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To prevent misconceptions in biology, developing visual and audio course materials related to some important concepts. Van/Turkey

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Abstract

Documents that cause misconceptions and related to important biological concepts were collected from relevant websites, virtual libraries, current lecture notes, articles, films shot in the laboratory, and films on YouTube and TV documentary channels. Thus, audiovisual and literary research material was prepared.

In order to measure the effect of the material developed in the research on education, we conducted a preliminary study and positive results were obtained.

All collected data were evaluated according to scientific methods and criteria.

In the research, 328 visual, audio, literary and relational concepts from 100 scientific documentary films about biology were selected and prepared by 3 biology faculty members who are experts on the subject.

The data is published on the Nadidem website in alphabetical order at http://nadidem.net/kf/oz/oz.html.

In the purpose and importance of the research section, the place of the study in science and the gaps it fills are explained.

The virtual tools used in the research, the techniques, methods and all stages of the processes are explained in the material and method section.

The achievements of the research, its contribution to education and the results are presented in the results and recommendations section.

Keywords: Visual Materials; Biological Concepts; Popular Biological Concepts; Audiovisual and literary Course Materials; Biological Course Materials; Misconception in biology

1. Introduction

"Concepts are like the building blocks of scientific knowledge (Demirkuş, 2017a)". Concepts can be concrete, abstract or virtual. In concept education, the use of visual, auditory and written definitions is extremely important (Gülen and Demirkuş, 2014a; 2014b).

It is especially important that some courses are taught concept-based first.

The concepts selected in the study are important basic concepts related to biology that we use in our daily lives. Especially those with misconceptions among the basic concepts in biological science were selected. For example, cell,

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cell science, Cell theory, cell development… Etc. Original definitions of the concepts have not been made together. In teaching concepts, the materials, methods and student characteristics used in the education the individual will receive in this field are important (Aydemir and Özyurt, 2016).

It is important to prepare the concepts visually, audibly and in writing (Şahin, 2016).

Nowadays, videos published on television, internet or mobile devices that combine sound, movement and image have become a popular area of interest shot and shared for very different purposes. Education is one of the environments where video applications, which are seen in all areas of life, from advertising, film, music, promotion and entertainment, are effectively used (Ata and Atik, 2016; Babacan, 2015).

In education and training: the presentation of visual, audio and written materials, one after the other, is of great importance.

It has been determined that children accelerate in speaking and learning concepts due to their imitations in television programs from their early ages (Çakır, 2014). Due to this effect, it is necessary to prepare visual and audio materials, which are an important factor in the concept education of the individual, by taking advantage of the opportunities of developing and advancing technology in today's education system (Gülen and Demirkuş, 2014a; 2014b; Ata and Atik,2016; Öztaş, 2008).

Materials in teaching: are tools used to concretize abstract concepts and model difficult-to-reach concepts (Gürbüz, 2006; Akalan, 2012). Some criteria are taken into consideration in the selection of these materials.

The first step in material selection is to determine the required student performance, target audience and their characteristics and learning types for the subject to be taught.

First of all, the size and learning types of the target audience to which the material will be presented or used must be determined, and then the method must be selected. In addition to these features, opportunities such as money, time and student characteristics should also be taken into account when choosing a method. After selecting the appropriate method, teacher skills and opportunities should be included in this process and the final stage, material selection, should be started (Bayram, 2006; Yelken, 2009).

1.1. Importance and purpose of the research

Concepts are like the cells of the scientific tissue, and concept clusters are like the scientific tissue: It becomes harmful if not learned correctly". (Demirkuş, 2017b).

Human beings have gotten to know and explore their environment thanks to their curiosity about nature.

When we look around us, we encounter many different living species. We examine the behavior of these creatures, their positions within their social environment, and their interactions with nature. We encounter so many biological actions that it is almost impossible to classify them, examine and evaluate all behaviors. Because there are so many living things and their behaviors in nature that mastering or dealing with all of them requires a difficult process.

The main purpose of this study is; in biology education; It is aimed to ensure that the concepts and natural concept clusters related to creatures, events, behaviors and living spaces are correctly established in the mind and learned.

In order for the prepared material to be useful to those who will use the material in terms of visual (film), audio (sound of the film), definition (definition of the film) and temporal (duration of the film), a sample application of the material was carried out in a school affiliated with the Ministry of National Education and positive results were obtained (Gülen and Demirkuş, 2014a; MEB-2013-2017).

It aims to enable students to learn how to examine living things in their habitats within the natural and artificial life process, correctly handle their actions or social relations in this environment, collect accurate data and make it ready for application (Çokluk et al. , 2011; Dalmışlı, 2013; Halls, 2012).

What is meant by natural environment is the study of a living thing with its natural structure, living space and social environment.

Before starting this study, it was aimed to discuss behaviors in a natural process and to categorize many important biological events, creatures, behaviors and habitats as films. However, since these behaviors do not have a taxonomy, only some of them are occasionally discussed within concept clusters. Not all of these concept clusters are examined in the form of scientific films about biological phenomena, behaviors, and concepts that define habitats (Özoğlu and Mısıroğlu 2015; Seels and Glasgow,1990) .

