+	3,49 (G)/B+
3	3,97 (E)/A	3,82 (E)/A-	3,82 (E)/A-	3,87 (E)/A
The mean score	3,70 (E)/A-	3,56 (E)/A-	3,49 (G)/B+	3,58 (E)/A-

Table 2 In cycle, the learners' attitude have developed at every meeting. In the first and second meeting, the average gained score is 3,56 with grade A- (Excellent category). Meanwhile, in the third meeting, the obtained score is higher than at the previous meeting: 3,97 with grade A (Excellent category).

After being exposed to Science and Technology-based learning model using the Natural Environment Approach, the learners' cooperative attitude score at cycle 1 is 3,70 which is classified into grade A- (excellent category). The instruction strategy using Natural Environment Exploration enabled the learners to develop their potentials as human beings with certain personalities (Euis, 2013). Discipline attitude has shown improvements at every meeting. In the first meeting, the average obtained score is 3,38 which is grouped into grade B+ (good category). In the second meeting, the average score is 3,47 which is grouped into grade B+ (good category).

Learners' attitude in the responsibility indicator has shown progress at every meeting. In the first meeting, the average obtained score is 3,21 which is included in grade B+ (good category). In the second meeting, the average gained score is 3,44 and still belongs to grade B+ (good category). Whereas, in the third meeting, the gained average score is 3,82 which is classified into grade A- (very good category). In terms of the learners' responsibility at every meeting, the gained average score in the cycle 1 is 3,49 which is classified into grade B+ (good category).

Learners' scientific attitude has shown improvements. In the first cycle, the gained score is 3,38 which is grouped into grade B+ (good category). In the second cycle, the scientific attitude score of the learners is 3,49 which was included in grade B+ (good category). In the third cycle, the obtained score is much higher than before, 3,58 which belongs to grade A- (Excellent category).

Cycle I (Reflection)

In the reflection stage, there are some aspects that need to receive attention in the first cycle. There were still learners who did not pay attention when the teacher explained the material at the stage of concept optimization. It is the stage where the teacher provided the concept optimization so that there would not be a misconception on the part of the learners. It had been proven from the learners' responses to the motivation questionnaire where some of the learners still had a misconception about what they had learnt as they had assumed that their concept of understanding had been good.

Cycle II

The Learners Learning Motivation

In the cycle II, there had been improvements in terms of the learners' learning motivation after being exposed to STCLearning model through Natural Environment Exploration approach as provided in table 3.

Table 3. The learners' Motivation Score in Biology Class, X Grade, Mathematics and Natural Science student¹ of State Senior High School 1 Kampar Before and After Cycle II.

NO	Motivation Indicators	Learners' Motivation				Motivation Improvement Cycle 1 (%)
		Before		After		
		Score	Category	Score	Category	
1	Interest	3,39	High	3,65	Very High	7,67%
2	Relevance	3,43	High	3,64	Very High	6,12%
3	Expectation	3,16	High	3,58	High	13,29%
4	Achievement	2,89	High	3,36	High	16,26%
Mean Score		3,22	High	3,56	High	10,56%

Table 3 The average score before the exposure of the STC is 3,22. After being exposed to the science and technology-based community, the score became higher, 3,56 (high category) with the increase percentage was of 10,56%. The motivation score of interest indicator has gained progress. Before the application of the STCLearning model, the score is 3,39 (high category). Meanwhile, after being introduced to the science and technology-based community, the score is higher, 3,65 (very high category). The increasing percentage is 7,67%.

From the gained score percentage, it demonstrates that the application of STC using the Natural Environment Exploration approach seems to be effective to improve learners' interest and curiosity. Such learning model owns an effective learning system in its own right in the form of involving the role of surrounding environment during the instructional process, particularly in the nearby river and market areas. Everything which has been observed by someone will automatically develop his/her interest as far as he/she has explored. A teacher, therefore, is required to develop learners' motivation in the course of instructional process (Ni Ketut Armini et al, 2013).

