Development of educational webtechnology on clinical cytology for students and healthcare professionals

RESUMO | Objetivo: Descrever o processo de desenvolvimento de uma webtecnologia educacional, do tipo blog, sobre citologia clínica, para estudantes e profissionais da área da saúde. Métodos: Pesquisa metodológica para construção de tecnologia educacional em saúde, desenvolvida em três etapas: Revisão da literatura (2019), a partir da qual se deu o delineamento teórico; Fotodocumentação (2020), que foi a fase responsável pela obtenção do conteúdo imagético; Construção (2020-2021), a partir da qual se deu a criação do blog. Resultados: Na primeira fase, obteve-se a fundamentação teórica. Na segunda fase, realizou-se a obtenção das imagens e na terceira fase, o desenvolvimento do produto técnico-tecnológico. Conclusão: O blog, emerge como modelo de suporte para proporcionar um caráter de ubiquidade à informação e como consequência disso, ampliar o potencial gerador de conhecimento sobre citologia clínica entre estudantes e profissionais de diversos campos da área da saúde, com enfoque à Biomedicina e Enfermagem.
Descritores: Blog; Educação continuada; Teste de Papanicolaou; Tecnologias Educacionais.

ABSTRACT | Objective: To describe the development process of an educational webtechnology, like a blog, about clinical cytology, for students and health professionals. Methods: Methodological research for the construction of educational technology in health, developed in three stages: Literature review (2019), from which the theoretical outline was given; Photodocumentation (2020), which was the phase responsible for obtaining the image content; Construction (2020-2021), from which the creation of the blog took place. Results: In the first phase, the theoretical foundation was obtained. In the second phase, the images were obtained and in the third phase, the development of the technical-technological product. Conclusion: The blog emerges as a support model to provide a ubiquitous character to information and, as a consequence, expand the potential generator of knowledge about clinical cytology among students and professionals from different fields of health, with a focus on Biomedicine and Nursing
Descriptors: Blog; Continuing Education; Pap smear test; Educational Technologies

RESUMEN | Objetivo: Describir el proceso de desarrollo de una tecnología web educativa, como un blog, sobre citología clínica, para estudiantes y profesionales de la salud. Métodos: Investigación metodológica para la construcción de tecnología educativa en salud, desarrollada en tres etapas: Revisión de la literatura (2019), a partir de la cual se dio el esquema teórico; Fotodocumentación (2020), que fue la fase encargada de obtener el contenido de la imagen; Construcción (2020-2021), a partir de la cual tuvo lugar la creación del blog. Resultados: En la primera fase se obtuvo el fundamento teórico. En la segunda fase se obtuvieron las imágenes y en la tercera fase, el desarrollo del producto técnico-tecnológico. Conclusión: El blog surge como un modelo de apoyo para dotar de un carácter ubicuo a la información y, como consecuencia, ampliar el potencial generador de conocimiento sobre citología clínica entre estudiantes y profesionales de diferentes campos de la salud, con enfoque en Biomedicina y Enfermería
Descriptores: Blog; Educación contínua; Prueba de Papanicolaou; Tecnologías educativas.

Célio Amoêdo de Melo

Biomedical, Master in Clinical Analysis from the Federal University of Pará, Professor of Biomedicine and Coordinator of the Graduate Program (Lato Sensu Level) in Oncotic Cytopathology with emphasis on the female genital tract at the Fibra University Center
ORCID: 0000-0003-4539-9230

Murilo Tavares Amorim

Biomedical, Master in Biology of Infectious and Parasitic Agents at the Federal University of Pará
ORCID: 0000-0002-9769-2183

Patrícia Bentes Marques

Biomedical Doctor in Biology of Infectious and Parasitic Agents from the Federal University of Pará, Coordinator of the Biomedicine course at Centro Universitário Fibra
ORCID: 0000-0003-0951-2822

Elizabeth Teixeira

Nurse, PhD in Sciences: Social and Environmental Development from the Federal University of Pará, Professor of the Postgraduate Program in Clinical Analysis at the Federal University of Pará.
ORCID: 0000-0002-5401-8105

Michele Amaral da Silveira

Biomedical, PhD in Neuroscience and Cell Biology from the Federal University of Pará, Professor of the Biomedicine course at Centro Universitário Fibra
ORCID: 0000-0001-5119-7526

