

THE DEVELOPMENT OF A VIRTUAL LEARNING ENVIRONMENT IN GENETIC SYNDROMES

A elaboração de um ambiente virtual de aprendizagem em síndromes genéticas

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ABSTRACT

Purpose: to develop a virtual learning environment (VLE) for elementary school students about genetic syndromes. **Method:** VLE, known as Cybertutor enables student learning through the Internet interactively. The methodology of this study consisted of two stages, the development and availability of the VLE. The development of educational content, graphic and audiovisual Cybertutor's counted on the help of a geneticist at the HRAC/USP and scientific information available in books, articles, thesis and national and international dissertations. The Cybertutor was available on the platform of the Young Doctor Project (<http://www.jovemdoutor.org.br/jdr/>) by the technical staff of DTM/FMUSP. **Results:** elaborated Cybertutor enabled the structure of educational content, graphics and audiovisual topics, to insert reinforcing issues, mailing list and check the performance of students. **Conclusion:** the VLE developed can be an important tool for health education in Genetic Syndromes, covering various regions of the country.

KEYWORDS: Genetics; Health Education; Education, Distance

INTRODUCTION

Telehealth is the offer of health services in situations with physical and/or temporal distance, by means of using technologies of information and communication (TICs). The practice of Telehealth

in Speech-Language Pathology and Hearing was regulated by the Federal Counsel of Speech-Language Pathology and Hearing, according to the resolution n° 366/2009, defining as "profession exercise by means of the technologies of information and communication using interactive methodologies and virtual environments of learning which may assist, promote education and realize researches in health"¹.

One of the aspects of large expansion of Telehealth in Speech-Language Pathology and Hearing sciences are the development and consolidation of projects that approaches Teleducation. The terms "Distance Education" and "Teleducation" are frequently used as synonyms. However, Teleducation must be seen as an optimization of process, in an environment that combines technologies to improve the educational efficacy, of both the traditional methods and the distance courses².

Several studies of health education associated to TICs are being developed in Speech-Language Pathology and Hearing area, embracing education activities to the professional³⁻⁵, to the patient⁶⁻⁷ and to population in general⁸⁻¹⁰. Specifically related to

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genetics syndromes, still are deficient in national literature and international studies that regards this theme.

It is up to the Speech-Language Pathologist and Audiologist, as member of the multidisciplinary team, and to the professional of public health, develop programs and educational practices that involve the promoting, prevention and rehabilitation of health¹¹. Concerning the genetic syndromes these practices also applied, since the *DataSUS* data show that in the period of 2005 to 2008, there were a total of 11,806.180 live-born and 75,814 of these patients had a genetic abnormality¹².

Based on the above, the objective of this study was to develop a virtual learning environment (VLE) approaching the genetic syndromes theme for elementary students.

■ METHOD

This project consists of a dissertation, resulting in the development of a VLE known as Cybertutor.

The Cybertutor on web, or electronic tutor, enables student learning by internet interactively, allowing verification of the performance by both the student and the tutors (leaders). Also presents interactivity resources, as the forum and the discussion list which ensure a better proximity between tutor and students.

The methodology of this study was composed by two stages: the developing and availability of VLE, gathering a set of procedures; and information creation.

It is stressed that this study was developed through a partnership between the Department of Speech-Language and Hearing, Bauru School of Dentistry – University of São Paulo (FOB /USP) and the Discipline of Telemedicine, School of Medicine, University of São Paulo (DTM-FMUSP).

The approval is filed in the Ethics Committee in Research at FOB / USP under protocol nº 039/2009.

1st Stage – Development of VLE

The development of a VLE named “Genetic Syndromes” leads us to infinite possibilities in science Genetics, especially in syndromology. To

definition of the approached topics, was made a survey supported by a geneticist of the Hospital for Rehabilitation of Craniofacial Anomalies, University of São Paulo (HRAC/USP). Therefore, was opted to choose few genetic syndromes with different etiologic classifications (chromosomal disorders, gene mutations, multifactorial and craniosynostosis).

The primary sources of information was constituted on books, articles of national and international periodic and information available on web, since originated of sites of educational institutions and dissertations and theses available online.

From the detailed analysis of selected information, a script was developed in Microsoft® Office Word 2007 with the educational content of the Cybertutor.