In the relevance indicator, there had been progress about 6,12%. Before being exposed to STClarning model, the average obtained score was 3,43 (high category) and after the application of this learning model, the achieved score was 3,64 (very high category). The increasing of each sub-indicators: goal-oriented program, commitment to gain achievement and the functional value had contributed to the improvement.

The expectation indicator part has shown improvement. Before being introduced to the innovative learning model, the score is 3,16 (high category) and after the implementation of Cycle II,the obtained score is 3,58 (high category).The increasing gained score is 13,29%. This obtained percentage score demonstrates that the application of STCusing the Natural Environment Exploration approach may increase the learners' expectation to be successful, to boost their self-esteem and get satisfiedfeeling. Before being exposedto the innovative learning model, the score in the achievement indicator part is 2,89 (medium category). The increasing score is 16,26%. The gained score percentage implies that the use of STCwith Natural Environment Exploration approach enables to improve the learners' academic achievement, to optimize the instructional process and to get satisfied feeling.Further, such learning model can be considered as a way of allowing learners to be familiar with the object they have observed and discussed (Barnes in Ketut Armni, et al, 2013). In the course of the instructional process, motivation plays a core role as someone who typically does not have motivation will not be serious in attending in the instruction activity. Learning motivation basically is engaged with the learners' willingness to participate in the instructional process (Clearinghouse in Ketut Armini, et al, 2013).

Scientific Attitudes

Based on the provided data, the learners' attitudes in cycle 1with the instructional material,the change and preservation of the environment can be seen in the following Table 4.

Tabel 4. The Learners' Attitude in Cycle II

Meeting	INDICATORS			The Attitude Average (Category)/Grade
	Cooperative (Category)/Grade	Discipline (Category)/Grade	Responsibility (Category)/Grade	
1	3,91 (E)/A	3,79 (E)/A-	3,76 (E)/A-	3,82 (E)/A
2	4,00 (E)/A	3,97 (E)/A	3,97 (E)/A	3,98 (E)/A
Mean Score	3,96 (E)/A	3,88 (E)/A	3,87 (E)/A	3,90 (E)/A

In table 4, the learners' attitudes in cycle II have increased at every meeting. It is evident with the progressive average score of each indicator: cooperative, discipline and responsibility.Students' attitudes at this cycle II have demonstrated progress. In the first meeting, the achieved score is 3,82 with grade A (Excellent category). In the second meeting, the gained score is 3,98 with grade A (Excellent category) The total mean score is 3,90 withgrade A (Excellent category).

The learners' attitudes in the cooperative indicator had achieved a satisfying score in the first and second meeting. In the first meeting, the gained average score is 3,91 with grade A (Excellent category). Whereas, in the second meeting, it has increased: 4.00 with A grade (Excellent category).The score on the cooperative attitude of the learners in the cycle II, after being exposed to the science and technology-based community, using the Natural Environment Exploration approach is 3,96 with grade A (Excellent category). This satisfying score could be

achieved owing to the cooperative atmosphere which was built on data collection with the natural environment exploration approach where the learners had been accustomed to cooperating together in the course of group discussion in the classroom.

The discipline indicator had experienced a satisfying growth at every meeting. In the first meeting, the gained average score is 3,79 with grade A (Excellent category). Conversely, in the second meeting, the obtained average score is 3,97 with grade A (Excellent category). In the discipline part, through the application of the STC using Natural Environment Exploration, the achieved score is 3,88 with A grade (Excellent category).

In terms of responsibility indicator, there had been a satisfying development at every stage of the meeting. In the first meeting, the obtained average score in the responsibility part is 3,76 with grade A- (Excellent category). In the second meeting, there had been a significant progress in the obtained average score, that is 3,97 with grade A (Excellent Category).

In the responsibility element, at every meeting, the gained average score in the Cycle I is 3,87 with grade A (Excellent category). Learners attitude in the cycle II had improved well. In the first meeting, the obtained score is 3,82 with grade A (Excellent category). Whereas, in the second meeting, the score is much better: 3,98. At this II cycle, the achieved mean score is 3,90 with grade A (Excellent category).

