



An Instructional Material for Teaching 'Life Cycle of a Frog' to Visually Impaired Students

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ACKNOWLEDGMENTS

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

Introduction

- Science has been considered as one of the most valuable subjects taught to students with disabilities (Norman, Caseau, & Stefanich, 1998).
- Science education typically provides students with a variety of opportunities to strengthen logical thinking and life skills (Wang, & Schmidt, 2001).
- However, majority of the resources and instructional methods used in science teaching are based on the vision and therefore, they are partly or not accessible at all by visually impaired students (Sözbilir, 2016) and this makes science difficult for visually impaired students.



Introduction, cont.

- In science, particularly biology topics are found difficult to learn and teach for all students due to its abstract nature. Therefore, there are abundance of studies regarding the learning difficulties and misconceptions in biology (i.e. Özay & Öztaş, 2003).
- Developing concrete instructional materials is one way of overcoming misconceptions regarding these difficult ideas.



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Introduction, cont.

- There is a need for adaptation of educational and instructional materials to visually impaired students due to the fact that they do not receive the educational benefit of the “hands on” science courses, nor are they on equal footing with their sighted peers without special adaptive tools and techniques (Supalo et al., 2007).
- Therefore, it is particularly important to produce materials used by visually impaired students (Bülbül, Garip, Cansu, & Demirtaş, 2012).
- This study **aimed** to design an instructional material for visually impaired students to teach topic of «life cycle of a frog» which is covered in grade 6 science curriculum in Turkey under the unit of «Reproduction and Growth in Plants and Animals».



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Design/Procedure

- At the beginning of the project, **unstructured observations of science classrooms** and **semi-structured interviews with science teacher** were conducted to determine visually impaired (VI) students' needs in science learning. The needs identified broadly fall into the following topics:
 - The teacher does not have enough knowledge on how to teach VI students.
 - No «**hands on**» practices are done. Majority of the activities are «**minds on**»
 - Lack of **tactile materials** for blind students
 - **No adaptations** were made for low vision students
 - In many cases available **materials are complex** to be understood by VI students
 - Not enough **Braille materials** available for each student
 - Colour **contrast was not considered** an issue in some materials that used
 - Teaching is dominated by «**knowledge transfer**» rather than «**knowledge construction**» and skills development.
 - No materials available **out of school hours**.

Design/Procedure, cont.

- At the design stage we wanted to focus on:
 - Developing tactile materials which would be accessible by VI students,
 - Materials that aligned with the curriculum,
 - Colours used in the materials need to be contrast,
 - All materials should be supported with accessible text handouts (Braille and enlarged prints)
 - Materials that hands on as well as helping knowledge development rather than knowledge transfer.

Design/Procedure, cont.

- At the development stage we wanted to focus on:
 - All materials should be aligned with the content covered in the curriculum
 - Provide opportunities for students to practice and develop skills
 - All materials should be durable and long lasting
 - Economically cheap
 - Improvement based on evidence
 - Accessible by all students not just VI students
- Following the implementation and evaluation of the materials are carried out and necessary improvements are done.



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- Rotter (2006) design principles also considered:

- (1) Contrast,
- (2) Orientation,
- (3) Lettering,
- (4) Artwork.

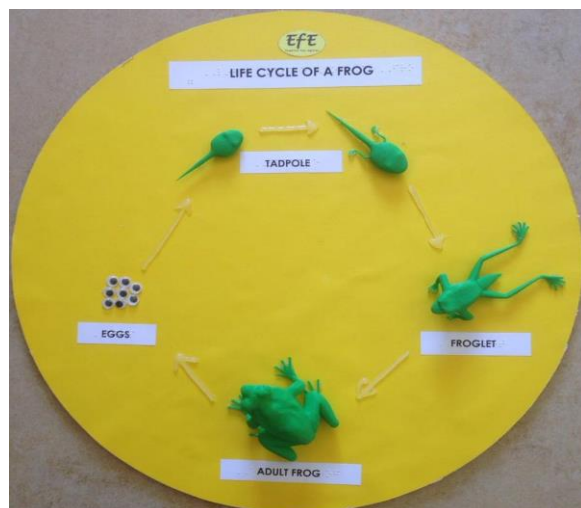


Figure 1. A material designed for teaching the topic of "Life Cycle of a Frog"



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- In addition to the material of «life cycle of a frog», the worksheet was developed as both normal print and braille.

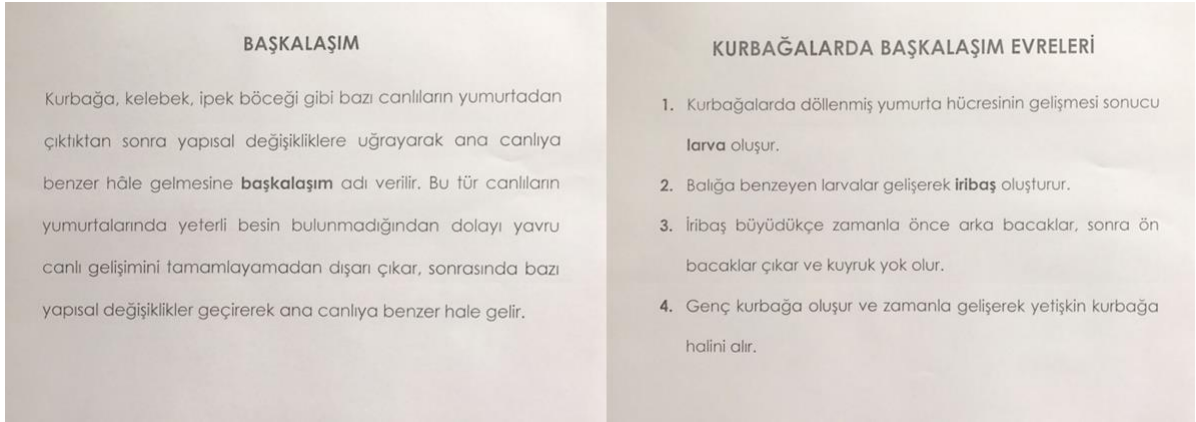


Figure 2. A worksheet designed for teaching the topic of "Life Cycle of a Frog"

