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Instrument for User Experience Assessment in Distance Higher Education Services

Instrumento para Avaliação de User Experience em Serviços de Educação Superior a Distância

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Abstract

Considering the expansion of higher distance education (ESaD) and the need for its evaluation through validated instruments, this research sought to propose an instrument aimed at measuring the user experience (Ux) of such services. The research is characterized as applied, qualiquantitative, exploratory and descriptive, being composed of (I) theoretical stage (mapping of dimensions and Ux factors); (II) definition of the pilot instrument (mapping of personas and experience map, definition of the construct and pilot model, validation of the content with specialists (n=8) and users (n=12) and (III) Validation (application of the instrument (n=181), factor analysis and internal consistency). As a result, the Ease-Ux (user experience e-learning service assessment scale) was proposed, consisting of 31 items divided into the dimensions of Central elements (items related to the hub's technological structure, tutoring, disciplines and content, didactic material and final image) and Support elements (items related to communication, processes, technology, support, physical structure of the pole and preview image). Validity and reliability analyzes allow us to say that the instrument concisely measures the construct and can provide data aimed at improving the service. The study also contributes to the Ux and services literature, opening possibilities for new related research.

Keywords: Service design. Higher distance education. User experience.

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Instrumento para Avaliação de User Experience em Serviços de Educação Superior a Distância

Abstract

Considerando a expansão de serviços de educação superior a distância (ESaD) e a necessidade de sua avaliação por meio de instrumentos validados, esta pesquisa propõe um instrumento voltado para mensurar a experiência do usuário (Ux) em tal contexto. A pesquisa caracteriza-se como aplicada, qual-iquantitativa, exploratória e descritiva, composta de (I) etapa teórica (mapeamento de dimensões e fatores de Ux); (II) definição do instrumento piloto (mapeamento de personas e experiência, definição do construto e do modelo piloto, validação do conteúdo com especialistas (n=8) e usuários (n=12), e (III) validação [aplicação do instrumento (n=181), análise de fatores e consistência interna]. Como resultado, foi proposta a Ease-Ux (escala de avaliação de serviços de educação a distância pela experiência do usuário), constituída de 31 itens organizados nas dimensões de "Elementos centrais" (itens relacionados a estrutura tecnológica do polo, tutoria, disciplinas e conteúdo, material didático e imagem final) e "Elementos de apoio" (itens relacionados a comunicação, processos, tecnologia, suporte, estrutura física do polo e imagem prévia). As análises de validade e confiabilidade indicaram que o instrumento mensura de forma concisa o construto, podendo fornecer dados voltados para a melhoria do serviço. O estudo também contribui para a literatura de Ux e de serviços, abrindo possibilidades para novas pesquisas relacionadas aos temas.

***Palavras-chave**: Design de serviços. Educação superior a distância. Experiência do usuário.*

1. Introduction

Reflecting cultural, economic and social trends, ESaD enrollment surpassed that of face-to-face courses in 2020 (Inep, 2020), revealing the consolidation and importance of this educational modality.

This growth implies greater competition between higher education institutions (HEIs) (Carvalho et al., 2020; Luna, 2020), as well as an increase in dropout rates - in 2019, 59% of students dropped out of the course they started a year earlier, citing the following factors as justification: inadequate content (31.2%), problems with teaching materials (22.1%), difficulties/frustrations with technology (16.9%), among others (Inep, 2020). These factors can be related to the service itself and are outside the scope of personal issues (such as motivation, time or financial resources).

It is understood that the relationship between the individual and the service is mediated by various types of interaction, resulting from perception, meanings, forms of use, the act of remembering or thinking, values and functions within the context of use (Krippendorff, 2006; Schifferstein and Hekkert, 2008). Various areas of research are concerned with offering visions for understanding user interaction with artifacts (whether products or services), from different focuses and objectives. Some possibilities include usability, human-computer interaction and user experience (which we will represent by the acronym Ux) (Saffer, 2007). Ux can be used to evaluate systems in a complementary way, and is a necessary activity in user-centered projects (Tullis; Albert, 2013). User research is used to measure it, based on the process of discovering how people interpret and use artifacts, using previously established indicators (Goodman; Kuniavsky; Moed, 2012).

