The construction of learning objects on communicable diseases for community health agents

A construção de objeto de aprendizagem sobre doenças transmissíveis para agentes comunitários de saúde

La construcción de objeto de aprendizaje sobre enfermedades transmisibles para agentes comunitarios de salud

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 ABSTRACT
Objective: To describe the creation of a Learning Object about communicable diseases and their identification, monitoring, and prevention for Community Health Agents.
Method: Qualitative and exploratory case study carried out in the North Zone District Management - *Eixo Baltazar* of the *Universidade Federal de Ciências da Saúde de Porto Alegre*, from October 2015 to January 2016. The study had 58 participants and consisted of the stages: field research, Bardin's content analysis, and design of the Learning Object.
Results: The profile of the professionals working in that location was established, and the most commonly diseases found by the agents were identified, as well as the needs in relation to a technological resource, enabling to delimit the contents and structure of the Learning Object.
Conclusion: The Learning Object is an alternative method for sharing knowledge on communicable diseases, associating technology and teaching and making the learning process and the work of the Community Health Agents more attractive and productive.
Keywords: Primary health care. Epidemiological surveillance. Communicable diseases. Education in health. Educational technology.

RESUMO
Objetivo: Descrever a elaboração de um Objeto de Aprendizagem sobre doenças transmissíveis, sua identificação, vigilância e prevenção, para Agentes Comunitários de Saúde.
Método: Estudo de caso qualitativo e exploratório realizado na Gerência Distrital Zona Norte – Eixo Baltazar da Universidade Federal de Ciências da Saúde de Porto Alegre, de outubro de 2015 a janeiro de 2016. O estudo teve 58 participantes e foi composto pelas etapas: pesquisa de campo, análise de conteúdo de Bardin e desenho do Objeto de Aprendizagem.
Resultados: Traçou-se o perfil do profissional atuante naquela localidade e foram identificadas as doenças mais encontradas pelos agentes e as necessidades em relação a um recurso tecnológico, permitindo delimitar o conteúdo e a estrutura do Objeto de Aprendizagem.
Conclusão: O Objeto de Aprendizagem constitui uma alternativa para a difusão do conhecimento sobre doenças transmissíveis, associando a tecnologia ao ensino, tornando o processo de aprendizagem e o trabalho dos Agentes Comunitários de Saúde mais atrativos e produtivos.
Palavras-chave: Atenção primária à saúde. Vigilância epidemiológica. Doenças transmissíveis. Educação em saúde. Tecnologia educacional.

RESUMEN
Objetivo: Describir la elaboración de un Objeto de Aprendizaje sobre enfermedades transmisibles, su identificación, vigilancia y prevención, para Agentes Comunitarios de Salud.
Método: Estudio de caso cualitativo y exploratorio, realizado en la Gerencia Distrital Zona Norte - *Eixo Baltazar* de la *Universidade Federal de Ciências da Saúde de Porto Alegre*, de octubre de 2015 a enero de 2016. El estudio contó con 58 participantes, compuesto por las etapas: investigación de campo, análisis de contenido de Bardin y dibujo del Objeto de Aprendizaje.
Resultados: Se trazó el perfil del profesional actuante en aquella localidad y fueron identificadas las enfermedades más encontradas por los agentes y las necesidades en relación a un recurso tecnológico, permitiendo delimitar el contenido y la estructura del Objeto de Aprendizaje.
Conclusión: El Objeto de Aprendizaje constituye una alternativa para la difusión del conocimiento sobre las enfermedades transmisibles, asociando la tecnología y el aprendizaje, tornando el proceso de aprendizaje y el trabajo de los Agentes Comunitarios de Salud más atractivos y productivos.
Palabras-clave: Atención Primaria a la Salud. Vigilancia Epidemiológica. Enfermedades transmisibles. Educación en salud. Tecnología educacional..

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■ INTRODUCTION

Digital technology is a valuable resource for health workers to search for information that helps them promote health and prevent diseases, especially in the field of disease control, which presents a new and challenging scenario. Despite the incidence of non-communicable chronic diseases in Porto Alegre, Brazil, the rates of communicable diseases has grown alarmingly[1]. Acquired immunodeficiency syndrome (AIDS), viral hepatitis, and tuberculosis are some of the main diseases currently affecting the population. These diseases have become an important public health problem, triggering the need to enforce control and prevention measures and keep health workers updated.

Learning objects are alternative forms of training health workers. These interactive web-based tools support the acquisition of specific concepts and increase, extend or guide the cognitive learning process[2]. The key features of this tool include accessibility, as they offer a standardised ID that guarantees recovery; reusability, once recovered they are used to compose several learning units; and interoperability, as they can communicate and function in various systems[3]. For all these reasons, these tools, in computers or smartphones, can be a valuable learning resource.

