

# International Journal for Innovation Education and Research

ONLINE ISSN: 2411-2933 PRINT - ISSN: 2411-3123

## HTML5 Authoring Tool to Support the Teaching-Learning Process: a case study with H5P framework

Dauster Souza Pereira; José Valdeni de Lima; Liane Margarida Rockenbach

Tarouco; Rafaela Ribeiro Jardim; Paulo Santana Rocha; Francisco Euder dos Santos

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**Published Date:** 2/28/2019

**Page:** 92-103

**Vol 7 No 2 2019**

**DOI:** <https://doi.org/10.31686/ijer.Vol7.Iss2.1325>

## **HTML5 Authoring Tool to Support the Teaching-Learning Process: a case study with H5P framework**

### **Dauster Souza Pereira**

PhD Student in Technology in Education, Federal University of Rio Grande do Sul, Porto Alegre, Brazil  
Professor at Federal Institute of Education, Science and Technology of Rondônia (IFRO), Porto Velho, Rondônia, Brazil  
[dauster@ifro.edu.br](mailto:dauster@ifro.edu.br)

### **José Valdeni de Lima**

PhD in Computer Science. Full Professor at the Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Rio Grande do Sul, Brazil  
[valdeni@inf.ufrgs.br](mailto:valdeni@inf.ufrgs.br)

### **Liane Margarida Rockenbach Tarouco**

PhD in Electrical Engineering. Full Professor at the Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Rio Grande do Sul, Brazil  
[liane@penta.ufrgs.br](mailto:liane@penta.ufrgs.br)

### **Rafaela Ribeiro Jardim**

PhD Student in Technology in Education, Federal University of Rio Grande do Sul, Porto Alegre, Brazil  
Professor at Federal Institute of Education, Science and Technology Farroupilha (IFFarroupilha), Alegrete, Rio Grande do Sul, Brazil  
[rafa.rjardim@gmail.com](mailto:rafa.rjardim@gmail.com)

### **Paulo Santana Rocha**

PhD Student in Technology in Education, Federal University of Rio Grande do Sul, Porto Alegre, Brazil  
Evandro Chagas Institute, Belém, Pará, Brazil  
[rochap01@gmail.com](mailto:rochap01@gmail.com)

### **Francisco Euder dos Santos**

PhD Student in Technology in Education, Federal University of Rio Grande do Sul, Porto Alegre, Brazil  
Professor at Federal Institute of Education, Science and Technology of Rondônia (IFRO), Cacoal, Rondônia, Brazil  
[euder@ifro.edu.br](mailto:euder@ifro.edu.br)

## Abstract

*The objective of this experiment report was to describe the development of studies of authorship tools and creation of educational resources carried out in 2017 by 12 students of the Doctoral Course in "Informatics in Education" of the Federal University of Rio Grande do Sul (UFRGS), 6 students of the Teleducation discipline and 6 students of the discipline of Hyperdocuments as Teaching Material. The impacts of the use of an authoring tool in the teaching-learning process were explored, focusing the analysis in descriptive aspects. It was concluded that the use of H5P contributed to discussions and reflections on authoring tools, also it was possible to establish an effective relationship between theory and practice, and its use proved to be satisfactory as well as promising for the teaching-learning process.*

**Keywords:** Authors' Tools; Learning Objects; Hyperobject.

## 1. Introduction

The search for innovative methodologies in the educational context is a necessary task, given the recurrent existence of problems presented by students in certain areas of knowledge. Because of this, both teachers and researchers have dedicated efforts to improve their methodologies. However, in spite of the engagement of teachers and researchers, the methodology is often not improved because it ends up being a simple reproduction of traditional methods using technological tools. [19]

In this scenario, it is not possible to affirm that only the production of educational contents using technological tools can guarantee student learning. On the other hand, the use of technology can effectively support and enrich activities in the classroom, provided they are used properly [14]. According to [13], in order for teachers to understand how to manage and take advantage of the available technological resources they need to understand what their real role is in relation to such resources. It is necessary for teachers to be comfortable with the use of technological resources, as well as perceive their importance in the teaching-learning process.

According to [17], like any other software, the authoring tool refers to any type of software or collection of software components with which one can implement or change certain content and make it available for other people.