"Even if we classify the creatures in nature very well for educational purposes, if the relationships and definitions of the concepts related to creatures, events, behaviors and processes in our minds do not work correctly, it means that the desired educational goal has not been achieved."

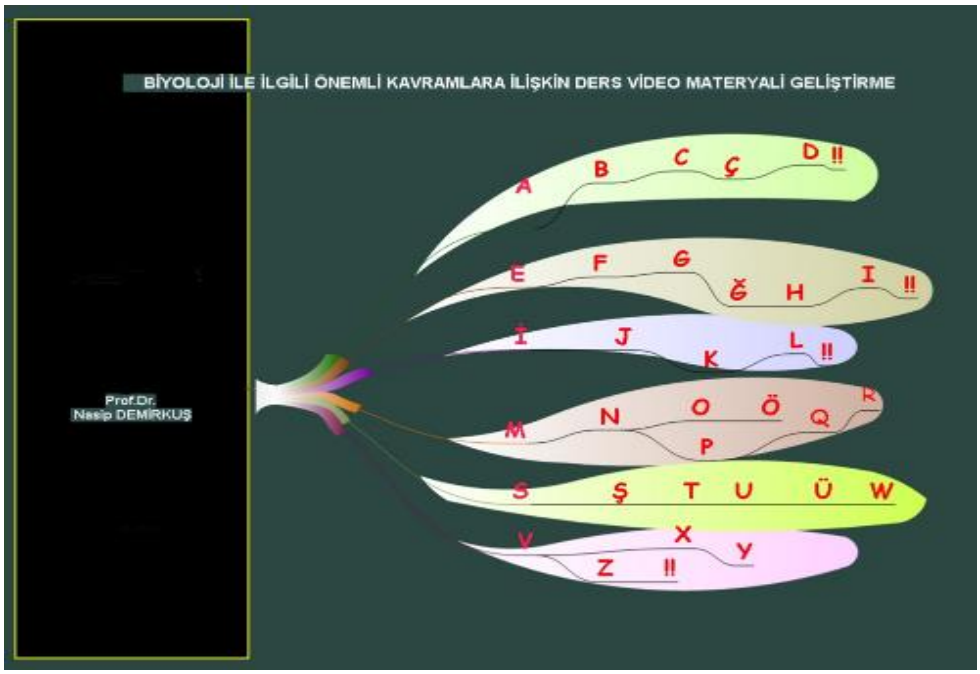
It is of great importance that the DVD prepared in the study contains internet links to the information that will be constantly updated. In other words, new updated information can be accessed through the added links. "

2. Materials

Content of the prepared material: Movies we shot in the biology laboratory, Youtube, National Geographic Channel, National Willd Channel, History Channel, Realty TV, BBC Premium... Etc. A total of 1100 scientific and documentary films have been recorded through its channels https://nadidem.net/f/kurbaga/kurbaga.mp4 https://www.nadidem.net/videot.htm . In addition, 160 scientific articles related to the concepts in the study were examined and designed. https://www.nadidem.net/makale.html

100 out of 1100 documentary films were selected for this study by 3 professors who are experts on the subject in biology. As a result of this analysis, name and definitions of 328 concepts belonging to short films with .mp4 extension were prepared.

Each of the 100 selected documentary films was watched at least twice. Then, the name of each concept, its place in the movie and its duration were written. 328 concepts were arranged in alphabetical order and put on the internet (Figure1). Each page includes a link to the name of the concept (Figure 2).

