ESTUDOS EM DESIGN
DESIGN ARTICLES

Bilingual digital educational resources design: a model for assessment and supporting checklist

Design de recursos educacionais digitais bilíngues: um modelo para avaliação e checklist de apoio

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Abstract
Bilingual Digital Educational Resources (DERs) are digital media (videos, animations, multimedia, etc.) designed for the teaching-learning process of deaf students, users of Brazilian Sign Language and Portuguese in its written form. The conception of these resources consists of a specific design demand, both as a project, as well as in the formal aesthetic aspects and in the organization of information. In this context, the design challenge of bilingual DERs is to contemplate two languages, articulating visual resources that support text and signaling, without overloading the user. Currently, many DERs are produced for the deaf, but research is scarce on how to assess the quality and select these materials. In this sense, the aim of this article is to present a model for evaluating the design of bilingual digital educational resources (Libras/Portuguese), as well as a support checklist for the evaluation of these resources, which can be carried out by researchers, teachers and project teams.

Keywords: Digital Educational Resources Design, Assessment, Assessment Model, Bilingual (Libras/Portuguese).

Resumo
Os Recursos Educacionais Digitais (REDs) bilíngues são as mídias digitais (vídeos, animações, multimídias etc.) elaboradas para o processo de ensino-aprendizagem de alunos surdos, usuários da Língua Brasileira de Sinais e do Português na sua forma escrita. A concepção desses recursos consiste em uma demanda específica de design, tanto como projeto, quanto nos aspectos estéticos formais e na organização da informação. Nesse contexto, o desafio do design de REDs bilíngues é contemplar duas línguas, articulando recursos visuais, que suportem ao texto e a sinalização, sem sobrecarregar o usuário. Atualmente, são produzidos muitos REDs para surdos, mas são escassas as pesquisas a respeito de como avaliar a qualidade e selecionar esses materiais. Nesse sentido, o objetivo deste artigo é apresentar um modelo para a avaliação do design de recursos educacionais digitais bilíngues (Libras/Português), bem como um checklist de apoio à avaliação desses recursos, que pode ser realizada por pesquisadores, professores e equipes de projeto.

Palavras-chave: *Design de Recursos Educacionais Digitais, Avaliação, Modelo para Avaliação, Bilíngue (Libras/Português).*

Introduction

Digital media and social networks have been incorporated into everyday school life, in person and online, and are part of changes in the way knowledge is produced, how people communicate and learn. Therefore, the morphology of educational materials is changing and the hegemony of textbooks and printed materials is giving way to other types of materials, such as digital teaching resources (AREA, 2017; BONILLA-CRUZ and CARRILO-SIERRA, 2017).

The term DERs (digital educational resources) is adopted by MEC (Ministry of Education in Brazil) and refers to video content, animations, multimedia, etc., available on the internet for educational purposes (PORTAL MEC, 2018). The use or development of these resources has been carried out by different profiles of people; from teachers, who envision a digital solution to a pedagogical problem, to multidisciplinary teams constituted for this production (SILVEIRA; CARNEIRO, 2012; MORAES et al., 2018).

However, this transformation from traditional teaching material to digital resources or environments is a complex phenomenon in which different dimensions intertwine, going beyond the mere change of technological support (AREA, 2017). Among them, the author (2017) highlights the change of the object to multimedia, hypertextual, interactive and other formats. The author also envisions the pedagogical adaptation, the characteristics of gamification, personalization and experiential learning, as well as the role of the student, with greater autonomy, collaboration and self-assessment capacity; and the role of the teacher, responsible for acquiring new technological skills and understanding new methodological approaches. In addition, it highlights the adaptation of the production, distribution and consumption sectors, in which the design teams fit, developing new platforms, teaching-learning environments, articulating multidisciplinary professionals and new DERs, with specificities of accessibility, reuse and openness.

In this context, the need for new resources for teaching people with different abilities has been the target of numerous researches in order to break down access barriers. In the case of deaf students, the subjects of this research, the basic need is the availability of DERs with a wealth of visual resources and with the use of the language of that community, the Brazilian Sign Language (Libras).