The authoring tools have been used by teachers as support to the teaching process, since they can make the development of more creative and motivating activities possible for the students. In this way, it becomes fundamental that teachers acquire the necessary skills to make use of all the resources available to them in order to improve learning.

In this scenario, this paper intends to present an experiment report about the use of an authoring tool called H5P, when applied in two disciplines of a post-graduation program in Informatics in Education, in integration with the authoring tool and the Moodle environment.

## 2. Theoretical framework

According to [23], an authoring tool is any application, part of an application or collection of applications with which the author interacts to produce, change, or assemble Web content that can be used by others. The authoring tools aim to reach a more lay public to assist in the process of producing content or educational materials [15]. However, [8] points out that the absence of authoring tools is still a challenge for the elaboration of interactive contents.

In this context, [16] carried out a study in which they presented a method for the quick and easy production of micro-learning content. According to [4] micro-Learning is characterized by allowing interactions with combinations of short or long activities, so that the teacher can establish predefined periods of time. In addition, it allows interactions with data, photos, activities and videos in real-time mobile environments. This way, it enables the teacher to manage the interactive contents and the time periods. For the development of the interactive contents were added the Bitnamsi Wordpress and H5P plugins in the Moodle platform. The authors noted that the use of these Web-based authoring tools was essential for the development of the study, as well as the use of the Moodle platform. The integration of these tools allowed teachers to develop content easily and enabled students to learn content with lower cognitive loads.

[22] presents a positive approach in the evaluation of the hypervideo authoring tool to support surgery learning. The main contribution of this work was the possibility of the students of the veterinary medicine course to interact with surgical simulations in the practical classes. This study contributed to the consolidation of new practices that make it possible to replace live, nonhuman animals in veterinary medicine training. The main limitations encountered by the author during the development of this work were related to the size of the videos, quality and access time. Finally, with this study it was possible to verify that the hypervideo is a learning support tool that allows the perception of surgical procedures.

[2] carried out an evaluation of four authoring software aimed at the development of educational games. For the application of the evaluation criteria, a set of activities were implemented with each of the software. The Hierarchical Analytical Method (MAH) was used in order to identify the most appropriate authoring software for use in the classroom. The MAH is one of the multicriteria tools used in decision making [9]. According to the authors, of the evaluated software, Visual Class was the one that showed the best results and met most of the criteria evaluated in the study.

## 3. Methodology

This work reports an experiment in postgraduate courses, exploring the impacts of the use of an authoring tool in the teaching-learning process, focusing the analysis on aspects of a descriptive nature.

This report was experimentd during the second semester of 2017 in the subjects of Teleducation and Hyperdocuments as Educational Material, both taught in the Program of Post-graduation in Informatics in Education of the Federal University of Rio Grande do Sul (UFRGS), counting on a total of 12 students.

The classes were organized in order to have two face-to-face meetings weekly, always held in a computer lab, as well as activities to be carried out in the EAD modality. During the face-to-face meetings the established dynamics took into account aspects of the cognitive domain of Bloom's Taxonomy [3], so each

meeting suggested the production, or evaluation, of educational resources, with subsequent validation of their suitability at a certain stage of Pedagogical Wheel.

In this scenario, the production of digital content always occurred in face-to-face meetings, thus requiring tools for material management and learning objects. Because of that, the virtual Moodle learning environment, for storing and creating content, was adopted. This technological choice was made due to the adoption of the environment by the research institution.

However, as an authoring tool for creating educational resources, H5P framework was explored, through its version available as a plugin for Moodle.

#### **4. Results and Discussion**

The experiment reported in this work was carried out at the Federal University of Rio Grande do Sul (UFRGS), in two classes of the postgraduate course in Informatics in Education, with the participation of 12 students.

In the Teleducation discipline, the objective was to investigate the various possibilities related to the use of information technology and communication, aiming at the production of theoretical and practical knowledge including the context of mobile learning.

Based on each of the themes foreseen in the syllabus of the subject, the teacher explained the educational theories related to the subject, discussing the main points necessary for their understanding, and later the students researched mobile authoring tools that could be used to support the teacher's activities inside the classroom. At a few points during the classes the students had time to explore these tools, each one of them should choose one authoring tool different from the other and give a presentation demonstrating its purpose and main features.

