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Students' perceptions of a situated learning environment

Cezmi Ünal[a] *, Hatice Zeynep İnan[b]

[a]*Faculty of Education, Gaziosmanpaşa University,Tokat, 60150, Turkey*
[b]*Faculty of Education, Dumlupınar University, Kütahya,43100, Turkey*

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Abstract

In this study, middle school students' perceptions of a situated learning environment were investigated. Because there was not a definite situated instruction model in the literature, the characteristics of ideal/situated learning environments, which had been proposed by Collins, Brown, & Newman (1989), were put into practice. Evaluation was based on the science journals that students kept after the activities and observations of the researcher and the classroom teacher during the instruction. Results showed that students had a positive perception of a situated learning environment. The current study is unique in terms of providing a sample unit plan for science classes based on Collins et. al.'s proposed model and examining students' perception of situated learning environments from a qualitative perspective.

Keywords: Situated learning; students' perception; science education; weather.

1. Introduction

Teaching method is one of the key factors that help students gain scientific knowledge and learn how to transfer it into different contexts. Previous research shows that there is a significant relationship between the teaching method and student's thinking/understanding of science (Schroeder, Scott, Tolson, Huang & Lee, 2007; Wise, 1996). For example, traditional methods, which are teacher-centred, are not effective in helping students develop scientific thinking skills, because students cannot find enough opportunity to truly understand scientific concepts in teacher-centred classes when all of the information is provided by the teacher (Llewellyn, 2002). Different teaching strategies have different impacts on students' learning, so that we can help students acquire expected gains by using appropriate teaching methods.

In the current study reported here, the researcher selected situated learning as a teaching methodology. The belief that learning and doing are inseparable and complement each other is the main corner stone of situated learning (Hendricks, 2001). Hendricks indicates that situated cognition propose the idea that situated learning environments offer contexts in which students find an opportunity to work on authentic activities and learn how to transfer knowledge to real-life situations. Situated learning perspective sees learning as a social activity and emphasizes the social interactions in learning environments (Cobb & Bowers, 1999). However, there is not even any clear

* Cezmi Ünal Tel.: +90-312-210-7510; fax: +90-312-210-7971
E-mail address: cezmi@metu.edu.tr

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instruction method based on situated learning, although there are some instructional methods like problem-based learning which can be justified from a situated learning perspective. Collins, Brown, and Newman (1989) defined the characteristics of an ideal learning environment considering the tenets of situated learning. There is a need for research to gain insight into students' perception of situated learning environments. This study aims to address this gap in the literature through examining students' perception of a situated learning environment. The researcher prepared a unit plan on the topic of weather for the seventh graders based on Collins et al.'s proposed model for situated learning. Through utilizing qualitative research methods (e.g., observation, informal interviews, documentation of student journals), the researcher examined the students' perceptions of a situated learning environment.

2. Method

The participants were the 25 seventh-grade students, 15 girls and 10 boys. Traditional teaching methods were usually used in their science classes. During the science lessons, one of the students read the topic from the book aloud and the teacher followed and emphasized the important points of the topic when it was necessary. The teacher presented some problem-solving exercises and then assigned students homework from textbook. Generally, the teacher could not present most of the experiments stated in the textbook because of inconvenient classroom facilities or lack of essential equipment. The teacher conducted only simple experiments and utilized online resources to enrich the science lessons.

After observing the current educational system in the class, the study began. The researcher helped the teacher and worked as a co-teacher during the instruction. The teacher has had 10 years of teaching experience in different middle school science classes. For the study, the researcher prepared a unit plan on the topic of weather based on Collins, Brown, and Newman (1989)'s proposed model.

The unit plan included three activities. The first one was called "Stormy Weather" in which groups of students conducted experiments on static electricity and one of the group members presented their findings to other classmates. Students learned about the connection between electric charges and lightning formation from the Stormy Weather experiment. In the second activity, "Weather Map", students learned the basic knowledge of weather maps, read real weather maps, drew their own weather maps, and presented them to the class as if they were weather forecasters. In the last activity, students worked on a computer and filled out the worksheets of a webquest page. The webquest page included information about water cycle, cloud types and formation, local weather and climate.

The teacher/researcher applied the unit plan by using Collins et al.'s recommended procedure. Activities were chosen according to the consistency between characteristics of activities and the characteristics of the ideal learning environments. All activities included domain knowledge of a weather topic. Presentation and discussion sessions in Stormy Weather and Weather Map activities comprised the control strategies for students. For example, in the Stormy Weather activity, all groups shared their findings with the class and got feedback on their process and results. Evaluating their classmates' works and receiving other students' thoughts about their process provided students new ideas on managing and interpreting experiments. Webquest was included as part of the learning strategy to provide access to information and real data. Students were able to find plenty of data sources by using the Internet.