Maísa Silva de Sousa

PhD in Biological Sciences: Genetics and Molecular Biology at the Federal University of Pará, Professor of the Postgraduate Program in Clinical Analysis at the Federal University of Pará
ORCID: 0000-0001-9944-7838

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INTRODUCTION

The process of understanding teaching and learning, as a fundamental property of human formation, coexists in a mutual way, presenting distinct elements that are characterized as essential properties, both for the individual and for the availability of products arising from the environment in which he is submitted. Thus, over the years, some attention has been paid to models applied in the development of knowledge and learning. 1 With an emphasis on the relationship between the individual and the object of knowledge, several theories on how the human formation process occurs are discussed, in order to remodel a specific teaching situation, based on the distinction of the main theoretical-methodological positions applied today. 2, 3

When considering the university as an institution demarcated with the proposal of systematization of knowledge, it is of fundamental importance to build viable alternatives and conditions in the promotion of teaching, based on the promotion of alternatives distinct from previously instrumentalized models, aimed at theoretical and practical development of professional training. Therefore, the training of professionals involved in the identification of uterine lesions and the greater number and availability of protocols can expand the options and enable early diagnosis. The creation of new reference contents can provide students and professionals with a new way of memorizing images and their respective identification criteria. 3, 4

In association with the theoretical and practical development of active teaching-learning methods, the university presents itself as an intermediary of permanent professional development, especially in courses in the health area, based on professional competence, integrated in the dialogic dimension, enabling the recognition of the social context in which the professional is inserted. 5,6 Therefore, some aspects of the education of students and professionals need favorable conditions in order to enable continued education, in order to encourage new teaching perspectives based on the most current methodological structures. 7,8

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The development of professional competence, in a synergy of the role of the professor at the university, is structured in this sphere, which converges in the training of professionals, in this area in particular, in the area of health. 8 The affective, cognitive and psychomotor domains can establish themselves as a highly variable regulator in this bias, since the transformation of the reality proposed to the individual can submit him to new challenges, making him able to actively respond to the difficulties that may be found in the work environment. Thus, due to the need for professional training committed to society and the provision of quality services, more and more professionals with full practice and permanent learning have been required. 9, 10

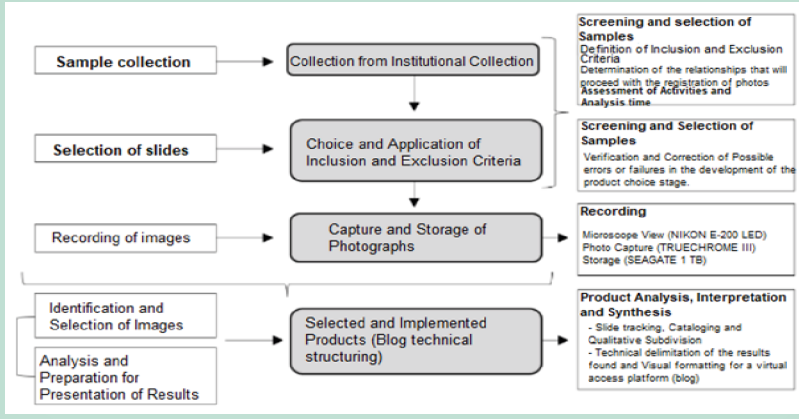
All teaching processes aim to enable learning for the individual who, in a sphere of multiplicity of subjects, knowledge, spaces and times, should be taken as a priority. Therefore, in areas that require an entirely specific accuracy of the professional, as observed in health courses, it is necessary to understand educational models in a critical and systematized way, based on the recognition of the existing relationships between education, society and pedagogical theories. 11 Thus, providing opportunities for the use of blogs in the educational sphere is also about encouraging the development of skills and interactive contexts in the construction of essential trajectories and experiences in the work context. 12, 13

In this spectrum, clinical cytology based on the focus of morphological identification of cellular structures requires an integrated understanding based on organized teaching systems

that enable substantial learning, associated with the proper handling of the teaching method and the ideal teaching product for transmission of knowledge. It is believed, then, that the interaction between the individual's previous cognitive structure and the learning content should be encouraged, in order to provide a process of mutual resignification of the acquired knowledge core, crucial for the development of the professional's technical skills. 14, 15