In addition, it was also noted whether the authorial result produced by using H5P could be used on Android or Iphone. The tests performed have generally shown that the produced content can be displayed and that the features created with the H5P work on a mobile device. At the end of each lesson, based on the topic that would be addressed in the next class, each student should choose a new tool to be studied. Based on the chosen tool, each student placed in the Moodle environment a small tutorial about the use and main features of the same.

The discipline of Hyperdocuments as Educational Material, aimed to provide students with the opportunity to learn methods for designing hyperdocuments, taking into account the definition of guided and guided-indexed script and temporal synchronization between text, voice and video.

The discipline dynamics was initially based on the research of hyperobjective modeling methods, where each of the students carried out a research on a particular model and presented it in the classroom. Based on the models studied, we explored in the discipline the main aspects to be considered in the creation of a hyperobject, which are: object model, hyperobject model, navigation model and interface model.

We also used the Synchronized Multimedia Integration Language (SMIL) to demonstrate the development of multimedia applications on the Web. Finally, it was proposed the implementation of a hyperdocument project called educational resource with a concept teaching approach. aspects of timing, voice, video and text. It was suggested to students to apply their educational resource, in order to test it and validate it.

Several researchers have dedicated efforts to analyze authoring tools to support teaching and learning. Among them, we can mention [11], [12], [1], [5], [10], [18], [8].

According to [20], authoring tools have been widely used for the creation of educational software, since they allow teachers to prepare materials for their classes without the need of help from computer specialists. Thus, the use of authoring tools provides greater independence for the teacher.

Considering that the proposal to use authoring tools aims to create educational resources that will be used by students with fewer skills to students with more skills, it is necessary to mention the importance of the Bloom taxonomy in this context.

[3] has developed its taxonomy, which comprises a hierarchical organization of educational objects classified as being knowledge, understanding, application, analysis, synthesis and evaluation. The use of the Bloom taxonomy assists the teacher in defining his goal considering the teaching-learning process. However, it is necessary that every process needs to be planned in order to guarantee effective and efficient results [21].

Four decades after the release of Bloom's taxonomy, it was reviewed by a group of experts in the fields of psychology, education, curriculum specialists, tests, assessments, and more. David Krathwohl also participated in the review, which also helped create the original taxonomy in 1956 and is redefined at the following levels: remember, understand, apply, analyze, synthesize and create. [7]

In addition to the concepts related to Bloom's taxonomy, the evaluation of the authoring tools analyzed in this report of experiments took into account the Pedagogical Wheel developed by [6], which classifies some authoring tools in the various levels of the Bloom taxonomy, as observed in Figure 1 below.