An instruction based on a situated learning includes modelling, coaching, scaffolding/fading, articulation, reflection, and exploration. The teachers benefited from those methods during the instruction. For example, during the Stormy Weather activity, the teachers used modelling to show students how to design experiments and to interpret a weather map and to use the Webquest page during the activities. When students were carrying out experiments, the teachers watched students and responded to their questions. The teachers used coaching to help students conduct experiments, draw weather maps, and find important pieces of information in the Internet. Fading/scaffolding was then used to gradually decrease the amount of assistance given to students during the activities. Students also had opportunities for independent practice in the Weather Webquest lesson. Presentation and discussion sessions were used to encourage students to articulate and reflect their understanding of the connection between static electricity and lighting. Students had an opportunity to reflect on their ideas and compare them with other students' and the teachers' ideas.

The unit plan also included the recommended sequences: Increase complexity, increase diversity, and global before local skills. For example, during the Weather Map activity students learned first about the weather map symbols by using a sample weather map. Students, then, applied this knowledge to a real weather map. Lastly, they chose a state or a country and drew their imaginary weather maps consistent with the characteristics of the chosen region. Consequently, students had the opportunity to master their skills and knowledge in diverse and complex settings with the provided lesson sequence as well as to apply different solutions to problems during the activities.

The unit plan covered most of the components of the sociology of the ideal learning environments. Students learned by actively working on science during the activities rather than passively receiving knowledge. Moreover, they mastered their knowledge under different conditions like experts (e.g., a weather forecaster) do. Students worked in groups in the Stormy Weather and Weather Map activities to increase cooperative learning skills.

This study spanned a one-week period of four 40-minutes lessons. In the first three lessons, students worked on activities. On the last day, each student was asked to complete a science journal based on the questions prepared by the teachers. The first two questions on the science journal were related to a comparison of previous science classes with the situated learning environment. The last three questions for the science journal were related to what the students liked and disliked about the situated instruction and whether it was useful for them. The observations of teacher and researcher were the other data sources for this study. Verbal communication between the teacher and the researcher during and after the study served as an additional component to judge the effectiveness of the situated learning experiences.

3. Findings

This section is divided into two sections and each section is dedicated to the research question posed in the introduction. The first section is based on students' responses to the science journal questions. The second section is based on the observations made by the researcher and teacher.

3.1. Science Journal Questions

This section is divided into five subsections corresponding to the science journal questions. The researcher looked for recurring themes found in the students' responses and categorized them into themes. These themes were organized to help identify the most interesting parts.

3.1.1. Is there a difference between your last three science classes and the previous ones? What is the difference?

Students were aware that a different instruction was used. Twenty of the twenty-three students who answered this question thought that there was a difference. Three students answered that there was no difference. Two students did not respond to this question.

The twenty students who thought there was a difference responded to the second part of the question. Some of them gave more than one answer according to the researcher's classification of the responses to the question about the nature of the difference. Six of the twenty students described the differences as "we did activities" or they wrote down all the activities. Nine students' answers included "we did experiment", seven students' answers included "we worked on computers", and six students' answers included "we worked with partners". Six students described the differences as "more fun". Two students indicated that there was "something different than everyday". These results show that students noticed the different kinds of activities in which they worked actively and had fun, but it is not clear if they also noticed the instruction methods the teachers used (i.e., modelling, coaching, and scaffolding/fading). The fact that students did not do many activities in the previous science classes most likely had an important effect on these results. If they had taken more activity-based science classes until that time, perhaps students could have distinguished the instruction method difference easily.

3.1.2. Which one do you prefer? Activities like you did in the last three class sessions or activities like you usually do?

All students answered this question. Most of the students preferred the ideal learning/situated learning environment instead of teacher-centred classrooms in which the teacher lectures and students listen. Twenty-two students, stated that they prefer doing activities in their science classes as they did in the last three classes. One student preferred what they usually do, and two students answered as "it does not matter for me".

3.1.3. What did you like in the last three science classes? Why?

All students responded to the first part of the question. Some of them gave more than one answer according to researcher's classification of responses. Six students liked "doing activities", ten students liked "doing experiments", nine students liked "working on computer", seven students liked "working with a partner", and two students liked "making a weather map".

Seventeen students responded to the second part of the third science journal question. Eight students described the instruction, in which they could actively work on variety of activities, as "it was fun", six students liked the activities because they "learned and had fun together". Two students liked the activities, because they stated, "they did not make me asleep". One student liked working on computers, because s/he could work on the computer after class.