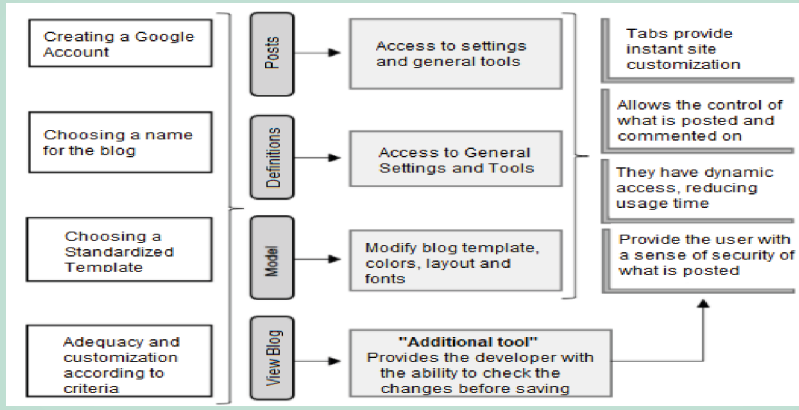
Understanding the aspects inherent to difficulties in professional training is correlated with the role of the educator and the monitoring of the institution in this process. Thus, due to the inherent aspects of difficulties in understanding clinical cytology, it is likely that technologies can translate changes in the way this teaching can be disseminated, based on the use of its access tools as instruments of innovation in teaching, enabling the building and updating of knowledge. 13 Given the need for improved continuing education, with a focus on training professionals for practice, one can think about structuring actions that give them skills in ordering, synthesis and identification of cell structures in clinical cytology. 16 The objective of the study is to describe the development process of an educational web-technology, like a blog, about clinical cytology, for students and professionals in the field of health.

Figure 1: Flowchart of the process of obtaining, selecting, recording and analyzing images



Source: Own Authorship, 2021

Figure 2: Blog Creation, Development and Editing Flowchart



Source: Own Authorship, 2021

METHODS

This is a methodological research on the construction of educational technology in health, 17 developed in three stages: (I) Literature review; from which the design of the technology took place, carried out during the year 2019; (II) Photo documentation; the part; go from which the outline of the content took place, taking place during the first and second quarters of the year 2020; (III) Product Construction; from which the creation of the blog took place, developed in the third and fourth quarter of the year 2020 and the first semester of the year 2021.

Initially, a literature review was developed that aimed to describe the content available in the literature on the use of educational technologies as integrative complementary tools in the training of students and professionals in the field of health, with a view to supporting the promotion of health education and promoting viable and accessible alternatives in the development of educational methods in clinical cytology. The study comprised the first stage of theoretical development applied to the construction of Web-technology, mediated by an integrative bibliographical review of an integrative, observational and qualitative nature, based on studies that reiterate themes about educational technologies as tools for the professional development in the health field. More structural details about the methodological model are available in Melo & Sousa (2021). 18

Due to the variety of existing recommendations for a good photographic record, having incipient and shallow parameters in the specialized literature, some being related to converging and others divergent parameters, the recommendations described from protocol references were used in order to guarantee the reliability of the record and maintenance of images. 19, 20 The cytological material used for photo documentation was obtained from cervical-vaginal scraping slides, stained using the Papanicolaou technique. The slides came from the institutional archive of the Cytopathology Laboratory of the Biological Sciences Institute of the Federal University of Pará. After a previous analysis, 200 slides were selected for field selection to compose the photo archive. Those older than 3 years, due to loss of color, wear of the blade (broken, dry or cracked) and with excess of piocytes and/or red blood cells were excluded.

To obtain the images, the slides were analyzed in a Nikon E-200 – LED microscope, in the objectives of 10 and 20 times. The areas selected for photography were marked on the slide with a 2.0 permanent pen, captured by the TrueChrome II camera, cataloged and filed in external HD, Seagate 1 TB, for further selection. Photos were documented according to image quality. Slides with smears of good didactic quality that met the research objectives were used. The registration and analysis of the objects of study were carried out at the Laboratory of Microscopy and Microscopic Projection at Centro Universitário Fibra. Figure 1 illustrates the process of prior selection of samples for further storage, recording, analysis and presentation of proposed results.

At the end of this process, the images needed to complement the webtechnology were extracted, responsible for composing the technical base of the educational product, in order to provide the structure of the final result.