Also were selected the contents of graphic (illustrative images) and audiovisual related to theme. It is important to emphasize that the language used in content, was appropriated to comprehension of elementary students.

As shown in Figure 1, the Cybertutor named “Genetic Syndromes” was didactically divided in topics.

2nd Stage – Availability of VLE

The technic team of the DTM/FMUSP, constituted by designers, web designers, journalists and communicators, was responsible for the insertion on web of the educational, graphic and audiovisual content.

The Cybertutor was available on platform of the Young Doctor Project (Figure 2), been accessed by the following address: <http://www.jovemdoutor.org.br/jdr/>.

■ RESULTS

To accomplish the access to educational content of Cybertutor, first it was need the student fulfilled an individual login in the platform of Young Doctor Project. The tutor should authorized the login and allow the access. Thus, the educational content would be available through identification (e-mail address) and password (Figure 3).

<p>GENETIC</p>	<p>What is genetics? What is medical genetics? What is gene? What does gene do? Curiosities: advances in genetic and genome project. Mutation</p>
<p>GENETIC DISORDERS/AFFECTIONS</p>	<p>monogenic disorders chromosomal disorders multifactorial disorders mitochondrial disorders</p>
<p>GENETICS MALFORMATION AND SYNDROMES</p>	<p>What is malformation? Cleft lip and palate What is a syndrome? Down Syndrome Waardenburg Syndrome Achondroplasia Velocardiofacial Syndrome The Fragile X Syndrome Albinism Duchenne Muscular Dystrophy Craniossinostosis: Apert Syndrome and Crouzon Syndrome</p>
<p>PREVENTION OF GENETICS DISEASES</p>	<p>Genetic advice Heterozygous Trial Consanguinity Advanced maternal age Environmental Factors Medicines Smoking Alcohol Acid folic intake</p>
<p>THE IMPAIRED PATIENT AND SOCIETY</p>	<p>Students with special educational needs and school – School Inclusion The Student inclusion and legislation</p>

Figure 1 – Educational Content of Cybertutor



Figure 2 – Young Doctor Project Platform (partial illustration)

Figure 3 – Access Screen of Cybertutor (partial illustration)

The chosen media, the Cybertutor, enabled structured the theoretical content in topics, as the Figure 4 shows. With the division of the content, the students could direct its own learning, facilitating the control of text access.

The contents educational, graphic (illustrative images) and audiovisual were available in Cybertutor. The Figure 5 shows an intern page of Cybertutor.



Figure 4 – Index Page of Cybertutor of “Genetics Syndromes” (partial illustration)