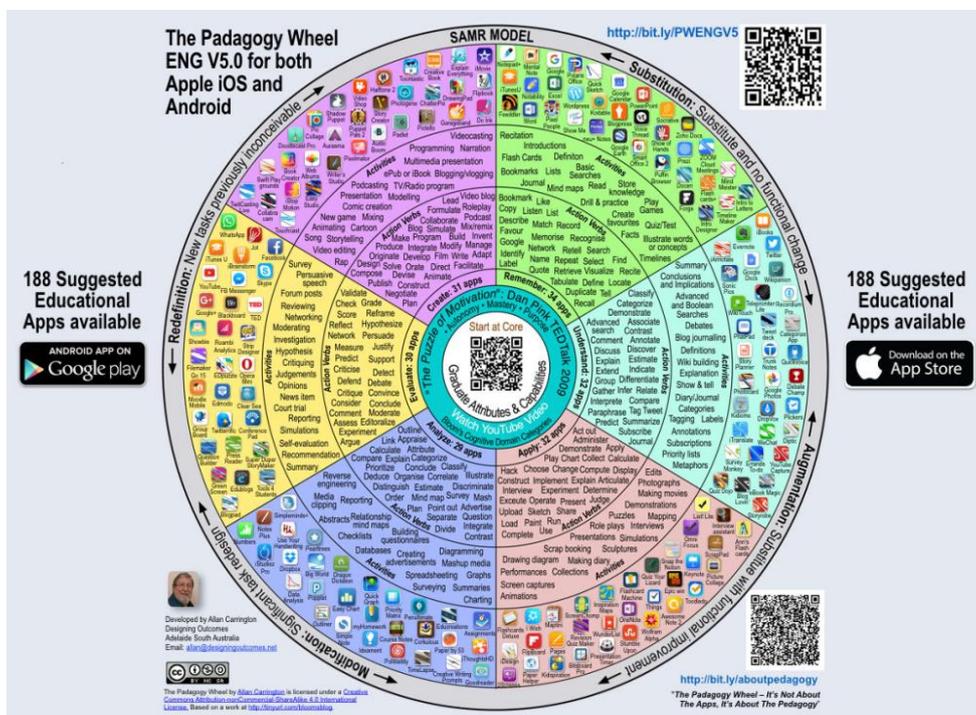


Figure 1. Pedagogic Wheel Developed by Allan Carrington  
 Source: <https://designingoutcomes.com/english-speaking-world-v5-0/>

In the course of Teleducation and Hyperdocuments as Educational Material, the Moodle environment was used as a tool to support teaching during the activities of the two disciplines. Moodle was used both for the provision of subject material to students, as well as for the postings of the analysis activities of the chosen authoring tools.

The Moodle environment has a variety of features, allowing its users the use of collaborative and interactive, synchronous and asynchronous tools, enabling teachers to use various strategies in the teaching process. Among the various resources available in the Moodle environment, the H5P authoring tool was used throughout the courses. This plug-in was installed in the Moodle environment of the graduate program and enabled the creation of dynamic and interactive content.

The H5P authoring tool can be used from the plug-in installed in the Moodle environment, as mentioned previously, but can also be accessed directly via the internet browser on the official website. Upon accessing this URL, the user will see Figure 2 which is the screen where the H5P login can be accessed. Note that it is necessary to register an account to access the H5P.

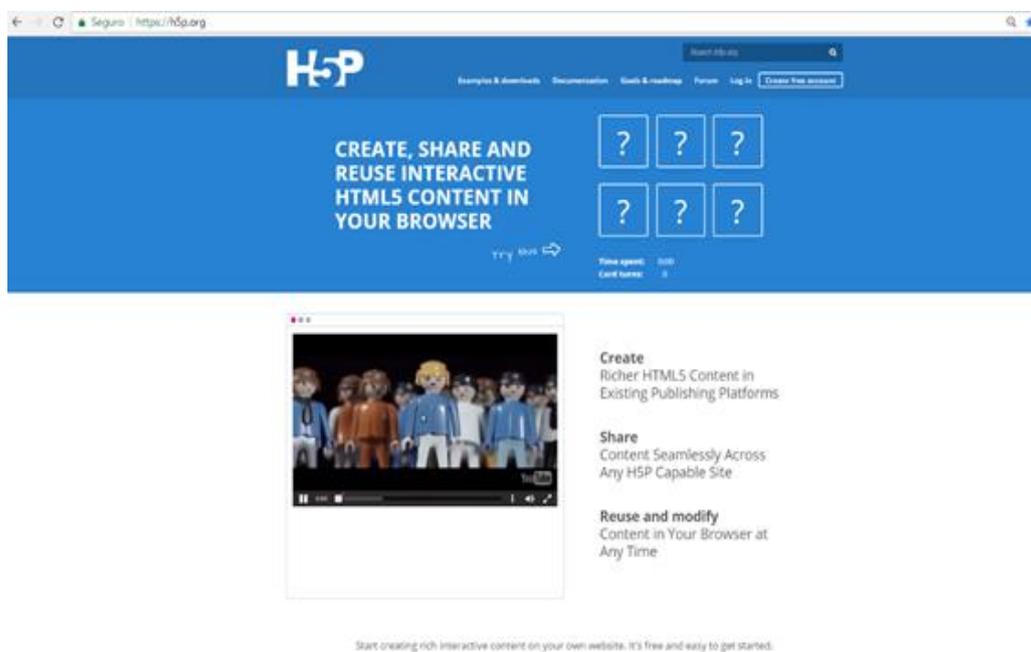


Figure 2. Login screen or account creation in H5P

Source: Author

H5P is an authoring tool that offers a variety of features that can be used for content generation. Some of these features are described in Table 1.