In the area of healthcare, these tools associated with mobile devices can be used for health inspection, diagnosis, and tracking and they can provide important content for treatment and prevention[4]. Learning objects are potentially valuable in the education of health workers since they are based on long range technology and have the capacity to maximise service actions and reduce workflow costs.

Community health workers (CHW) are part of the Family Health Strategy ("ESF") and form a link between health services and the community. They perform educational and awareness actions and work with the prevention of diseases and illnesses, health promotion, and health inspection[5].

Their work is important for managing community health problems, especially in the prevention and early identification of communicable diseases that affect the Brazilian municipalities.

The use of educational alternatives to meet the needs of these workers can be a new path toward the qualification of critical and reflexive professionals who can outline the new epidemiological profile of Brazil.

Learning objects can support CHW in areas of difficult access, such as communities far from the large centres, enable the acquisition of knowledge, and decentralise and distribute information. These interactive tools can be applied in several area of healthcare and serve as a basis for remote monitoring, diagnostic support, and decision making[6] at a lower cost. In healthcare and other areas, cost reduction must be considered due to the scarcity of resources. Therefore, the use of low-cost educational tools that improve the quality of education for CHW makes their work more viable and productive.

The guiding question of this study was: Can learning objects help CHW manage users with regard to communicable diseases?

The aim of this paper was to describe the preparation of a learning object on communicable diseases, their identification, inspection, and prevention for community health workers.

The research seeks to reinforce the importance of diversifying learning spaces using technological resources to potentially transform education and establish a new form of learning, teaching, and producing health in the daily activities of the Unified Health System ("SUS").

■ METHOD

This is a qualitative, exploratory, case study conducted in the Programa de Pós Graduação em Ensino na Saúde - Mestrado Profissional, of the Universidade Federal de Ciências de Porto Alegre (UFCSPA)[7].

The case study is an empirical investigations used to study a contemporary phenomenon within the real-life context, especially when the boundaries between phenomenon and context are not clearly defined[8]. This approach was easier to adjust to the study since it allows the investigation of a given population in the real context of healthcare practices. The study consisted of three stages, namely data collection, data analysis, and design of the learning object.

The chosen scenario was the Teaching-Care District ("DDA") of the UFCSPA North District Management Zone - Baltazar, in the city of Porto Alegre, Brazil. The DDA has 16 units of the Family Health Strategy and an average of four CHW in each unit. This location was chosen because the geographic territory provides students with practice in primary care, which qualifies the teaching and care provided to the population.

The participants were selected according to the inclusion criteria of individuals between 18 and 60, who had been working as CHW for at least three months, and who were members of staff of the Family Health Strategy units in the North Zone - Baltazar. The criteria for exclusion were individuals who refused to participate in data collection and who diverged from the ethical aspects of the study.

The subjects signed an informed consent statement explaining the objectives and methodology of the study in easily understandable language. The study had 58 participants.

Data were collected between October 2015 and January 2016 at 16 scheduled meetings (one meeting per unit) by means of a questionnaire with open-ended and

closed-ended questions. The questions addressed socio-demographic data, communicable diseases, and the use of technology. The identities of the subjects were protected by replacing their names by the letter A (short for Agent) followed by an Arabic numeral.

The collected data were subjected to Bardin's content analysis technique[9]. This technique is based on understanding the content in the collection instrument (questionnaire) according to the context in which it was constructed. From the methodological standpoint, content analysis is divided into three steps, as described by the author, namely pre-analysis; exploration of the material; and treatment of results, inference, and interpretation. It was possible to identify the most representative diseases in the daily routine of the CHW and which features a technological device should contain to meet their educational needs.

After the analysis stage, the learning object was constructed based on the features mentioned by the CHW. In this stage, searches were conducted in national and international databases on the subject using a CDr image tool.

The human resources for preparing the content were a nurse, a graduate student of the Programa de Pós Graduação Ensino na Saúde - Mestrado Profissional (postgraduate programme of healthcare education - professional master's degree); and two doctors of the same programme.

The present study observes the ethical guidelines of research involving human beings, as specified in Resolution 466/12 of the National Health Council[10]. It was approved by the Research Ethics Committee of the Universidade Federal de Ciências da Saúde de Porto Alegre, Opinion No. 1.115.444, on 19 June 2015. The Municipal Department of Health of Porto Alegre approved this study through the coordination assessment of Primary Care.