Libras is a visuospatial language, which presents all the specific properties of human languages and with its own grammatical structure, coming from communities of deaf people in Brazil (GESSER, 2009). Bilingualism, on the other hand, is defined by the coexistence of the Brazilian Sign Language as the first language and the written Portuguese language as a second language, paying attention to the different functions that each language presents in the daily life of the deaf person (QUADROS, 2008; MACHADO, 2009). Therefore, it is in the acquisition of knowledge in sign language that the acquisition of reading and writing in Portuguese by the deaf student is made possible (QUADROS, 2008).

Despite the growth of research and production of bilingual DERs in different interfaces, such as videos, multimedia systems, interactive websites and online learning environments (MORAES et al., 2018), the research by Moraes (2020) points to the lack of studies and instruments for the

evaluation of resources destined to deaf students, both for the end user, for the teacher, institutions and repositories of educational resources.

Therefore, the objective of this work is to present a model for evaluating the design of bilingual DERs, which was the result of the author's doctoral thesis[1], as well as a checklist with the criteria to assist the assessment. For this purpose, initially, the context of the design of bilingual DERs and the evaluation are presented. Then, the evaluation model, its categories and criteria are displayed, and, lastly, the checklist to support the evaluation of these resources by researchers, professors and/or project teams is presented.

The design of bilingual digital educational resources (Libras/Portuguese)

The conception of digital educational resources is linked to Design activities, both in the design process, in formal aesthetic aspects and in the organization of information (FILATRO, 2018). Thus, in the development of bilingual DERs, the design project's challenge is to contemplate two languages: Libras and Portuguese. Articulating visual resources (images, videos, animations and illustrations) that support text and signs, without overloading the user and paying attention to the formal-aesthetic quality. Therefore, design articulates different perception channels (visual, auditory, tactile) and multiple media (music, text, images, animations, cinema, etc.), so that the way these elements are organized affects the way in which the information is received by users.

In this sense, the area of information design brings great contributions, as it deals with the organization and transformation of data into information with value and meaning (SHEDROFF, 2014). The main goals of information design, according to Horn (2014), are: to develop documents that are understandable, accurate and quickly recoverable; and, designing interactions through easy and pleasant systems, solving human-computer interface design problems, paying attention to ergonomics and usability requirements.

In addition, information design applied to human cognition presents ways to reduce cognitive complexity and contributes to presenting information in a useful way (BONSIEPE, 2011). When several information sources compete with each other for the limited processing capacity of memory, there is cognitive overload[2]. Therefore, when educational resources are developed, it is possible to make use of this knowledge to balance the cognitive load[3], developing adequate interfaces between the information and the user/reader (FILATRO, 2018; BONSIEPE, 2011).

In this sense, the research by Moraes (2020) shows how information design contributes to presenting bilingual content and DERs, through the development of adequate interfaces between information and the user. Therefore, the research listed design principles, already consolidated in the area, applied to bilingual digital educational resources (Libras/Portuguese), namely: the

[1] The thesis can be accessed at: https://repositorio.ufsc.br/handle/123456789/219342.

[2] The cognitive load theory was developed by John Sweller, an Australian psychologist and expert in the field of cognition. According to the author, learning is more effective when the volume of information presented to the student is compatible with their own processing capacity. To explain how people process new information, cognitive theory divides human memory into sensory, working, and long-term memory, with increasing storage capacities (FILATRO, 2018).

[3] Cognitive load refers to the mental work imposed on the working memory at a given moment.

principles of multimedia learning (MAYER, 2009), the general principles of information design (LIPTON, 2007; BONSIEPE, 2011) and the principles applied to bilingual interfaces (GALASSO et al., 2018; DEBEVC et al., 2014), to develop and compose the criteria for evaluating the design of bilingual DERs, which will be presented in the following sections of this paper.

Digital Educational Resources Assessment

Quality assessment is an activity that can permeate all stages of the production cycle of an educational resource, it has a procedural and multidisciplinary character and the participation of different actors (FURNIEL et al., 2020). It is also a process of collecting and using information in order to aid decision making. For this, there are scientific and empirical instruments that establish standards, criteria, recommendations and requirements for quality assessment both in the development of the project and the finished product (GODOI and PADOVANI, 2009).

