Effect of "Context Based Learning" in Students’ Achievement about Nervous System

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Received: 30.06.2009 Revised: 02.09.2010 Accepted: 31.10.2010

The original language of article is Turkish (v.8, n.2, June 2011, pp. 91-106)

Keywords: Context Based Learning; Nervous System; Instructional Materials; Achievement of Students.

SYNOPSIS

INTRODUCTION

When traditional learning is resembled climb a ladder, most of scientists have enjoyed climbing this ladder. Unfortunately, many students do not successively see the connection between stair of ladder and they jump or fall off the ladder before they reach the top. For this reason, they leave from science. When they have some problem, they cannot solve it with the ladder of traditional science education (Schwartz, 2006).

Science education has some problems: Overload, Isolated Facts, Lack of transfer, Lack of relevance, Insufficient emphasis. “Contexts” are used as the basis for curriculum design and classroom teaching for eliminate each of these problems. Meaning of “context” is “coherence”, “connection”, and “relationship” (Gilbert, 2006).

Context-based courses have two particular features for enhance the understanding of scientific ideas: The first of these is the motivational aspect that provides students can see what they are studying and in this way they learn more effectively. The second feature is ‘drip feed’ approach that provides more opportunities for students to develop their scientific understanding by revisiting of ideas at different points in a course (Bennett & Holman, 2003).

Bennett (2003) determined the research findings for students in context based lesson:

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When pupils use context based materials or follow context based courses, their interest in science lesson generally increase.

Context based materials help pupils perceive relations between the science and everyday lives for pupils.

Researches on context based learning (Murphy, 1994; Hennessy, 1993) determine that contexts relate with out-of-school activities increase students’ interests. People are more successful at problems in everyday life than problems in formal settings, and better deal with everyday problems rather than scientific one (Whitelegg & Parry, 1999). People control problem solving processes in their everyday experience. In contrast, students have not control problem solving processes in context of school and experiments (Lave, 1988). Students are empowered by choosing an accessible context or building on a context suggested by students themselves. Furthermore, student’s social needs may be met and promoted students’ self-esteem and prestige with contexts (Whitelegg & Parry, 1999).

In context-based learning approach, Bennett et al (2005) use a few newspaper headlines or a brief article from the media to capture as context. For example; chemical equilibrium concept is introduced in the context based course with the ‘Steel Story’, where redox reactions are introduced. Students learn biology through real-life contexts. Television news, newspaper reports and dramas on TV and film, all provide examples for biology in context based learning approach. These examples include the health risks of smoking, genetic counselling, global warming, GM crops, DNA fingerprinting, the spread of pathogens, the destruction of natural habitats, drug abuse in sport, and recreational drug use (SNAB, 2007).

Students are asked to respond related activity in context based learning chapters. There are three types of pedagogical activities in context based learning approach. “Your Turn” activities are straightforward drills and exercises. “Consider This” activities relate to applications of science and the social issues. “The Sceptical Chemist” activities relate to students’ critical thinking to check the accuracy and plausibility of assertions (Schwartz, 2006).

Activities that used in context-based lesson are as follows (Waddington, 2005):

<table>
<thead>
<tr>
<th>Activity</th>
<th>Examples of activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher-centred activity</td>
<td>Introduction to lesson, teacher-led discussion, demonstrations</td>
</tr>
<tr>
<td>Information gathering</td>
<td>Reading, text comprehension, case studies, library research, watching TV or video</td>
</tr>
<tr>
<td>Making sense of information</td>
<td>Interpreting data, translating data into different forms, solving numerical problems, directed activities related to text</td>
</tr>
<tr>
<td>Information technology</td>
<td>Using indexes or keys, data capture using sensors linked to computers, other computer use</td>
</tr>
<tr>
<td>Practical activity</td>
<td>Designing experiments, undertaking investigations, undertaking practical work to develop skills or illustrate principles, making or using models, field work, surveys</td>
</tr>
<tr>
<td>Information sharing</td>
<td>Raising questions, decision-making, hypothesizing, self-assessment</td>
</tr>
<tr>
<td>Communication</td>
<td>Writing reports, creative writing, oral reporting</td>
</tr>
<tr>
<td>Ways of exploring complex issues</td>
<td>Simulation, role play</td>
</tr>
</tbody>
</table>

Context based learning approach have a specific assessment still. According to assessment still, firstly contexts are presented as start point and students are evaluated with questions related these contexts for test contexts’ understandable. Secondly, students are evaluated with “open book” questions for test scientific knowledge. Thirdly, students’ practice skills are evaluated (Sözbilir et al., 2007).
Students’ misconception is one of the most important problems in biology instruction (Çepni et al., 2006; Köse, 2007; Öztaş & Özay, 2004; Dikmenli & Çardak 2004). In Saka et al. (2002)’ study; it is defined that students have misconceptions on nervous system since elementary level. For this reason, related researches suggest that nervous system must be instructed by using different teaching methods (Arslan et al., 2006; Şahin et al., 2001; Zöhre, 1999).

**PURPOSE OF THE STUDY**

The aim of the study was:

a- to develop instructional materials for the elementary education student teachers enrolled in the course of general biology about the topic of “nervous system” based on the context based approach,

b- to apply context based approach

c- to evaluate their effectiveness in terms of students’ achievement.

**METHODOLOGY**

**a- Research Design**

In the research, mixed research design was used for test effectives of context based learning in students’ achievement related nervous system. Mixed research design consist of single group pre test-post test as quantitative and open-closed ended questions as quality.