■ RESULTS AND DISCUSSION

In all, 58 questionnaires were completed by the CHW in the 16 Family Health Strategy units of the DDA. Analysis of the collected material provided a sociodemographic profile of the workers in this locality, followed by the thematic clusters, "The challenge of communicable diseases in the daily work of CHW" and "The ideal technological resource according to the CHW". The subsequent step was the design of the learning object on communicable diseases.

The demographic profile of CHW who work in the family health strategy units linked to the DDA

The study had 58 participants, of which 54 were women and 4 were men, aged between 20 and 60 with a pre-dominance of people around 35 years of age. In relation to schooling, 47 of the 58 participants had completed secondary school, corresponding to 81.3% of the study population. Of the remaining participants, 1.7% had technical education, 6% had not finished university, and 10.3% had finished university (courses unrelated to their education as CHW). In relation to time working as CHW, of the 58 participants, 34 had been working in this function for less than 5 years. The number of workers dropped as the time working as CHW increased, resulting in 13 CHW in the 5 to 10 year group and 11 CHW in the over 10 year group.

The challenge of communicable diseases in the daily work of CHW

In the questions related to the most representative communicable diseases, the respondents mentioned six diseases in their daily work. AIDS was the disease that most affected the users, as observed below:

Without a doubt, AIDS is a disease is always present. (A7)

We find lots of people with AIDS, but many say they are getting treatment. (A26)

I believe that AIDS is by far the disease that affects people the most. (A39)

I see many young people with AIDS. (A2)

The results show that AIDS is at the top of the list of communicable diseases that affect the population assisted by the participants of the study. According to estimates of the Department of STDs, AIDS and Viral Hepatitis, approximately 798,366 people living with HIV/AIDS in Brazil[1]. This number, however, may be even higher since many people prefer not to get tested or refuse to believe they are infected. Among the Brazilian states, in terms of detection, Rio Grande do Sul (RS) has had the highest number of sufferers since 2003, with 38.3% of detected cases for every 100,000 inhabitants[11]. In literature, despite advances in detection in the capital city of this state, the rate of infected youths is growing steadily and should serve as a warning to local governments.

The professionals mentioned tuberculosis as the next most common disease, as shown in the following statements:

We have seen many people with tuberculosis, but they resist going to the doctor because they think they are sick with the flu and it will pass. (A57)

Tuberculosis has appeared more often. (A12)

There was a time we stopped seeing it, but today there are plenty of people with tuberculosis. (A19)

With improvements in living conditions of the population, a greater supply of health services, and the emergence of new technologies, the panorama of infectious diseases shifted in Brazil. The incidence of several diseases, including tuberculosis, dropped due to the factors mentioned above and prevention and treatment programmes. This pathology, however, has been growing constantly. These findings agree with the description of the epidemiological bulletin released in 2014 by the municipal department of health of Porto Alegre, in which the city came second in the ranking of incidence of this disease in 2012, and the incidence of all clinical forms of the disease increased in 2013, totalling 106.72 cases for every 100,000 inhabitants[12]. The coinfection between tuberculosis and HIV should be observed, as this relationship increases the mortality rate of the population. Porto Alegre has a high rate of coinfection, from 20 to 30%, well above the national average of 10%[13].

Hepatitis was mentioned in the answers of the participants as a third most common disease affecting the users they assist. The participants did not, however, identify the types of this pathology and merely treated it as hepatitis, as shown in the following statements:

There are a lot of people with hepatitis here. (A28)

Many people have had hepatitis. (A33)

Hepatitis, especially in children. (A5)

Hepatitis is a disease that still appears, but with less frequency than AIDS. (A51)

The World Health Organization (WHO)[14] estimates that about 400 million people have become chronic carriers of some type of hepatitis all over the world, and the most common types affecting the world population are A, B, and C.

The Epidemiological Bulletin released by the Ministry of Health in August 2015 also shows the current situation of hepatitis in Brazil and reveals that northern and northeastern Brazil have the highest incidence of this disease[1]. Hepatitis B did not change significantly in relation to age groups from 2004 to 2014. The south and southeast of Brazil have the highest incidence of the disease and the average age of the cases of infection is 39.1 years[1]. With respect to hepatitis C, an estimated 2 million people suffer from the type C virus in Brazil[1]. In the case of Porto Alegre, the records show 34.3 cases for every 100,000 inhabitants, and annual notifications of 1000 cases of hepatitis C and 200 cases of hepatitis B, on average[1]. These high rates make Porto Alegre a priority in the fight against this epidemic.

