Principles of Development of a Chemistry Unit to Visually Impaired Students

Mustafa SÖZBİLİR
Aydın KIZILASLAN
Seraceddin Levent ZORLUOĞLU

This work was funded by the Scientific and Technological Research Council of Turkey by the Grant # 114K725. The authors would like to thank the teachers and students who voluntarily participated in this study.

Science education has been identified by some special educators as a one of the most useful and most valuable content area for many students with special needs. It is obvious that visually impaired students perform as effectively as other students in science if their needs due to lack of vision are taken into consideration.

Visually impaired students can’t use sight or use very little. They also have problems in the learning process with the inability to see. For this reason, different learning styles are needed in the learning of visually impaired students.

How to learn?

Seeing: Usually low vision students use their sense of sight.

Hearing: Blind and low vision students learn this way.

Touching: Blind and low vision students learn this way. But Blind students often use touch.

Smelling: Visually impaired students recognize their surroundings with smell.

Visually impaired students learn by touching objects, listening to the sounds of objects, smelling and looking at their tastes. Therefore, in the education of the visually impaired, Relief-tactile alphabets (Braille Alphabet) or auditory materials (such as audio books) are needed.

What's the challenges of visual impairment in the classroom?

• Slow reading skills
• Difficulty to meet the learning demands of education classroom
• Fewer opportunities to acquire visual information
• Learning difficulties
• Lack of teaching supporting material
• Delays which impact on the student’s academic development in concept learning
Purpose of The Study

In this study, we developed an instructional design to teach the concepts regarding matter and heat in light of the students’ individual needs and investigated the efficacy of instructional design model developed following the implementation.

Research Design

The study was conducted as a Design Based Research (DBR) method. DBR is used as a response to the gap between basic and applied research practices.

Participants

<table>
<thead>
<tr>
<th>Student No</th>
<th>Vision Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Low Vision</td>
</tr>
<tr>
<td>02</td>
<td>Blind</td>
</tr>
<tr>
<td>03</td>
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<tr>
<td>07</td>
<td>Low Vision</td>
</tr>
<tr>
<td>08</td>
<td>Low Vision</td>
</tr>
</tbody>
</table>

This is a case study representing a 8th grade classroom taking science in special school for blind based in Erzurum/Turkey. Participant of this activity was eight students including three blind students.

Data Collection Tools

Observation Form
Achievement Test
Student Interview Form
Developing Materials

Example of Instructional Process

Findings

Teacher: What was the initial temperature of sources?
Teacher: Ok. Ok. Temperature of their glass jar was 78 °C.
Teacher: Ok. What is the last temperature?
Teacher: Ok, 67. It is 64 °C.
Teacher: Ok. Ok. Temperature is 56 °C in small glass jar. Temperature is 59 °C in small glass jar placed inside another bigger jar.
Teacher: Ok. Temperature dropped to 59 °C from 78 °C.
Can you compare temperature change of the small jar with temperature change of small glass jar placed inside another bigger jar?
Teacher: Ok. The small glass jar shows inside another bigger jar is less. Because there is gap between them.
Teacher: Ok. The small jar contain air. There are gap in the other jar. The gap blocked cooling of smaller.
Teacher: Ok tell me: What were the initial temperature of sources?
Teacher: Ok and Ok tell us. What were the initial temperature of sources?
Teacher: Ok it was 78 °C.
Teacher: Ok single jar was 79 °C. Other jar was 78 °C.
Teacher: Ok. What is the last temperature? 67 °C.
Teacher: Ok tell me: What is the last temperature? 64 °C.
Teacher: Ok. Can you tell me which jar is cold?
Teacher: Ok small jar is cold.
Teacher: Ok. bag jar and gap are provided thermal insulation. Teacher: Ok tell us: What is result to be drawn from activity?
Teacher: Ok temperature decrease was less in the glass jar that was supplied thermal insulation. Thermal insulation reduced the amount of heat transferred through the environment. The air between the jar become as insulated.
Results and Discussion

- The result of learnings happening in the environments where the students are made to participate actively in the lessons being more effective.
- With this study, the result of lack of vision senses of low vision and blind students not causing any obstacle to instruction of these students, necessary knowledge may be brought to students by using appropriate methods and techniques and adaptations suitable to vision disability levels was reached.

- Visually impaired students differ according to type and level of vision disability. In general and special education environments of visually impaired students, the diversity of the students should absolutely be considered. In learning environments where general education needs as well as special needs are considered, students may actualize a more effective and efficient learning.
- The tools and materials to be used should be available in easily accessible places, if necessary, each tool should be labeled with big sized typefaces for those with low vision, and Braille for those who are blind. Students should be informed for an activity to be performed, audio descriptions should be available on the condition of focusing on blind students.

- This study aimed to develop an activity, as part of a large project, which is accessible to visually impaired students in teaching unit of matter and heat which is found difficult to comprehend even by the sighted students. For this purpose we have designed an activity based on using tactile and audial material (talking thermometer) for making science more accessible to 6th grade students in a special school for visually impaired.
- The activity is basically consists of simple, economical and easily accessible everyday materials.
- Then students were questioned through inquiry based questions during the following 5-10 minutes. In the follow up interviews two hours after the activity took place nearly all of the students were able to answer questions about thermal insulation concept.
Thanks for listening...

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