In the process of evaluating digital educational resources, Godoi (2013) presents three concepts: formative, summative and prognostic evaluation. Formative assessment is carried out throughout the development process of the digital educational resource. The summative evaluation is carried out at the end of the design process, when the interface is ready. The prognostic evaluation is carried out before using a DER, that is, it is used when planning its use or when deciding to purchase a resource.

Assessing the quality of educational resources is a complex task, according to Cechinel (2015) the very notion of quality is contextual, so it depends on who the object is intended for, the environment for which it was designed and implemented and the purpose of the educational resource. In accordance with this notion, for Furniel et al. (2020) quality can be understood as a property attributed to a product according to a pre-established set of dimensions and criteria.

In this context, different assessment instruments have criteria of different natures, Silva (2017) divides them into: ergonomic, pedagogical and communicational criteria. Ergonomics ensure that the user can use the educational software safely, comfortably and productively. The pedagogical criteria ensure that the didactic strategies for presenting information and cognitive tasks are in accordance with the educational objective and the user's characteristics. And communication criteria ensure that media communication devices are effective from the interactivity and information quality standpoints. These are intermediate criteria between task and action.

The LORI (Learning Object Review Instrument) (LEACOCK and NESBIT, 2007), which is currently the most recognized instrument for the quantitative measurement of quality in ready-to-use multimedia resources, evaluates quality based on nine different criteria: content quality, alignment with the learning objective, feedback and adaptation, motivation, presentation design, interaction usability, accessibility, reusability and standards compliance.

However, even with the existence of some instruments and criteria of different natures to carry out the assessment of digital educational resources, Moraes (2020) points out that most proposals focus only on establishing pedagogical and ergonomic criteria, and is sometimes rather broad in terms of accessibility criteria, which proves to be insufficient to compose the necessary criteria to assess bilingual digital educational resources.

The Bilingual DER Design Assessment Model (Libras/Portuguese): methodology and result

According to Dresch et al. (2015), a model is a set of propositions or statements that express the relationships between concepts in a domain. Therefore, the suggested model is conceptual, which allows the understanding of the domain of the assessment of bilingual DERs (Libras/Portuguese), based on the relationship between the categories and axes of evaluation criteria.

For its conception, methodological procedures[4] were used with a mixed approach, with the combination of qualitative and quantitative procedures in data collection (CRESWELL, 2010). Initially, the traditional and systematic literature reviews raised the main issues related to the evaluation of bilingual DERs and supported the elaboration of an interview, which was carried out with seven professionals in the production of bilingual resources from public institutions of reference in the education of the deaf in the country. For the analysis of the interview data, the qualitative analysis proposed by Creswell (2010) was used, which involves extracting meaning from the data, from the information provided by the participants, which were interpreted according to the researcher's reality and to the literature.

From these first two procedures, the pre-categories for evaluation and 37 preliminary criteria for the evaluation of bilingual DERs (Libras/Portuguese) were elaborated. Subsequently, to verify the validity of these criteria, a questionnaire was applied, which was answered by 52 deaf and hearing professionals in the area of bilingual education, according to the Delphi method[5].

At the end of two rounds of application of the questionnaires, 32 evaluation criteria were validated, distributed into five categories, which make up the Model for Evaluation of Bilingual DER. They are: Pedagogical Context, Deaf Culture, Translation and Interpretation, Digital Media and Interface Design.

The Pedagogical Context category refers to the adequacy to the pedagogical objectives of the educational resource and also cognitive and emotional characteristics that enable the user to learn. The Deaf Culture category brings questions regarding the use of Libras and Portuguese, visual culture and the adequacy of the resource to the cognitive characteristics of the bilingual deaf student. The Translation and Interpretation category contemplates the quality of translation and interpretation and the interaction between the presenter and the visual elements in bilingual DERs. The Digital Media category, on the other hand, refers to the elements of digital media that configure educational resources and the Interface Design category contemplates the visual organization of the interface, as well as the usability aspects of digital educational resources.

[4] The methodological procedures can be seen in a more detailed manner in another publication by the authors MORAES, L. M.; GONÇALVES, B. S. (2021).