Another disease mentioned by the participants of the study was syphilis, which, according to them, is increasing every year:

We see more and more people with syphilis. (A28)

There's a lot of people with syphilis in my area. (A11)

Every year we see more people with syphilis. (A47)

This pathology is a systemic infectious disease of chronic evolution, sexually and vertically transmitted. In both sexes, it makes the body more vulnerable to other diseases. For this reason, it is considered one of the most common public health problems in the world. In the state of Rio Grande do Sul, 17,805 cases of acquired syphilis were reported from 2010 to 2015[11]. According to the same bulletin, most of these cases occur in the regions of highest population density, namely Caxias, Vale do Caí, and the metropolitan region, especially the capital Porto Alegre, with 29.6% (5,060) of cases.

Finally, the CHW mentioned genital herpes as the last most important disease in their practice:

I have a few cases of herpes in my area. (A1)

I have two people with herpes, but they are already getting treatment. (A33)

I think herpes. People are ashamed to say they have it and that makes treatment difficult. (A40)

According to the WHO[15], this sexually transmitted disease has a high transmission capacity and it is caused by herpes simplex virus type 2 (HSV-2). The WHO estimates that every year around 19.2 million new infections by HSV-2 occur in people of the 15 to 49 age group.

The ideal technological resource according to the CHW

When asked about the features the technological resource should have to help them manage communicable diseases, the CHW stressed the importance of using instruments with mobile technology, as illustrated below:

Patient data in a tablet. (A26)

Tablet with better Internet access and a Nextel phone. (A32)

Mobile device. (A40)

I think a tablet would help a lot. (A49)

A tablet to search for information. (A55)

The professionals recognised that a technological resource supports their work, especially mobile devices like tablets and phones. These interactive tools can be applied in several areas of healthcare and serve as a basis for remote monitoring, diagnostics, and decision making[6]. In addition to mobile technology, they stressed the importance of an Internet connection and applications that provide information related to their coverage area:

Internet is essential for our work, from applications, to send information to patients more quickly. (A20)

A very efficient Internet connection, as well as good applications. (A15)

Integration between basic networks, such as the services of our region, for example. That would help us. (A1)

An app to search the entire ESF coverage area during the visit, to refer the person to the right place. (A14)

In the area of healthcare, an Internet connection enables the agents to search for information they can use for educational and awareness purposes. Moreover, the participants stressed the importance of being able to register information about users since a critical part of the work of CHW is the register of families during visitations.

For sure, an application with records of our users would be very useful. (A7)

An application with the feature to register, that we already use on your computer, and gives us access to patient data. (A38)

An application on a tablet should have a VD sheet to add people with STDs, especially HIV, and the children of HIV mothers. (A28)

The experience with the use of technology in the primary care improved the working conditions of these profes-sionals. Some localities, such as Porto Alegre, use the e-SUS information system in the healthcare units. In relation to the North District Management Zone, during a study, the records were made on paper cards standardised by the Ministry of Health for this purpose. This makes the work more tiring, as the CHW must carry large bulks of paper in their briefcases and rucksacks. A technological tool can be used for monitoring and updating information, and improve working conditions by eliminating the weight of paper[16].

The other participants mentioned features to make the digital resource user-friendly, with content on topics related to their professional practice:

It should be objective and easy to use. (A35)

Simplified tabs. (A11)

Something fun, not heavy to look at. (A50)

Practical information to improve our work and answer queries during visits. (A10)

Information about diseases so we can take and show people. (A5)

Forms and a summary of diseases to use in case of doubts at the time of the visit. (A13)

The findings shed light on the features that the technological resource should provide. These features are related to cognitive tools to stimulate reasoning and memorisation and support decision making for work or entertainment[17]. The statements also reveal the need for content that can be studied in case of doubts.

The provision of appropriate content to meet the needs of the participants is a key factor in the successful use of this technology. Educational content serves as a support for learners and can be used as a resource. The creation of teaching material using multimedia and interactivity is possible and makes teaching and learning environments supported by the TICs more effective[3].

In this universe of content, interactivity, and technology, designing educational resources to promote learning and professional advancement is both attractive and enjoyable is a challenge. Thus, the way this resource is presented is important to encourage learners to explore the content.

Creation of the ConectAgent® learning object

A prototype of an application for an Android mobile device was created according to the needs of the CHW. The

name ConectAgent® was chosen because it represents the work proposal, which is to connect the CHW to a range of information on disease control and inspection. The database of the application can be accessed anywhere, online or offline. This features is important because the work of these agents is mostly conducted outdoors and at the homes of users, usually in locations of difficult access without Internet connection. A similar application is the Clinic Web®(18), an information system that allows offline access to medical records using PDAs. The figure below shows the main screen of the ConectAgent® application.