2.2.3 Step 3: Product Construction

The construction of the educational technological product (blog) took place with the materialization of the study design, based on what was exposed in stage 1 and stage 2 of development. A secondary elaboration system was used, using the Blogger website, hosted on the Google virtual access platform, following a pre-determined design by the website's algorithms, which provided a detailing of the tutorial sequence, the navigation structure, the Blog interface and layout.

> “Understanding the aspects inherent to difficulties in professional training is correlated with the role of the educator and the monitoring of the institution in this process”

The construction of the Blog took place in HTML (HyperText Markup Language), Javascript, CSS and the Bootstrap framework for being easy to understand, simple, clear and objective languages, in addition to avoiding the creation of long access links and difficult to share. These languages were chosen because they make the content more accessible to users, allowing them to share the content more easily and, as a result, to learn and advance in their studies more easily. In addition, the Blogger choice system also offers tools for editing and management. Therefore, it will be made available online, using the Web 2.0 tool at the address: https://citologiadiferenciada.blogspot.com. The creation of the blog followed the tutorial available on the site, with an elaboration flow outlined in Figure 2.

At the end of this process, the final product was obtained, together with the inclusion of images and comments on the Blog, in order to inform and disseminate scientific knowledge, thus contributing to the training of health professionals.

RESULTS

The results found mainly deal with the need to change the way of learning, based on the adaptation to new means and technologies for the higher education system. In line with trends observed in the educational environment, changes in education and societal requirements have been widely discussed in the literature. Adhering to these technologies should expand the potential for generating knowledge, in addition to the development of clinical cytology students, revolutionizing the role of the professional and translating new changes in the practice of teaching in cytology. Details and presentation of the studies can be seen in Melo & Sousa (2021). 18

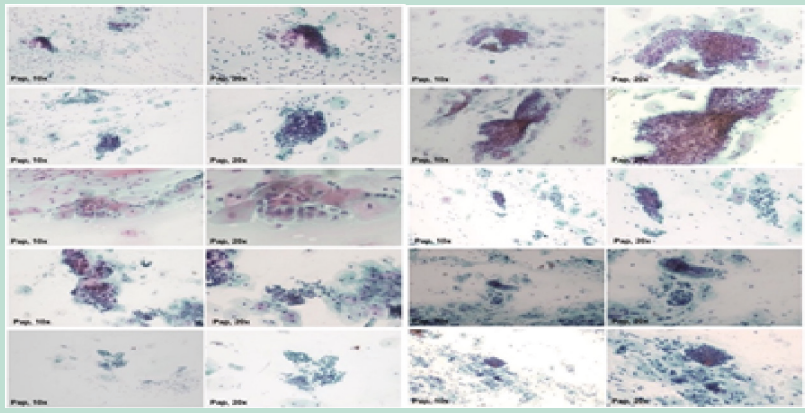
Each image presents its cytomorphological explanation in text form, following the criteria for cervical reports. 21 Image comments will be allowed to facilitate a better interaction between the student and the teacher. (Figures 3, 4 and 5).

The home page contains the name of the Blog and a brief description of its functions, whose purpose is to facilitate the recognition of endocervical cells, since, when deposited on slides by hand smears, they acquire various formats, types of clusters or even present themselves isolated. It has a brief description of the main anatomical, histological and cytological features of the female genital tract. The images highlighted on the homepage are copyright and are intended to introduce basic concepts to the proposed theme. To access the Blog, you can use the address: https://citologiadiferenciada.blogspot.com, access can also be made possible by pointing the mobile device reader at the QR Code (Figure 6).

Also on the home page, the user will have the "Useful Links" tool, which automatically redirects to reference sites (Brazilian Society of Cytology; National Cancer Institute; Histopathology and Cytopathology of the Cervix - Digital Atlas; Brazilian Society of Clinical Cytology ; Nomenclature for Cytological Reports; Brazilian guidelines for tracking the CCU; Quality Management Manual for the Cytopathology Laboratory). These sites were chosen according to the author's criteria, based on the content most used in the development of the teacher's classes, as they are reliable and reference sources in the area.