[5] The Delphi is a systematic method for collecting opinions and aims to obtain a consensus of opinions from a group of experts, through a series of intensive questionnaires, interspersed with controlled feedbacks (DALKEY, 1969). It is a way to scientifically validate information in the field, and it is possible to combine both a quantitative and a qualitative analysis (MUNARETTO et al., 2013).

Figure 1 shows the synthetic configuration of the Model for Evaluation of the Design of Bilingual DERs, which includes the 5 evaluation categories in a circular format, each one divided into the respective axes of criteria that compose the category.

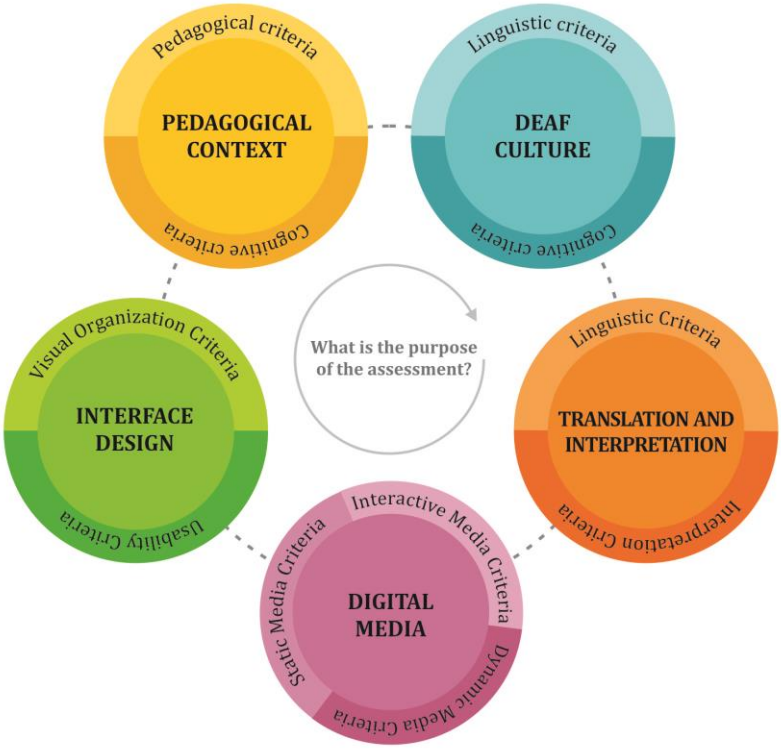

Figure 1: Synthetic configuration of the Model for evaluating the design of Bilingual DERs (Libras/Portuguese). Source: developed by the author.

The Model has a dynamic and fluid form, allowing the non-linear visualization of the evaluation categories and their respective criteria axes. Categories are joined by a dashed line, which indicates that they are linked, but there is no linear path to be carried out. The question on whether the purpose of the evaluation is located at the center, so that the evaluator can reflect on why the evaluation was carried out (either to select a resource for use or to recommend it to someone), how and where the resource will be used (either in the classroom, mediated by the teacher, or autonomously by the student, in person or online) and which categories are needed to carry out this assessment and should be present throughout the entire assessment and updated with each new assessment.

Next, in Figure 2, the Model in its expanded version is presented, with the presence of the evaluation criteria validated in the research, which can be checked in full in the checklist. It is importante to highlight that not all criteria can be applied during the assessment. Its design has been validated in the context of bilingual DERs, but can be updated according to different resources, technologies and assessment contexts.