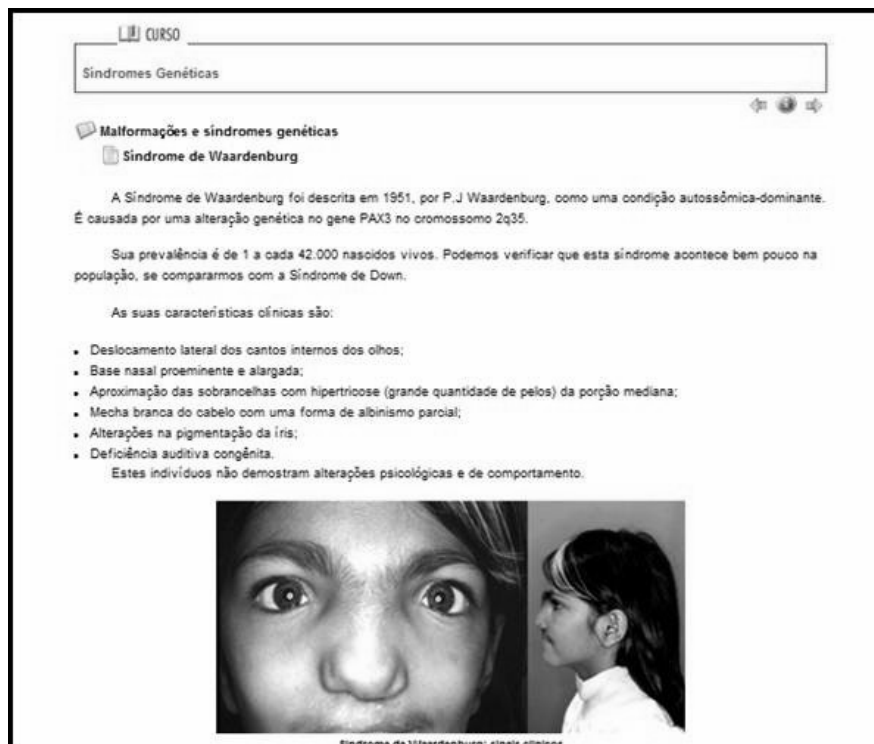


Figure 5 – Representative Page of the theoretical content of Cybertutor – “Waardenburg Syndrome” (partial illustration)

Aiming to ensure and monitor the students learning was created 16 questions of reinforcement along the educational content of Cybertutor. The reinforcement questions enabled the tutor to monitor

the learning. The student only went to the next topic answering correctly of the question (Figure 6), otherwise, went back to the topic to remake the content reading (Figure 7).

The screenshot shows a window titled 'AVALIAÇÃO'. At the top, it says 'Avaliação: Síndromes Genéticas - Questão 10' and 'Responsável:'. Below this, a message states: '██████████, você acertou 100% das questões!'. There is a button '» Clique aqui para avançar'. The question is 'Questão 1' and asks to identify the incorrect alternative regarding genetic disease prevention. Five options (A-E) are listed. The correct answer is 'E' and the user's answer is also 'E', with a small '[ACERTOU]' next to it. Another '» Clique aqui para avançar' button is at the bottom right.

Figure 6 – Reinforcement Question – Correct Answer (partial illustration)

The screenshot shows a window titled 'AVALIAÇÃO'. At the top, it says 'Avaliação: Síndromes Genéticas - Questão 1' and 'Responsável:'. Below this, a message says 'Olá ██████████' and 'Vamos relembrar alguns conceitos importantes do tema que você acabou de ler?'. A message states: 'Você não acertou nenhuma questão!'. The question is 'Questão 1' and asks 'O que significa hereditariedade?'. A sad face icon is next to the text 'Você não leu com atenção e errou!!' and a button '» CLIQUE AQUI para aprender mais...'. Five radio button options (A-E) are listed. The second option is selected.

Figure 7 – Reinforcement Question – Incorrect Answer (partial illustration)

The discussion list is an interactive tool asynchronous created to allow the exchange of information, doubts and questions, as demonstrated in figures 8. The discussion list was a strategy used to maintain the interaction between tutor and student.

The Cybertutor also allowed the tutor verify the performance and access of students. The figures 9 demonstrated this tool.

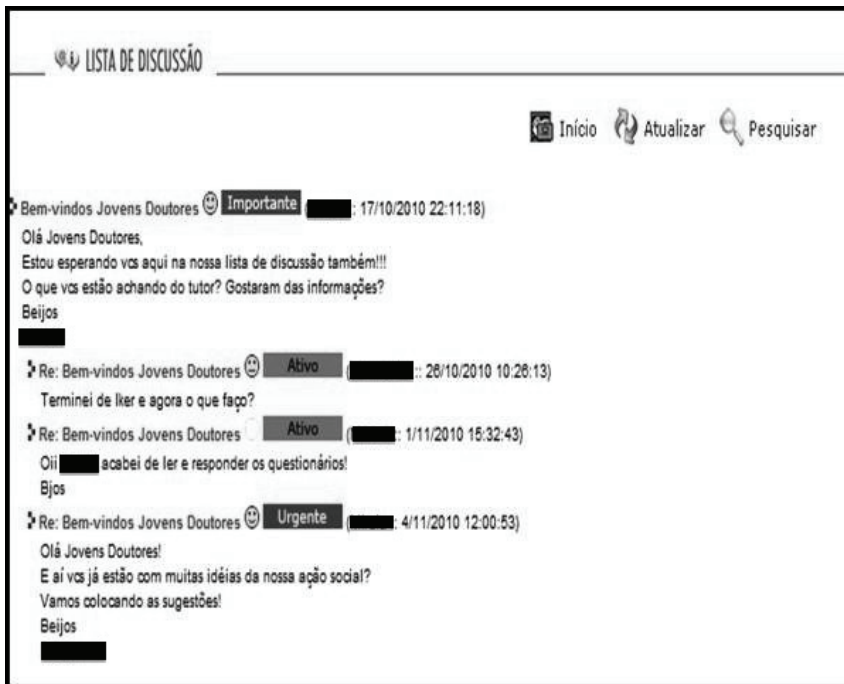


Figure 8 – Cybertutor Screen – Discussion List (partial illustration)