Table 1. Available features in the H5P

Available features			

<i>Multiple Choice</i>	<i>Interactive Video</i>	<i>Course Presentation</i>	<i>Fill in the Blanks</i>
 <i>Quis (Question Set)</i>	 <i>Questionnaire</i>	 <i>Drag the Words</i>	 <i>Drag and Drop</i>
 <i>Speak the Works Set</i>	 <i>Mark the Word</i>	 <i>Image Hotspots</i>	 <i>Accordion</i>
 <i>Dialog Cards</i>	 <i>Personality Quis</i>	 <i>Single Choice Set</i>	 <i>Memory Game</i>
 <i>Flashcards</i>	 <i>Collage</i>	 <i>True/False Question</i>	 <i>Timeline</i>

Source: Author

During the lessons of Teleducation, some resources of the H5P authoring tool were explored to identify its purpose, according to some examples detailed below:

- ✓ Multiple Choice: used for elaboration of multiple choice questions. In this type of resource the student receives immediate feedback regarding their performance. You may have one or several correct options for the question.
- ✓ Interactive Video: used to include interactivity in videos, such as explanations, extra images, tables, white space fill and multiple choice questions.
- ✓ Fill in the Blanks: Used to fill in the blank left in a given text to test the student's ability to reproduce facts or produce mathematical inferences.
- ✓ Quis (Question Set): used to create a set of questions of various types (multiple choice, drag and drop, fill in the blanks). It also allows you to add videos that are played at the end.
- ✓ Drag the Words: used to drag the previously chosen words to spaces absent in a given text.
- ✓ Drag and Drop: used for drag-and-drop questions, allowing the student to associate two or more elements and make logical connections in a visual way.

One of the activities of the discipline of Hyperdocuments as Teaching Material was the creation of an educational resource that had the purpose of supporting teaching. Both the choice of content to be taught and the technological tool to be used was freely chosen.

In view of this, it was decided to develop a prototype of an educational resource that contributes to the teaching of data structure contents. In order to create this educational resource, it was necessary to take into account some aspects covered during the discipline of Hyperdocuments as Teaching Material, as an example, the definition of guided and guided-indexed route, temporal synchronization between text, voice and video. Taking into account these requirements, it was decided to use the H5P authoring tool for the implementation of this educational resource, since the available resources could meet the established requirements in a satisfactory way.

Figure 3 shows the initial screen of the educational resource prototype created for teaching Data Structure using the Python language.



Figure 3. Screen of the Educational Resource Prototype using H5P

Source: Author

Figure 4 shows the use of the H5P Timeline feature that was also used to create the educational resource for teaching Data Structure. Using this feature, timelines are easily editable, shareable, and reusable. The content type of the timeline allows you to insert a sequence of events in a chronological order. For each event you can add images and texts as well as include Twitter, YouTube, Flickr, Vimeo, Google Maps and SoundCloud features.



Figure 4. H5P Timeline Feature

Source: Author

In the progression bar highlighted in Figure 5 it is possible to notice some markers that indicate that in that location there is some feature of the H5P created and that at that point it will be initialized.

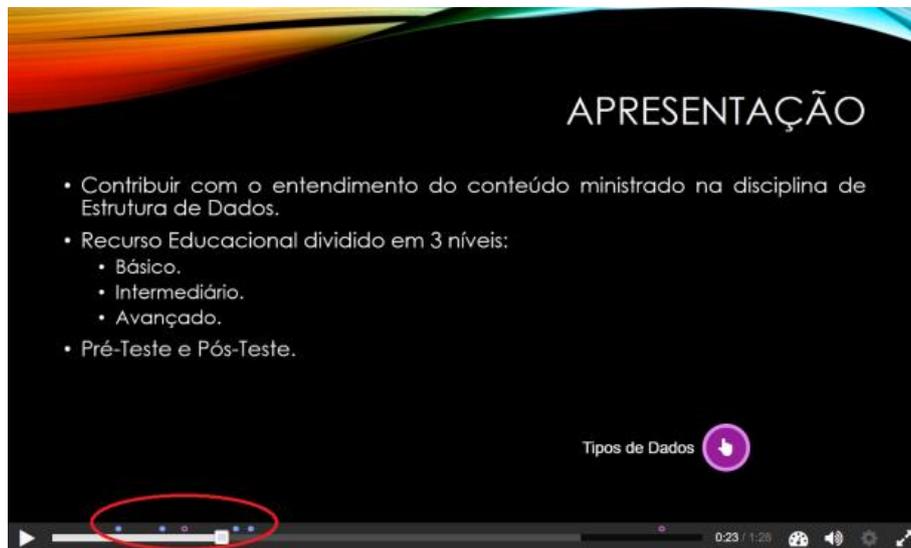


Figure 5. Educational resource in execution

Source: Author

Figure 6 shows the moment when the resource is initialized and, in this case, it requires the user to answer a multiple choice question about the desired topic.