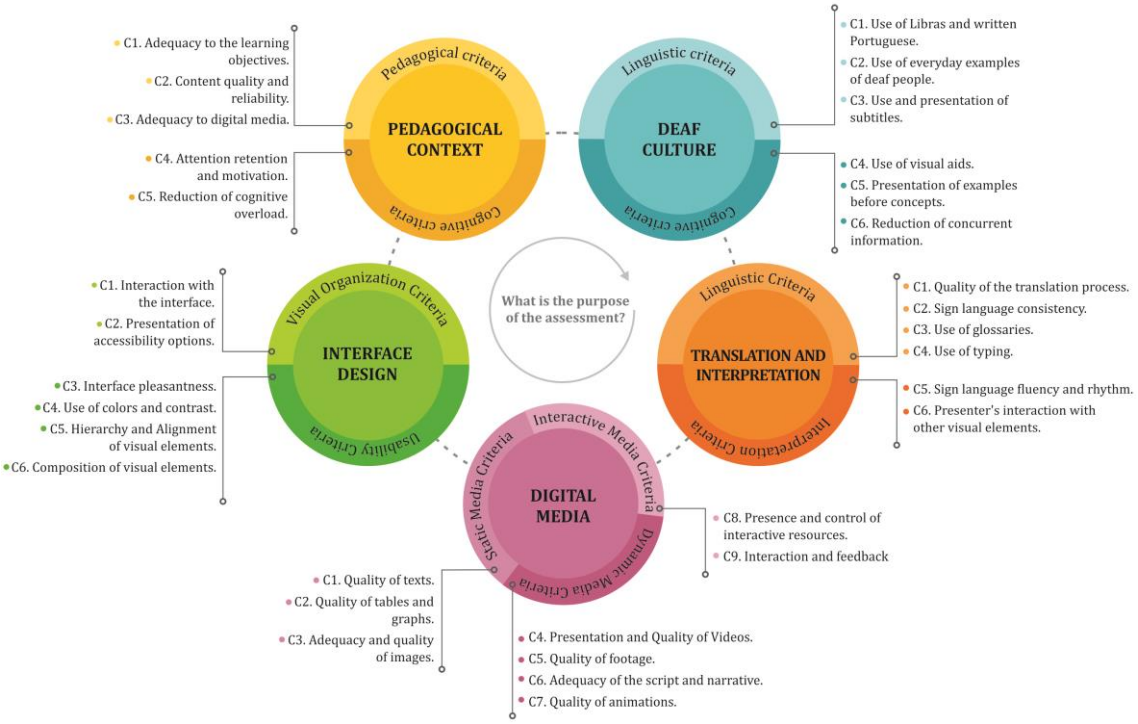

Figure 2: Expanded configuration of the Model for evaluating the design of Bilingual DERs (Libras/Portuguese). Source: developed by the author.

Based on the criteria, an instrument in the form of a checklist was developed to support the assessment, either by a teacher, a user and/or a Project team. This instrument is detailed in the next section.

Checklist to support the assessment of bilingual DERs

According to Dresch et al. (2015), although a model may be imprecise about the details of reality (abstract), it needs to be able to capture the general structure of reality, seeking to ensure its usefulness. Therefore, models are often accompanied by instantiations, in other words, artifacts that operationalize other artifacts, such as complementary guides, checklists and instruments.

In this sense, as the Model is conceptual and the application of the evaluation criteria is flexible, it was considered more appropriate to develop an instrument with questions in a checklist format. The checklist is a list of items that can appear in the form of questions or actions to be taken. They may have a scoring system or inclusion and exclusion of items according to their suitability for the resource that is being evaluated (GODOI and PADOVANI, 2009). Thus, this instrument can be programmed in the future and become a tool, which can be available on a website or applied in a portal or repository.

Next, in Table 1, the checklist presents the evaluation criteria, divided into their categories and followed by questions and examples that help the evaluation. It is possible that DER does or does not fit the criteria or does not apply to the question (Not applicable – N/A).