Figure 1 - Home screen of the ConectAgent® application

Many of the applications available in healthcare confuse users. Thus, the ConectAgent® application was designed to meet the needs of the CHW in a clear and accessible language, making it a reliable reference and source of information for these workers.

It has four functions, the first of which, Diseases, provides a lot of information on communicable diseases. When the function is clicked, the user is directed to another page with a definition of the disease, its causes, symptoms, and treatment. The Symptoms section includes an image bank to make identification more effective in practice. Some healthcare applications provide photographs, such as Figure 1®, available at Google Play® (19), designed for health workers who want to share clinical cases using photographs in real time. The figures below illustrate the function Diseases. The first figure shows the screen to access the functions and the second screen shows the diseases in the application.
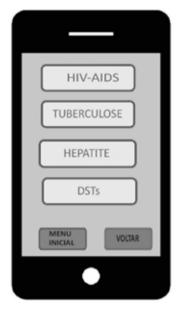

Figure 2 - Functions access screen

Figure 3 - Diseases access screen

The second function, Test your knowledge, is a Serious game where the CHW can test their knowledge after reading the content. This game consists of three stages and multiple choice questions. For each correct answer, the users get a point. After reaching a certain number of points, they are rewarded with a gun to kill the virus. The figure below shows the access screen of the game:

This type of game has been widely used in healthcare to support education and construct new knowledge through specific content(20). These games have an entertainment feature, enabling workers to test their knowledge and formulate a hypotheses in a fun way. The Clinical

Figure 4 - Access screen to the game

Science® app was especially designed for this purpose and enables the solving of clinical cases. It targets the medical category and is available at Google Play® [19].

The third function of the ConectAgent® is the support network linked to the DDA with maps, addresses, phone numbers and opening hours of the health units, hospitals, social welfare centres, women's care centres, and others. This function streamlines the work of agents by providing the right guidelines for users on how to access these services and by reducing the time the workers would need to visit the unit, get the information, and return to the user´s house. This function cannot be compared to any other application since it was strategically designed for the target public of this study.

After going through the first three functions, the workers are ready to use the fourth feature called the Open function. During home visits, the workers can use this function to record information, such as address, sex, age, and a brief description of the case, based on user complaints and symptoms. These data are stored in the application so workers can discuss the cases with the team when they return to the unit to identify a possibly case of suspected disease. This way, workers can plan more effective actions for the immediate resolution and monitoring of the user in question and provide guidelines on available treatment.

For security and confidentiality reasons, access to this function is only possible with a username and password created by the worker responsible for the device.

Alternatives do exist for CHW in online stores[18], such as the ACS *Agente Conectado de Saúde*®, ACS *lite e-SUS AB ePHealth,*® and ACS *salutar*® (only for councils using the salutar system), among others. However, these proposals differ from the ConectAgent® application since they mostly focus on user registration. The following two figures show examples of the functions mentioned above. Figure 5 shows the Support Networks and Figure 6 shows the Alert function.

Figure 5 - Access screen to Support Networks

Figure 6 - Access screen to Alert function

■ FINAL CONSIDERATIONS

This study essentially focuses on the creation of a learning object to promote the education of CHW, especially prior knowledge and their need for a resources that can truly support health practices and help prevent and identify new cases of communicable diseases in the context of primary care.

Ensuring communication and information in communities and healthcare units is one of today's challenges. In view of the need to promote health and prevent diseases, especially communicable diseases, the dissemination of a

tool that can support health inspection should be a priority public health strategy.

The learning object can provide valuable support in areas of difficult access, such as the communities the CHW must cover, by providing data and decentralizing and distributing information. This resource can also support decision making and ensure health actions for users are safer and more effective.

In relation to new health education strategies, innovative proposals that target the specific needs of workers while associating educational approaches with technology to provide a constant review of knowledge can serve as an alternative toward a new path to qualify critical and reflexive health professionals who can delineate a new epidemiological scenario in Brazil.

This innovative project contributes to the process of monitoring the health-sickness process by making the education of CHW more dynamic and attractive. The proposal presented here can qualify healthcare actions and help create a new epidemiological panorama in the scope of primary care. It also fulfils a social commitment in the creation of an interactive tool to organise the work process and construct and disseminate knowledge, and in the elaboration of strategies to improve the lives and health of communities.

The main limitation of this study is that the learning object was in the design stage and it could not be tested in practice. In future studies, researchers will develop, apply, and assess the learning object.

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