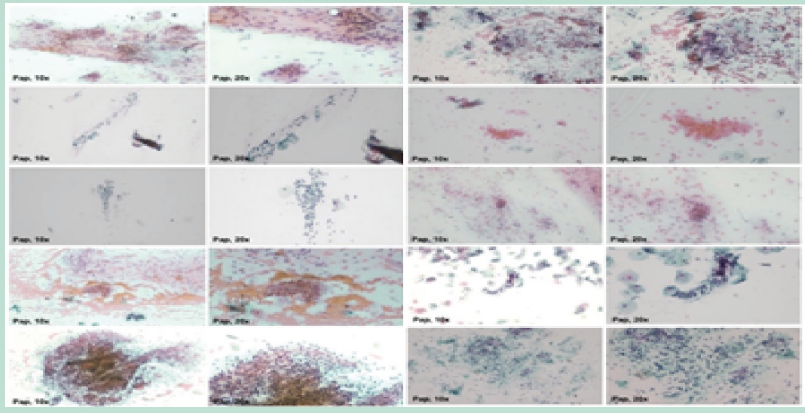
The Differentiated Cytology Blog was divided into categories according to the categories of each cell group that can be observed: Endocervical Cells well preserved; Endocervical cells in the process of degeneration; Degenerate Endocervical Cells. Each category has twenty images, ten with lower magnification (10x) and ten with higher magnification (20x). The user must access the links found on the home page in the “Categories” section, or they may use the search tool (located above the categories section), using any related keyword. This search tool allows quick access to any content on the blog, ensuring flexibility and speed in using the platform while browsing.

Figure 3: Well-preserved endocervical cells



Source: Own Authorship, 2021

Figure 4: Endocervical cells in the process of degeneration

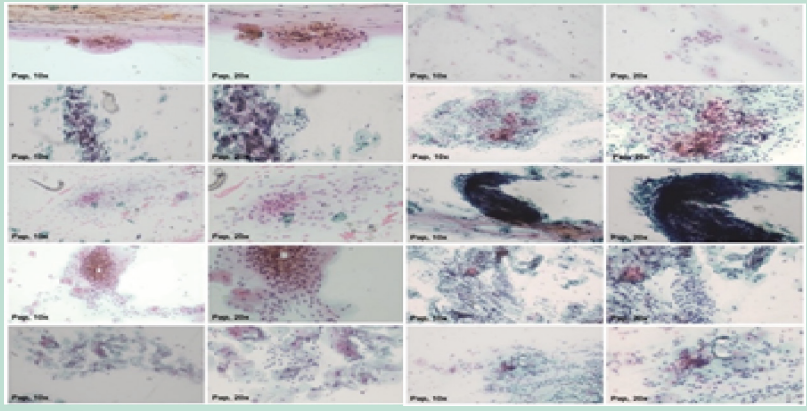


Source: Own Authorship, 2021

When selecting the desired category, the user is directed to the page that contains the gallery of images belonging to the respective group. By clicking on each image, as described in the photodocumentation, the user is directed to the page that has the description of each slide and the most relevant cytological aspects. Still on the page of the image selected in the image collection, the blog user will be able to leave a comment, and the student can respond, generating interaction and feedback among the academic body. This space will be used for inserting doubts and sharing ideas and understanding among the group of students, in order to facilitate learning. This resource is very useful for allowing direct contact and discussion of content.

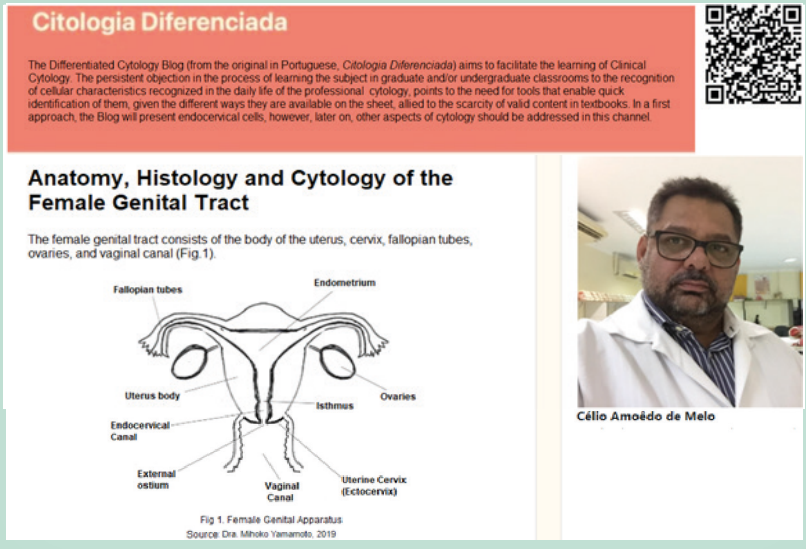
When selecting the desired category, the user is directed to the page that contains the gallery of images belonging to the respective group. By clicking on each image, as described in