**b- Sample**

This study was applied to 37 student teachers enrolled in the course of general biology in department of elementary learning education in Education Faculty of Bayburt University -Turkey at the first semester of 2007-2008 education years.

**c- Data Collection Tools**

The achievement test about nervous system developed by the researchers was applied as pre-test before from material and as post tests after from material. This test has multiple choice 17 questions. Materials about the topic of “nervous system” based on the context based approach carried out first year student teachers enrolled in the primary teacher education program. A qualitative questionnaire was conducted in order to understand students’ perceptions about the context based learning. Qualitative questionnaire has 2 open ended and 8 closed ended questions.

**d- Data analysis**

A paired t test was used to determine if there were significant differences among the mean scores on the pre test and post test scores of the achievement test of nervous system. Closed ended questions were showed as yes, no, undecided and other answer. Open ended questions were categorized and these categories were converted into scores in results section.

**c- Development of Lesson Plan**

These stages were followed in the plans of efficiency developed by researchers; —General biology located in first semester of elementary teacher training program is a two hourly theoretical lesson. Topic of Nervous system is inside of “organ system and human body” chapter.
— For developing of lesson content, firstly topics and goal concepts were determined. For contexts in lesson plan, connections were established between students’ daily life and biological topics and lesson plan was prepared according to principle of context based learning. Activities which located in contents were designed in order to make students more active. Besides, students were provided with entertaining and interesting texts to see biology in their everyday life.

— While material about nervous system was developed, more than one context were tried to use. Newspapers, news and web sites were used for context material. For lesson’ starting were used texts like “motion sickness”, “brain train computer”, “sensorial organs” from newspapers, news or web sites. Firstly, questions related these contexts were prepared for test contexts’ understandable. Then, other questions are generated in order to make a link between texts and subjects. Sometimes students were asked to prepare for the answers of these questions as a group or as individual.

Students were supported with contexts in order to make research. Different studies were applied by communicating like teacher-student, teacher-group, group-group, or student-student while questions were being answered. It was also tried to make questions from cases which students encountered in everyday life. Materials about subjects like video and model were applied. Feedbacks were acquired from texts and activities in the end of lesson. Inadequacies of students about subjects were supplied by the teacher.

— Developed materials as a draft were examined by instructors who have studied on the subjects. Developed materials were revised with regard to instructors’ opinions. Prepared materials applied at 3 lesson hours (150 minutes).

FINDINGS

It was found that the context based materials increased the level of academic achievements of the students. Pretest and posttest scores are different significantly (p<.05) (Table 3). Daily life context in materials about the topic of “nervous system” based on the context based approach have positively effect on students’ achievement. For this reason, these contexts remind easily concepts.

Table 3 . Results of pre and post test

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>37</td>
<td>4.49</td>
<td>2.02</td>
<td>4.285</td>
<td>.000*</td>
</tr>
<tr>
<td>Post test</td>
<td>37</td>
<td>6.70</td>
<td>2.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

Results obtained from open-closed ended questions supported quantitative data. This study’ qualitative test determine that context-based approach help students easily understanding, learning and retention:

“I think that this method significantly affected retention of what I learned. Reviewing the issues and concepts in the course, I could bear in my mind them easily and imagine powerfully”.

“I think that it enabled us to easily learn the biology”.

“Active learning activities in the course increased my learning and comprehension on biology issues and concepts”.

“The narratives that are read at the beginning of the lesson had a positive effect on my learning”.

2 open ended questions, categories and students numbers are in below:

1) How did the new method implemented in biology course affect your learning? Explain your response.
discovering retention of learning- 6 students
• making learning and understanding easy -11 students
• providing need of scientific research- 3 students
• making the biology fun - 3 students
• active participation to lesson - 2 students

2) Did the course make contribution you? How?
• No contribution- 2 students
• it only helped me to pass the biology examination- 6 students
• it contributed to obtain information- 11 students
• it helped me to know my body- 2 students

DISCUSSION and CONCLUSION

Recently, Turkey has attempted to develop an effective education model. This attempting improve multidimensional rationale instead of monotone rationale (Çınar et al., 2006).

The purpose of this study was to investigate the effects of context-based approaches in students’ achievement on nervous system. At the 0.05 level, significant changes occurred in students’ achievement. This result shows that students’ knowledge about nervous system increased by context-based approach in post test. This increase may be the result of contexts used by students. Because contexts are stories connected with daily life, contexts facilitate biology’ learning for students. Stories impress students and stories’ remembrance is easier. Students remember story, think concepts in story and connect others concepts. Furthermore, team work, discussion and researches provide to structure knowledge correctly. The contexts chosen for the course are actual, interest to students and enduring. There are a wide variety of learning activities including practical works. Some activities involve model-building. Other activities include discussions, research and role plays.


As a result of these findings, it may be advised to use of context materials in biology lesson. Because increasing understanding for learning biology is the reason for using this approach, appropriate contexts for students should be selected. Biology should be presented to the student not only as a body of knowledge, but also its influence on the students’ personal life and the society in which he/she lives.

Teacher preparing programs must have lesson contents which help teacher candidates to associate their knowledge with everyday life, to use subjects with everyday life examples. Teacher preparing programs should include context based learning in whose lessons teach new theory, method and techniques. It should be ensured that teacher candidates know approaches and how to apply these approaches. In order to use context based approach in schools, teachers should prepare lots of text books, source books and education materials which can assist with performing activities based on context based. Schools also should be supported with kind of experiment materials and lesson equipment. Leading activities on context based approach should be prepared and presented to the teachers.
REFERENCES