CURSO

Procurar Curso

Nome do curso:

Cód. do curso: 17

Procurar

Síndromes Genéticas	
Aluno	Conclusão
ALEXANDRE	14%
AMANDA	0%
ANA BEATRIZ	2%
ANDRESSA	97%
ANDREZZA	97%
BEATRIZ	97%
EDUARDO	0%
ELISAMA S	0%
FABIANO	23%
FÁBIO	33%
FABRICIO	97%
GABRIELLE	23%
JÚLIA P	100%
KAMYLLA	0%
LUCA	21%
LUCAS	14%
LUCIELE D	100%
LUCIELE	0%
MARCELA	97%
MARCELA	0%
MARIA FER	97%

Figure 9 – Cybertutor Screen– Performance Verification (partial illustration)

■ DISCUSSION

The development of a VLE adds TICs to process of teaching/learning. The VLE, known as *Cybertutor* was initially developed by DTM/FMUSP. Nowadays, several thematic are being developed by researches of the Teleducation area. Develop an educational material is a challenger task and create a material that provides learning, in a pleasant and interactive manner, is even more complex⁷. In this study specifically, were several challenges, since the adequacy of the technical language, to images polishment, to the choice of the themes more motivating and appropriated to thematic of tutor.

Because it is a VLE available on Internet, the access hours are flexible, due to the time and interest availability. Another study¹³, which also used the VLE, verified that this pattern of education promotes the learning in educational content thematic, in digital inclusion and in self-discipline.

The *Cybertutor* enables the fragmentation of educational content in topics (figure 1, figure 4 and figure 5), making easier the direction of learning.

As shown in figures 6 and 7, the reinforcement questions allowed tutor a better monitoring of learning. A different study¹⁴, also inserted reinforcement questions in a VLE, aiming to improve the memorization and learning of content.

The discussion list of guarantees the interactivity and exchange of information (figure 8). This tool allows comprehending the thought of other people, construct and express ideas and stimulate arguing¹⁵. Several studies^{8,9,13,14,16}, also used the discussion list to maintain the interaction and motivation of students in VLE.

The *Cybertutor*, as VLE interactive, also was used in other projects, verifying that it demonstrate to be an excellent option to knowledge acquisition, therefore, corroborating to this study^{3,8,9,13,14,16,17}.

■ CONCLUSION

The VLE developed provides the union of information to technology and resources of interactivity, available on web. So, it is assumed that this *Cybertutor* can be an important tool of health education in Genetic Syndromes, enclosing the most different regions of country.

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RESUMO

Objetivo: desenvolver um ambiente virtual de aprendizagem (AVA) para alunos do ensino fundamental sobre síndromes genéticas. **Método:** o AVA, conhecido como *Cybertutor*, possibilita o aprendizado do aluno pela internet de forma interativa. A metodologia deste estudo foi composta de duas etapas, a de desenvolvimento e a de disponibilização do AVA. O desenvolvimento do conteúdo educacional, gráfico e audiovisual do *Cybertutor* contou com o auxílio de um geneticista do HRAC/USP e de informações científicas disponibilizadas em livros, artigos, teses e dissertações nacionais e internacionais. O *Cybertutor* foi disponibilizado na plataforma do Projeto Jovem Doutor (<http://www.jovemdoutor.org.br/jdr/>) pela equipe técnica da DTM/FMUSP. **Resultados:** o *Cybertutor* elaborado possibilitou estruturar o conteúdo educacional, gráfico e audiovisual em tópicos, inserir questões de reforço, lista de discussão e verificar o desempenho dos alunos. **Conclusão:** o AVA desenvolvido pode ser uma importante ferramenta de educação em saúde em Síndromes Genéticas, abrangendo as mais diversas regiões do país.

DESCRITORES: Genética; Educação em Saúde; Educação a Distância

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