PEDAGOGICAL CONTEXT Category composed of criteria that assess the adequacy of the educational resource to pedagogical objectives, as well as cognitive and emotional characteristics that allow for the best use of the resource and consequent user learning.			
Pedagogical criteria They refer to the adequacy of the pedagogical proposal and the degree of confidence in the content.			
Criterion 1: Adequacy to the learning objectives.	Yes	No	N/A
a) Is the content of the resource suitable to the school level, teaching unit, objective, proposal, etc.?	( )	( )	( )
b) Does the resource present the pedagogical objective, whether in a supporting PDF, in the virtual learning environment or in the repository?	( )	( )	( )
Criterion 2: Content quality and reliability	Yes	No	N/A
a) Does the resource present information about the origin of the material, such as: author of the material, sources and/or references?	( )	( )	( )
b) Does the resource avoid biases, prejudices, errors and omissions?	( )	( )	( )
Criterion 3: Adequacy to digital media.	Yes	No	N/A
a) Is the choice of the type of digital media aligned with the learning objective? For example, video classes can bring theoretical explanations signaled; infographics can be used to rank information, build timelines; animations can represent spatial and temporal information, as a diagram of information relationships that change over time.	( )	( )	( )
Cognitive criteria They refer to the cognitive and emotional characteristics that allow the best use of the resource and the consequent learning by the user.			
Criterion 4: Attention retention and motivation.	Yes	No	N/A
a) How much can the resource retain the user's attention, engage him and provide affection? For this, the resource can be playful, gamified and/or interactive etc.	( )	( )	( )
Criterion 5: Reduction of cognitive overload.	Yes	No	N/A
a) Does the resource show a reduction in the amount of information?	( )	( )	( )
b) Does it present different levels of theoretical depth? For example: presentation of a basic concept, in order to later explain a new concept.	( )	( )	( )
DEAF CULTURE Category composed of criteria that assess issues related to the use of Libras and Portuguese, visual culture and the adequacy of the resource to the cognitive characteristics of the bilingual deaf student.			
Linguistic Criteria They refer to the use and presentation of the languages involved.			
Criterion 1: Use of Libras and written Portuguese.	Yes	No	N/A
a) Does the DER use Libras as a first language (L1) and written Portuguese as a second language?	( )	( )	( )
b) The main content is presented in sign language.	( )	( )	( )
c) Are the metaphors in Portuguese translated and are the implicit concepts and meanings explained?	( )	( )	( )
Criterion 2: Use of everyday examples of deaf people.	Yes	No	N/A
a) Does the content of the resource contain examples from the everyday life of the deaf? Such as references from deaf culture, such as jokes, deaf	( )	( )	( )

characters, etc., instead of examples based on Portuguese rhetoric and/or auditory experiences.			
Criterion 3: Use and presentation of subtitles.	Yes	No	N/A
a) Does the DER have subtitles in Portuguese?	( )	( )	( )
b) Does it have an option to hide/show the caption?	( )	( )	( )
c) Is the caption synchronized with the signaling and with the presentation of the referring images, as much as possible?	( )	( )	( )
d) Is the subtitle in accordance with the structure of Portuguese rather than a transcription of the signaling?	( )	( )	( )
Cognitive criteria They refer to the visual and cognitive needs of the bilingual deaf user.			
Criterion 4: Use of visual aids.	Yes	No	N/A
a) Does the resource use images, graphics, videos and/or animations to support and complement sign language information?	( )	( )	( )
b) Does it use images in combination with words in Portuguese in order to complement the understanding of the deaf?	( )	( )	( )
Criterion 5: Presentation of examples before concepts.	Yes	No	N/A
a) Does the resource present examples (situations, objects or images) in the signaling, before explaining the concept?	( )	( )	( )
Criterion 6: Reduction of concurrent information.	Yes	No	N/A
a) The resource does not present (or avoids presenting) more than one relevant visual information at the same time (competition of the visual channels). For example, it prevents an animation from being presented at the same time as an important explanation in sign language.	( )	( )	( )
TRANSLATION AND INTERPRETATION Category composed of criteria that evaluate the quality of translation and interpretation and the interaction between the presenter and the visual elements in bilingual DERs.			
Linguistic Criteria Concerning the translation process and the quality of the languages involved.			
Criterion 1: Quality of the translation process.	Yes	No	N/A
a) Does the resource seem to be the result of a careful translation project? Rather than produced in simultaneous interpretation.	( )	( )	( )
b) All information in Portuguese was properly translated to Libras and vice versa.	( )	( )	( )
Criterion 2: Sign language consistency.	Yes	No	N/A
a) Is the sign language used correctly, maintaining its aesthetics and syntax, avoiding the use of signaled Portuguese?	( )	( )	( )
b) Does it use classifiers and examples?	( )	( )	( )
c) Are regional signs and linguistic variations used and valued?	( )	( )	( )
Criterion 3: Use of glossaries.	Yes	No	N/A
a) Does the DER have glossaries or links to access glossaries?	( )	( )	( )
b) Does the DER provide the explanation and/or translation of unknown terms or words in the resource itself?	( )	( )	( )
Criterion 4: Use of typing.	Yes	No	N/A
a) When using touch typing, are spelled words highlighted in writing in the resource? So that the deaf person can have the record written in Portuguese.	( )	( )	( )
Interpretation Criteria They refer to the quality of interpretation and the presenter's relationship with visual elements.			
Criterion 5: Sign language fluency and rhythm.	Yes	No	N/A
a) Is sign language fluent in the DER?	( )	( )	( )