Figure 6. Educational resource in execution - multiple choice question

Source: Author

It can be noticed that the authoring tools can be used for content creation and, because of this, end up being a great ally of teachers in the teaching-learning process, since they enable the creation of interactive learning contents that tend to motivate students' interest, mostly because of the diversity of resources presented to them.

## 5. Final Considerations

This report shows the importance of using authoring tools, such as the H5P framework, in the teaching-learning process.

From the activities developed in the subjects of Teleducation and Hyperdocuments as Educational Material, it was possible to get to know better the resources available in the H5P and how they can be used for the creation of an educational resource.

A few difficulties that can be described relate to the unavailability of a Moodle environment in the Hyperdocuments as Teaching Material course, in which the students should have had administrator privileges so that the installation of the H5P plugin could be done in the environment. To solve this problem it was decided to create a Moodle environment external to the UFRGS where the tests were carried out.

As future recommendations, it is suggested to continue the development of the educational resource mentioned in this report so that it is applied in the classroom with the objective of analyzing if there will be improvement in learning when students make use of it.

As a general result, it was possible to observe that the H5P authoring tool integrated with the Moodle environment has great potential to collaborate in the teaching-learning process.

## 6. Acknowledgement

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior -

Brasil (CAPES) - Finance Code 001. We would like to express our gratitude to the Federal Institute of Education, Science and Technology of Rondônia (IFRO) for encouraging intellectual production.

## 7. References

- [1] BATTISTELLA, P. E.; NETO, A. C. R.; CAMPOS, R. L. R.; et al. Classificação de Objetos de Aprendizagem e análise de Ferramentas de Autoria. In: XX Simpósio Brasileiro de Informática na Educação, 2009. Disponível em: <[http://www.niee.ufrgs.br/eventos/SBIE/2009/conteudo/artigos/completos/62035\\_1.pdf](http://www.niee.ufrgs.br/eventos/SBIE/2009/conteudo/artigos/completos/62035_1.pdf)> Acesso em 01 Mai. 2018.
- [2] BERTIN, R.; LIMA, M. DE F. W. DO P.; WEBBER, C. G. Desenvolvendo Jogos Educacionais Por Meio de Softwares de Autoria. *RENOTE - Novas Tecnologias na Educação*, v. v.13, p. 1–10, 2015.
- [3] BLOOM, B. S.; ENGLEHARD, M. D.; FURST, E. J.; HILL, W. H.; KRATHWOHL, D. R. *Taxonomy of Educational Objectives: The Classification of Educational Goals: Handbook I Cognitive Domain*. Michigan, 1956.
- [4] BRUCK, P. A.; MOTIWALLA, L.; FOERSTER, F. Mobile learning with micro-content: A framework and evaluation. *25th Bled eConference - eDependability: Reliable and Trustworthy eStructures, eProcesses, eOperations and eServices for the Future, Proceedings*, p. 527–543, 2012.
- [5] BULEGON, A. M.; TAROUÇO, L. M. R. Exe Learning E Objetos De Aprendizagem : Ferramentas De Autoria Para a Construção De Materiais Digitais Para O Ensino De Ciências Exe Learning and Learning Objects : Author Tools for Building Materials for Digital Science Teaching, n. April 2017, p. 1–8, 2015.
- [6] CARRINGTON, A. *The Padagogy.* , p. 10315, 2013. Disponível em: <[http://designingoutcomes.com/assets/PadWheelV4/PadWheel\\_Poster\\_V4\\_HighRez.pdf](http://designingoutcomes.com/assets/PadWheelV4/PadWheel_Poster_V4_HighRez.pdf)>. Acesso em 20 Mai. 2018.
- [7] FERRAZ, A. P. DO C. M.; BELHOT, R. V. Taxonomia de Bloom: revisão teórica e apresentação das adequações do instrumento para definição de objetivos instrucionais. *Gestão & Produção*, v. 17, n. 2, p. 421–431, 2010.
- [8] GOMES, E. H.; PIMENTEL, E. P.; BRAGA, J. C. Ferramentas de Autoria de Conteúdos e as Limitações para a Personalização da Educação. *Anais do Workshop de Desafios da Computação Aplicada à Educação*, v. 0, n. 0, p. 148–157, 2012.
- [9] JORDÃO, B. M. DA C.; PEREIRA, S. R. A Análise Multicritério na Tomada de Decisão - O Método Analítico Hierárquico de T. L. Saaty. , 2006.
- [10] LARA, L. L.; BONFIM, G. F.; NETO, C. DA S. F.; NETTO, C. M.; COSTA, A. C. R. Plataforma para criação e utilização de conteúdos multimídia educacionais. *Anais do Workshop de Informática na Escola*, v. 1, n. 1, p. 1275–1284, 2010.
- [11] LEFFA, V. J. Uma ferramenta de autoria para professor: o que é e o que faz. *Letras Hoje*, v. 41, n. 144, p. 189–214, 2006.
- [12] MONTEIRO, V. C. P. C.; MENEZES, C. S. DE; NEVADO, R. A.; FAGUNDES, L. DA C. Ferramenta de Autoria e Interação para apoio ao desenvolvimento de Projetos de Aprendizagem. *RENOTE - Novas Tecnologias na Educação*, v. 3, n. 2, p. 1–12, 2005.