Figure 5: Degenerate endocervical cells



Source: Own Authorship, 2021

Figure 6: Home page and QR Code to access the Blog "Differentiated Cytology "



Source: Adapted from Citologia Diferenciada Blog, Available at: https://citologiadiferenciada.blogspot

the photo documentation, the user is directed to the page that has the description of each slide and the most relevant cytological aspects. Still on the page of the image selected in the image collection, the blog user will be able to leave a comment, and the student can respond, generating interaction and feedback among the academic body. This space will be used for inserting doubts and sharing ideas and understanding among the group of students, in order to facilitate learning. This resource is very useful for allowing direct contact and discussion of content.

DISCUSSION

Considering the learning methods found in the literature and compared to the scenario of theory and professional practice, in the area of health, under its principles and guidelines, it could be observed that its structural component contains a set of fundamental requirements for the identification of health needs and patient-centered care. Thus, in order to promote meaningful and connected learning in the continuous training process, several teaching models focused on the professional's technical evolution have been used in order to favor their internal process of professional construction. As a result, studies have been developed with the purpose of understanding the proposed challenges, and responding to them, in the search for effective teaching methods that understand the needs of contemporaneity. 13, 22, 23

The blog allowed students and professionals to interact continuously, offering a mutual contribution between users and this web-technology model, when properly planned and structured, can serve as a pedagogical teaching tool in subjects that require continuous training and improved in the development of training strategies. 12, 24 The Differentiated Cytology Blog proposed to present endocervical cells, due to their differentiated characteristics, among the cytological findings. However, it is intended that the other aspects of Clinical Cytology will soon be addressed in this channel. Given the wide space that the theme addresses, in addition to the benefits arising from web-technology, which can be an effective tool for mitigating failures in the teaching-learning process.

Thus, the developed product establishes itself as a model of educational technology that seeks to add to the promotion of health education for students and professionals, in addition to promoting a viable and accessible alternative that encourages the development of similar products, featuring as an innovative model regarding the expansion of competences, through the autonomy and creativity provided by the use of the blog. Thus, in the midst

of promoting the dissemination of proposals that make knowledge viable for health professionals, the Fibra University Center should be highlighted as a partner institution in the development process of this study, which provided all the necessary means for the construction of the final product.

CONCLUSION

In a first approach, the Differentiated Cytology Blog presents itself as a technological product with an innovative spectrum in the health area. As an authorial product and given the difficulties observed in teaching after years and experience, the proposal, characterized as a form of digital transformation applied to teaching, corresponds as a support model to provide a ubiquitous character to information and, as a consequence, expand the potential for generating knowledge, in addition to the professional development of clinical cytology students.

From this perspective, the study proposed to present the morphological aspects of endocervical cells, as they present different characteristics, among the cytological findings. However, it is intended that the other aspects of Clinical Cytology will soon be addressed. Considering the wide space that the theme addresses, in addition to the benefits arising from web-technology, which can be an effective tool for mitigating the failures of the teaching-learning process on the subject, because, when the articles were collected, it was the difficulty in searching for articles related to the topic is notorious.

Furthermore, the study was able to show that the understanding of the cells of the female genital tract is an important exponent in the context of education in the area of health. The inherent difficulty in understanding the morphological study of cellular alterations was an aspect observed during the performance of the work and the Centro Universitário Fibra, as a partner institution, permeated the process of developing the final product. Thus, this study hopes to contribute to the screening of Cervical Cancer from the training of professionals involved in the identification of uterine lesions.

For this, the development of digital resources can contribute to the standardization of cell morphology. Thus, education can benefit from this tool, using teaching blogs as a pedagogical strategy for building knowledge. The construction of the Blog "Differentiated Cytology" can contribute to a better elucidation about clinical cytology, in addition to strengthening ties between professors and students, through feedback between the parties, through virtual interaction.

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