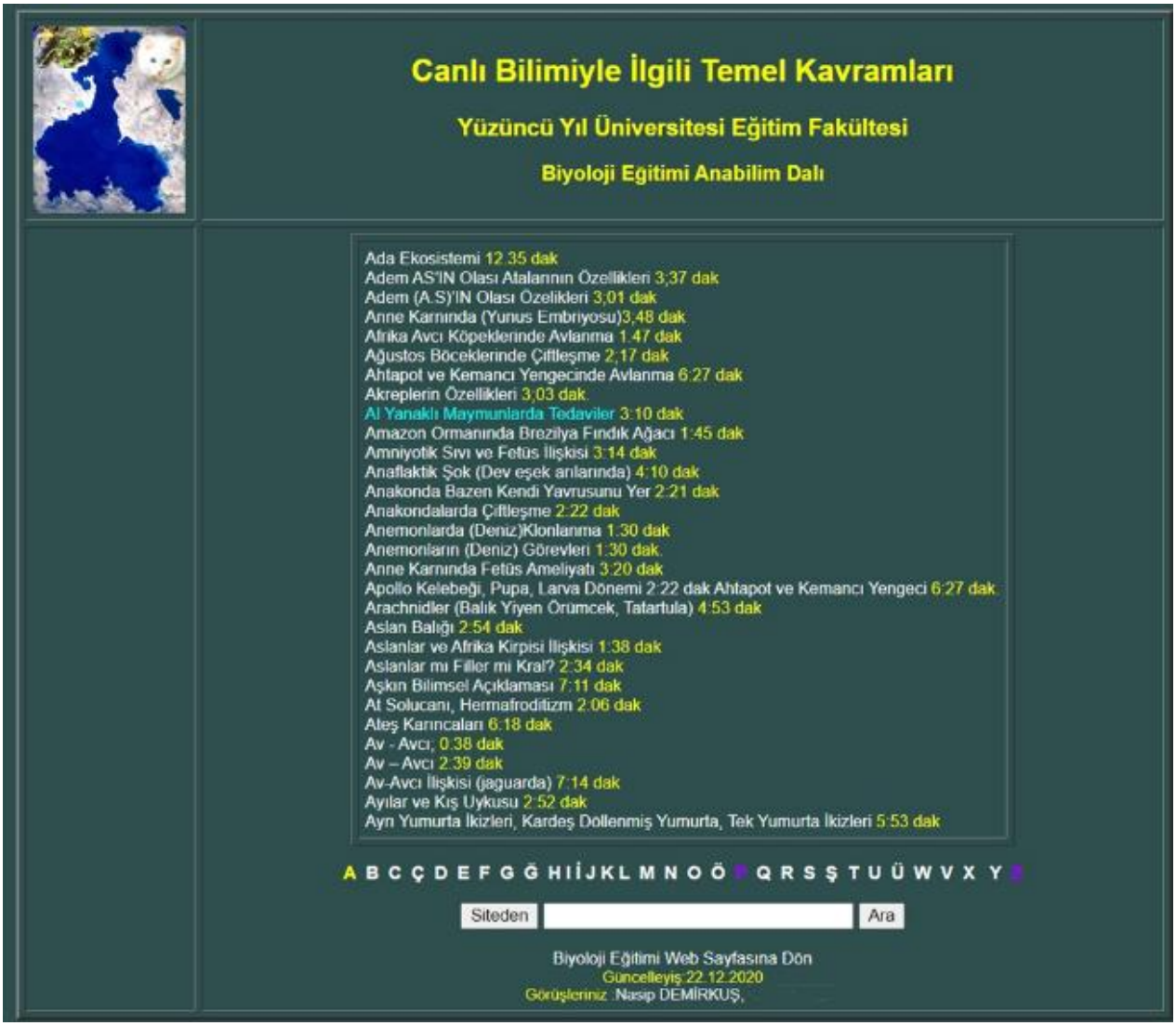


https://nadidem.net/kf/oz/oz.html

Figure 1 Alphabetical sorting containing links to short films of all concepts.

The duration of the concept film is written opposite the concept name. When you click on the concept name, you can access the short movie of the definition (Figures 2, 3).

Content of the prepared material: 160 scientific articles and 70 websites providing scientific data services related to the research were used. https://www.nadidem.net/makale.html .



https://nadidem.net//kf/indexa.htm

Figure 2 Figure containing short film names and durations of all concepts related to the letter A

https://nadidem.net//kf/alyanaklimt/alyanaklimt.mp4

Figure 3 Short film about rhesus monkeys and its duration

3. Methods

100 documentary films were selected by three biology education experts among a total of 1100 scientific and documentary films from television documentary channels, movies recorded on YouTube and specially shot in our biology laboratories. In each movie, parts of the preferred concepts were determined. Film cutting, audio, video and time editing were done with the help of Ulead Media Studio 7 Video Editor program. https://nadidem.net/f/kurbaga/kurbaga.mp4 , http://nadidem.net/videot.htm#videot

https://nadidem.net/f/annekarikizucuz.html; http://nadidem.net/videot.htm#videot

Figure 4 Questions and summary page for the feature film "The journey of twins, triplets and quadruplets in the womb", one of the 100 films examined

Short films of the concepts in .mpeg format were converted to .mp4 format with the Aimersoft Video Conventer Ultimate program.

Conceptual questions and summaries of the 100 selected films were prepared in .html format and published on the internet. The text "Movie Summary" was placed in front of the movie title (Figure 4).

160 articles related to biology downloaded from the internet were disciplined in accordance with the topics in the research title and published on the Nadidem website as research indexed. https://www.nadidem.net/makale.html .

An internet-integrated DVD containing links, descriptions and videos of 328 concepts has been prepared http://nadidem.net/kf/oz/oz.html .

4. Results

Misconceptions of concept lead to misconceptions of thought, misconceptions of thought lead to misconceptions of action and application. Therefore, it is very important to prevent misconceptions in lessons.

In education and training, it is of great importance to use the techniques in this study to prevent misconceptions in abstract, difficult to reach and understand concepts.

Especially in education and daily life, individuals have difficulty understanding some concepts.

It is thought that the technique and method followed in this study will contribute to the education of abstract, difficult to reach and understand concepts. In this way, misconceptions will be prevented.

5. Conclusion

No similar studies have been found in the literature. In order to avoid misconceptions, it is of great importance to apply the methods and techniques in this study to other scientific fields. It is thought that it would be more efficient to develop materials with the help of material development seminars and courses, using virtual and objective tools similar to this study, in cooperation with the units of the Ministry of National Education.

Compliance with ethical standards

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