b) Is Libras at an adequate pace? For example, neither too fast nor too slow.	( )	( )	( )
c) DER has no redundancies in translation/interpretation.	( )	( )	( )
Criterion 6: Presenter's interaction with other visual elements.	Yes	No	N/A
a) Does the resource presenter interact with the visuals and graphics? For example, the interpreter indicates or interacts with images, graphics and/or animations.	( )	( )	( )
b) Does the presenter take the necessary breaks during the signaling, in order to allow the user to be able to visualize both the signaling and the important images or texts?	( )	( )	( )

DIGITAL MEDIA Category composed of criteria that assess the quality of the elements of digital media that make up educational resources: text, graphics, images, videos, animations, games, etc.			
Static Media Criteria They refer to elements of text, typography, tables, graphics, images, illustrations, infographics and icons.			
Criterion 1: Quality of texts.	Yes	No	N/A
a) Is the written or sign language text presented in clear and straightforward language, appropriate to the subject and audience?	( )	( )	( )
b) Are the texts ranked in topics and/or numbering?	( )	( )	( )
c) Does the text use fonts with good readability?	( )	( )	( )
d) Is the layout of the texts in a single column, in order to faciltate the reading order?	( )	( )	( )
Criterion 2: Quality of tables and graphs.	Yes	No	N/A
a) Does the DER use tables and/or graphics with clear identification of titles, headings, lines, columns and axes?	( )	( )	( )
b) Do the tables and/or graphs present a complementary explanation in sign language, in order to locate the variables and/or results?	( )	( )	( )
Criterion 3: Adequacy and quality of images.	Yes	No	N/A
a) Does the DER use images according to the style and audience of the resource?	( )	( )	( )
b) Does it present images in good resolution, cropping quality, lighting and focus?	( )	( )	( )
c) Does it present images without exaggeration of shadows, lights and effects, which could harm the main information?	( )	( )	( )
Dynamic Media Criteria They refer to the elements of videos, animations, audio and video graphics.			
Criterion 4: Presentation and Quality of Videos.	Yes	No	N/A
a) Does the video have good resolution, lighting, focus, contrast and chroma key cropping?	( )	( )	( )
b) Is the video quality and framing capable of capturing the details of hands, eyes, mouth and movements?	( )	( )	( )
c) Is the presenter/interpreter of the resource properly sized in conformity with the rest of the video?	( )	( )	( )
d) Is the average duration of the DER on vídeo around 10 minutes? For example, videos that are too long fatigue the user.	( )	( )	( )
Criterion 5: Quality of footage.	Yes	No	N/A
a) Are the lighting, costumes and image of the presenters maintained throughout the scenes?	( )	( )	( )
b) Are camera changes and cuts carefully done, so that they do not impair the understanding of sign language?	( )	( )	( )
Criterion 6: Adequacy of the script and narrative.	Yes	No	N/A