Reflection of Cycle II

In cycle II, the teachers seemed to thoroughly motivate the learners by focusing on the main activities which may attract the learners' interest and put the emphasis on providing inputs on the concept. In this respect, they stressed on the key concepts so that the learners may not make any mistakes to the concept they have acquired. At the cycle II, the teachers invited the learners to have laboratory work. It is aimed at helping the learners in analyzing problems they are encountering in their own neighbourhood and strengthen the comprehension of the concept. At this stage, therefore, the learners' motivation and positive attitude towards science had increased significantly.

4. Conclusion

This study concludes that the application of STC learning model using the Natural Environment Exploration approach seems to be effective to improve motivation and scientific attitude of the tenth grade, Mathematics and Natural Science student, State Senior High School 1, Kampar.

Referring to the findings of this study, the teachers of State Senior High School I Kampar are recommended to practice the STC learning model using Natural Environment Exploration approach, particularly in the instructional materials: ecology and the change and preservation of environment to be one of alternatives to boost both the learners motivation and positive attitudes towards science. This study needs to be pursued and focused on the other instructional materials and refers to the available allocated instruction time.

References

- Agustini D., Subagia, dan Suardana. 2013. Pengaruh Model Pembelajaran Sains Teknologi Masyarakat (STM) Terhadap Penguasaan Materi Dan Keterampilan Pemecahan Masalah Siswa Pada Mata Pelajaran IPA di MTS. Negeri Patas. *e-Journal Program Pascasarjana*. Vol. 3 Universitas Pendidikan Ganesha. Singaraja
- Indah Puspita Sari, Margareta Rahayuningsih, Nugroho Edi K. 2012. Pemanfaatan Kebun Sebagai Sumber Belajar Dengan Menerapkan Pendekatan Jelajah Alam Sekitar (JAS). *Journal of Biology Education (2)* Universitas Negeri Semarang. Semarang
- Krista Septiawan, Arini dan Wawan Sudatha. 2014. Penerapan Model Pembelajaran Sains Teknologi Masyarakat (STM) Berbantuan Media Audio Visual Untuk Meningkatkan Hasil Belajar IPA Pada Siswa Kelas V Semester Ganjil di SD Negeri 2 Sudaji, Kecamatan Sawan, Kabupaten Buleleng Tahun Pelajaran 2013/ 2014. *Jurnal Mimbar PGSD* Vol. 2 (1) Universitas Pendidikan Ganesha. Singaraja
- Mahmuddin. 2009. Pendekatan Sains, Teknologi, dan Masyarakat dalam Pembelajaran. <http://mahmuddin.wordpress.com>.
- Mustamir Anwar, Supardi, Sugiharto. 2012. Pengembangan Perangkat Pembelajaran Biologi Dengan Pendekatan Bioenterpreneurship Untuk Meningkatkan Keterampilan Proses Ilmiah dan Minat Berwirausaha Siswa. *Innovative Journal Of Curriculum And Educational Technology*. Vol. 1 (01). Universitas Negeri Semarang,
- Ni Ketut Armini, Lasmawan, Gede Rasben Dantes. 2013. Pengaruh Model Pembelajaran Sains Teknologi Masyarakat (STM) dan Motivasi Berprestasi Terhadap Hasil Belajar IPS Siswa Kelas V SD Gugus III Kecamatan Kuta Selatan Badung. *e-Journal Program Pascasarjana*. Vol. 3 : 1-12 Universitas Pendidikan Ganesha. Singaraja
- Sardiman. 2007. *Interaksi & Motivasi Belajar Mengajar*. PT Rajagrafindo Persada. Jakarta
- Trianto. 2007. *Panduan lengkap penelitian tindakan kelas*. prestasi pustaka. Jakarta
- Yuli Nurul Fauziah. 2011. Analisis Kemampuan Guru Dalam Mengembangkan Keterampilan Berpikir Kreatif Siswa Sekolah Dasar Kelas V Pada Pembelajaran Ilmu Pengetahuan Alam. *Jurnal Edisi Khusus* No. 2, ISSN 1412-565X