- [13] MORAN, J. M. A Educação que Desejamos: novos desafios e como chegar lá. Campinas/SP: Papirus Editora, 2007.
- [14] MUSSOI, E. M.; FLORES, M. L. P.; BULEGON, A. M.; TAROUCO, L. M. R. GeoGebra and eXe Learning: applicability in the teaching of Physics and Mathematics. Systemics, Cybernetics and Informatics, v. 9, n. 2, p. 61–66, 2011. Orlando/Flórida.
- [15] NOLÊTO, C. O.; TRINTA, F. A. M. Uma Ferramenta de Autoria para o Desenvolvimento de Jogos Pervasivos Baseados em Realidade Aumentada. IX Workshop de Teses e Dissertações ( WTD) do WEBMEDIA, 2014.
- [16] PARK, Y.; KIM, Y. A Design and Development of micro-Learning Content in e-Learning System, v. 8, n. 1, p. 56–61, 2018.
- [17] RODRIGUES, A. M.; GALÃO, M. C.; SCHWARZ, G.; GLUZ, J. C. SAAPIENS: Uma ferramenta de Autoria de Objetos de Aprendizagem e Apoio Pedagógico na Dedução Natural na Lógica Proposicional, n. Cbie, p. 1003, 2014.
- [18] ROSSETTI, A. G.; ALBUQUERQUE, A. DOS S.; SILVA FILHO, V. P. DA; TODESCO, J. L.; GAUTHIER, F. Á. O. Ferramenta de autoria multimídia para ensino de língua estrangeira em ambiente multiagente TT - Multimedia authorship tool for the teaching of foreign languages in a multi-agent environment. Educação e Pesquisa, v. 35, n. 1, p. 81–97, 2009.
- [19] SANTOS, T. R.; KIOURANIS, N. M. M.; SILVEIRA, M. P. As Tecnologias de Comunicação e Informação: fragmentos de uma sequência de atividades de um trabalho de formação continuada. , 2011. Maringá/PR.
- [20] SILVEIRA, S. R. Estudo de uma Ferramenta de Autoria Multimídia para a Elaboração de Jogos Educativos, 1999. Porto Alegre: Universidade Federal do Rio Grande do Sul.
- [21] SOGAYAR, R. L.; LONA, M. Ensino superior em Turismo: refletindo sobre a pedagogia das competências, a Taxonomia de Bloom e os valores do Tourism Education Future Initiative (TEFI). . p.1–12, 2011. Balneário Camboriú: VIII Seminário da Associação Nacional Pesquisa e Pós-Graduação em Turismo.
- [22] TIELLET, C. A. B. Construção e Avaliação do Hipervídeo como Ferramenta Auxiliar para Aprendizagem de Cirurgia, 2010. Universidade Federal do Rio Grande do Sul.
- [23] W3C. Disponível em: <<https://www.w3.org/standards/agents/authoring>>.