a) Are the script and narrative line constructed according to Libras' linearity? For example, the objects are presented first, then the scene and then the actions.	( )	( )	( )
b) The script prioritizes the development of a playful, light and dialogic narrative.	( )	( )	( )
Criterion 7: Quality of animations.	Yes	No	N/A
a) Are the animations consistent with the theme of the resource? For example, animations for adult audiences can be playful, but not childish.	( )	( )	( )
b) Do animations make proper use of animation principles: timing, anticipation, continuity, etc.?	( )	( )	( )
c) Are the animations clear and concise? That is, they avoid details and effects that might distract the user.	( )	( )	( )
Interactive Media Criteria They refer to the elements of games, hypervideos and websites.			
Criterion 8: Presence and control of interactive resources.	Yes	No	N/A
a) Does the feature present basic control options to the user? For example, apparent volume control, pause, on/off.	( )	( )	( )
b) Does the feature have control on video players? For example, increasing or decreasing speed, turning on subtitles, marking and/or accessing hyperlinks.	( )	( )	( )
c) Does the resource present a menu or summary in the videos?	( )	( )	( )
Criterion 9: Interaction and feedback	Yes	No	N/A
a) Can the user easily interact with activities, games and other interactive resources?	( )	( )	( )
b) Does the user receive responses from his actions and is he able to complete them?	( )	( )	( )
INTERFACE DESIGN Category composed of criteria that assess the visual organization of the interface, as well as the usability aspects of digital educational resources.			
Visual Organization Criteria They refer to the pleasantness of the interface and adequacy to the design of the visual information.			
Criterion 1: Interface pleasantness.	Yes	No	N/A
a) Is the resource's interface suitable for the intended content and audience? For example, it can be more playful, serious or formal.	( )	( )	( )
b) Does the interface present information on the screen clearly, without excessive visual information?	( )	( )	( )
Criterion 2: Use of colors and contrast.	Yes	No	N/A
a) Does the resource use color to rank information and functionality?	( )	( )	( )
b) Do you use contrasting colors between captions, images and background?	( )	( )	( )
c) Does the DER use colors that present contrast between the interpreter and the background of the videos?	( )	( )	( )
Criterion 3: Hierarchy and alignment of visual elements.	Yes	No	N/A
a) Does the interface visually rank the information? For example, it differentiates the most prominent elements by size and color. It approximates blocks of similar information and segments dissonant information.	( )	( )	( )

b) Is the interface visually balanced? For example, it presents alignment between elements, providing the flow and direction of reading information.	( )	( )	( )
Criterion 4: Composition of visual elements.	Yes	No	N/A
a) Is the presenter/interpreter of the resource located in the foreground of the video, and are the images, graphics and animations clearly organized around him?	( )	( )	( )
Usability Criteria They refer to the aspects of use and interaction in the interface and also the accessibility characteristics of the resource.			
Criterion 5: Interaction with the interface.	Yes	No	N/A
a) Is the interface self-explanatory, with fast navigation, logical and easy to understand for different users?	( )	( )	( )
b) Does it present in a clear manner action options such as buttons, links and menus, as well as clear options for going back and getting help?	( )	( )	( )
Criterion 6: Presentation of accessibility options.	Yes	No	N/A
a) Does the resource have subtitles and speed control for vídeos in Libras?	( )	( )	( )
b) Does it have the ability to enable high contrast for low vision and virtual magnifying glass scaling up to 200%?	( )	( )	( )

Table 1: Complementary Checklist of the Model for evaluating the design of Bilingual DERs (Libras/Portuguese). Source: developed by the author.

Conclusion

This work aimed to present the conception and model for the evaluation of the design of bilingual DERs (Libras/Portuguese), as well as a complementary checklist with the evaluation criteria, which resulted from a PhD thesis in Design. In order to characterize the field, an explanation of the design of bilingual DERs and the main characteristics and needs for the design of instruments for evaluation was carried out.

As a result, the model conceived is conceptual, as it represents the domain of evaluation of bilingual DERs through categories and criteria axes. Thus, it can be used to visualize and understand the area and also give rise to different instruments applied from this Model. The proposed and validated criteria cover a large part of the evaluation needs, raised in the research. However, they can and should be updated according to technological advances, the different types of media and resources that arise over time.

The Model is aimed at end users, whether students or teachers, and is useful for selecting quality resources to use or recommending them. It can also be used by teams during the design or evaluation of bilingual resources and can also help portals and repositories in the curation or ranking of bilingual DERs.

Finally, this research favors the demarcation of the space and importance of the Design area in the context of the evaluation of digital educational resources, regarding various aspects of design: different digital media, interface design, adaptation to the context of the target audience, usability aspects etc. It is also believed that this study contributes to the expansion of the theoretical body regarding bilingual interfaces and digital media accessible to the deaf public, as

it explains the complexity of designing interfaces in two languages of different modalities, Libras and Portuguese, and oriented to the deaf culture.

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