- In worksheet, the letters and figures were printed with large print for those who has low vision, and with Braille for blind students .

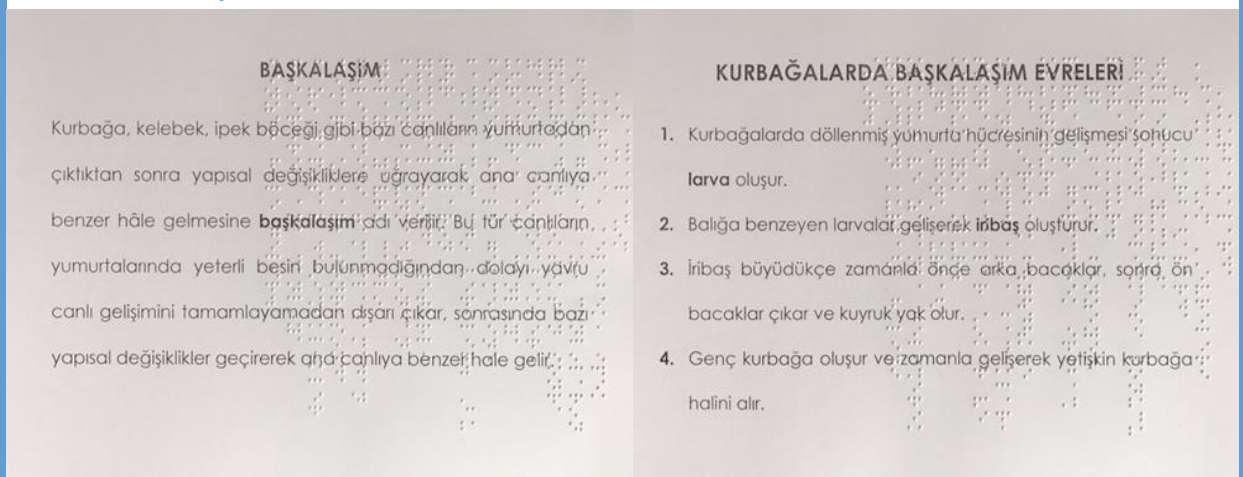


Figure 3. Braille worksheet designed for teaching the topic of "Life Cycle of a Frog"

Sample

- The sample used in the needs analysis stage was consisted of six 6th grade students attended from a special school for Visually Impaired Middle School in center of Erzurum/Turkey.
- The sample used for testing the effectiveness of materials consists of nine grade 6 students attending the same school.



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Sample

	Students	Gender	Visual Acuity
Needs Analysis phase Sample Group (2014-15)	S NA1	Male	Low vision
	S NA2	Male	Low vision
	S NA3	Female	Low vision (advanced)
	S NA4	Female	Low vision
	S NA5	Male	Low vision
	S NA6	Female	Low vision
Implementation Phase Sample Group (2015-16)	S 1	Female	Blind
	S 2	Female	Low vision (advanced)
	S 3	Female	Low vision
	S 4	Male	Low vision
	S 5	Male	Low vision
	S 6	Male	Low vision
	S 7	Male	Blind
	S 8	Male	Blind
	S 9	Male	Low vision



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Implementation Stage

- Following development of the materials, pretest (PrT) and posttest (PoT) applications was performed with 9 visually impaired students.
- For this aim, previously an achievement test with 20 questions was developed. In fact, this test was developed towards overall of the units «Reproduction and Growth in Plants and Animals».
- However, this study was only included the findings of subject “**Life Cycle of a Frog**” which also sub-topic of this unit. Therefore, only the findings of two questions (Q11 and Q12) related to subject “Life Cycle of a. Frog” are presented here

- Addition to PrT and PoT, semi-structured interviews were held with 9 students.
- As related to the subject “Life Cycle of a Frog”, the following question was asked to the students:
 - What does metamorphosis mean?
 - Which animals do undergo metamorphosis?
- The findings from both PrT / PoT and semi-structured interviews were analyzed with a descriptive manner as frequency and percentage.

- The findings in Table 2 indicated that the students responded correctly to all questions related to the subject "Life Cycle of a Frog" during interviews.

Table 2. Achievement status in terms of interviews

Q	S1	S2	S3	S4	S5	S6	S7	S8	S9	% Success
7	✓	✓	✓	✓	✓	✓	✓	✓	✓	100

- As a result, the findings from Table 1 and Table 2 implies that the these materials developed for the visually impaired students have been remarkably effective on their achievement

- However, these materials can be developed according to VI students' needs.
- Therefore, adaptation and usage of educative materials for visually impaired students in science courses requires a close collaboration of working together expert in the field both science educators and special education specialists.
- This study may set a good example for collaboration of experts from science and special education

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