3.1.4. What did you dislike in the last three science classes? Why?

This question asked specifically what parts of the new instruction they did not like. All students responded to the fourth question and each one indicated only one reason. The most common response was "nothing", which means that they liked all parts. The next highest responses were "I want to pick my partner", "doing presentation in front of the class", and "long worksheets". Although some students did not like these parts, these were considered to be beneficial for students' social life and education (e.g., being able to work with different people, being comfortable to speak to an audience, and having more practice through long worksheets). The other responses were "using computer", "studying", "being timed", and "doing experiment". Just one student rated each of them.

3.1.5. Do you think that class activities you did in the last three classes are useful for you?

All students responded to this question. Twenty-two students thought that the activities were useful for them, while one student thought that the activities were not useful for him/her. Two students answered as "a little bit useful". Ten students also wrote their reasons for why they thought activities were useful for them. Some of the reasons that researcher found of interest were "it makes it easier to learn something", "one day we might be a weather forecaster", "you discover and the interest your mind", "we actually did it instead of just explaining it", and "we were doing something and I think we would be more eager to learn more about science." These are promising responses, because these are some of the major goals of the researcher by creating situated learning environments. Moreover, these responses show that the students were conscious about what they were doing.

3.2. Observations

This section is based on the classroom observations of teacher and the researcher during the study. There were two main points that took attention of them based upon their insightful observations: Habits and motivation of students. One important observation was that students' previous experiences seemed to be related to students' behaviors during the study. The other important observation was that the situated learning environment seemed to increase the students' motivation to learn about science.

At the beginning of the activities, students thought that sitting and listening were enough for them. They did not pay much attention to the teacher during the modelling period. For example, while the teacher was explaining the meanings of symbols used in weather maps, most of the students were looking only at the weather map instead of looking at both the weather map and the weather map symbol appendix together. They did not ask many questions during the modelling period. However, the number of questions was increased when they had to do activities by using the information that the teacher had already explained in detail in the modelling period.

Another important observation about students' behaviors was that students learned to keep their attention on what they were doing until the end of the activity announced. At the beginning, they were interested in different kinds of things other than the instruction, like making fun of their classmates or combing their hair or talking with each other when they needed to begin doing activities. They seemed to have plenty of spare time and nothing to do. However, learning about time limits triggered them. When they learned that they needed more time to complete the activities and worksheets, they became more focused. This shows that being cognizant of the daily plan was important for students and should be announced by the teacher at the beginning of the lesson.

Some of the students had problems with group work during the activities. These students either did not know how to work cooperatively in a group or wanted to work with different group members. This can also be seen in the responses to the fourth question of the science journal. Some of the students said they wanted to change their group members, and some wanted to work alone in the group or work totally alone outside a group. Some preferred to ask even simple questions to the teacher instead of their group friends. They tended to do what they were used to doing in the past. The teacher and the researcher agreed that this problem should be solved by increasing the number of group work experiences in the class.

In a personal communication with the teacher pointed out that the students' motivation was increased during the study. The teacher appreciated students' effort to plunge into activities and willingness to participate into the class discussions and activities. This observation was also consistent with Collins, Brown, and Newman (1989)'s work. They stated, "The methods of modelling-coaching-fading, insofar as they promote acquisition of integrated skills in the service of a coherent overall activity, are supportive of intrinsic motivation" (p. 489). The learning activities used in this study helped students focus on instruction. Working with real data might be another motivating factor for students in this study. Krajcik (2001) indicates that working with real data like scientists do makes science subjects more relevant to the students' life. In the current study, students tended to pay more attention and ask more questions when they worked on real data during the Weather Map and Weather Webquest activities. Cooperative work also helped them during the study. As stated before, some students wrote in their science journals that the best part of the last three instructions was "working with a partner". The researcher and the teacher observed that students started motivating each other implicitly or explicitly. For example, one student called to the group friends who were not paying enough attention to the activity by stating, "You have to work with me, put everything away." The cooperative group works and this kind of dialogue between group members encouraged participation and helped students keep their attention on the activity.

4. Conclusion

Since there is lack of empirical data related to situated learning environments that is designed around all of the principles articulated by Collins, Brown and Newman (1989) in the literature, this study contributes to understanding of situated learning environments in terms of students' perception toward them. Little research is based on characteristics of situated learning environments in science education (e.g., Hendricks, 2001). The current study is unique in terms of providing a sample unit plan for science classes based on Collins et. al.'s proposed model and examining students' perception of situated learning environments from a qualitative perspective. It was hard to apply all of the characteristics of the ideal learning/situated learning environment through a short term intervention, but the promising results show that science teachers can apply it in their classes in long-term duration. More long-term applications of the situated learning environment and lesson plans with a variety of activities are needed to gain insight into situated learning.

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