The aim of this is to improve the interaction between the individual, the system and the context in various respects, making it one of the possible approaches to evaluating distance learning services.

We therefore understand the need for evaluations in the university setting, which can benefit stakeholders from both the institutional point of view (HEI managers) and the users of the activities offered in such places (students). Collecting data on the experience during the student journey over time can allow for quick adjustments and improvements in service design[1].

In this way, service design and UX can be related, which makes it easier for these factors to work together through a holistic approach, since both have the user as their guideline and their objectives are directly aligned (Ramos et al., 2016; Rosa, Guimarães; Godinho, 2019).

However, although the literature presents tools and instruments for evaluating Ux, they are too generic for evaluation in specific contexts (Rivero; Conte, 2017; Väänänen-Vainio-Mattila; Segerståhl, 2009), as in the case of distance education.

Therefore, this study asks how to structure a scale that measures the Ux of distance education services, providing data to improve the service provided by HEIs. It is thought that such a proposition will make it possible to assess user perception and respond to the diversity and dynamic nature of the service in question, pointing the way for managers to propose changes that will increase student satisfaction.

1.1. Concept of Distance Education

Based on the concepts of Brazilian legislation on the subject and authors in the field such as Behar (2009) and Moore and Kearsley (2013), it can be seen that the literature presents various definitions of distance education. They complement each other in different aspects, and it is possible to see that the technological factor stands out, followed by the spatial, pedagogical, organizational and temporal. Thus, distance education is characterized by being a planned teaching-learning process, mediated by information and communication technologies, which requires special course creation and instructional techniques, in which students and teachers carry out educational activities in different places or at different times, requiring a special institutional and administrative organization from the offering institution. It should be noted that there are various possible configurations of distance education, in terms of educational concepts, types of learning and the technologies used.

It is considered that the object of study of this research is contextualized in distance education based on the digital environment and its technologies mediated from the internet, with a focus on higher education with a predominantly virtual workload, being a service offered by public and private institutions.

1.2. Education as a service

For Mager (2009), unlike a product, which provides possession of an object, a service provides a benefit, an experience for the user, consisting of "acts, processes and performances offered or co-produced by one entity or person, for another entity or person" (Zeithaml; Bitner; Gremler, 2014, p. 4).

Parasuraman et al. (1985) and Moritz (2005) highlight the main characteristics of services that are also present in distance education: intangibility, heterogeneity, simultaneity, complexity of the experience offered and the need to measure quality.

1 Service design is the activity of planning and organizing the people, infrastructure, communication and material components of a service in order to improve its quality and the interaction between the company providing the service and consumers (Mager, 2009).

Services are interactive, requiring joint action between the provider and the consumer (who is its co-producer - in the case of ESaD, the student is required to interact with various points of contact at the institution, from admission to training). Thus, in order to achieve the strategic objectives set and a course to obtain the desired results, there are elements in the service proposal that require specific management, due to their level of complexity. All of these management issues can benefit from the application of Service Design and UX, which can result in a positive student experience.

Fitzsimmons and Fitzsimmons (2014) define a taxonomy of services, dividing them into: central (main service, the basic activity of the business); complementary (necessary for the proper execution of the central service - without them, you generally can't access the central service) and supplementary (only add value to the overall service, without a direct link to the central service, providing competitive advantage or differentiation). This categorization can be applied to the definition of the ESaD service.

1.3. User Experience (Ux)

Nielsen and Norman (2014) point out that UX can encompass all aspects of the end user's interaction with an artifact, and that in order to achieve a high-quality experience, there must be a continuous fusion of various disciplines involved in the context.

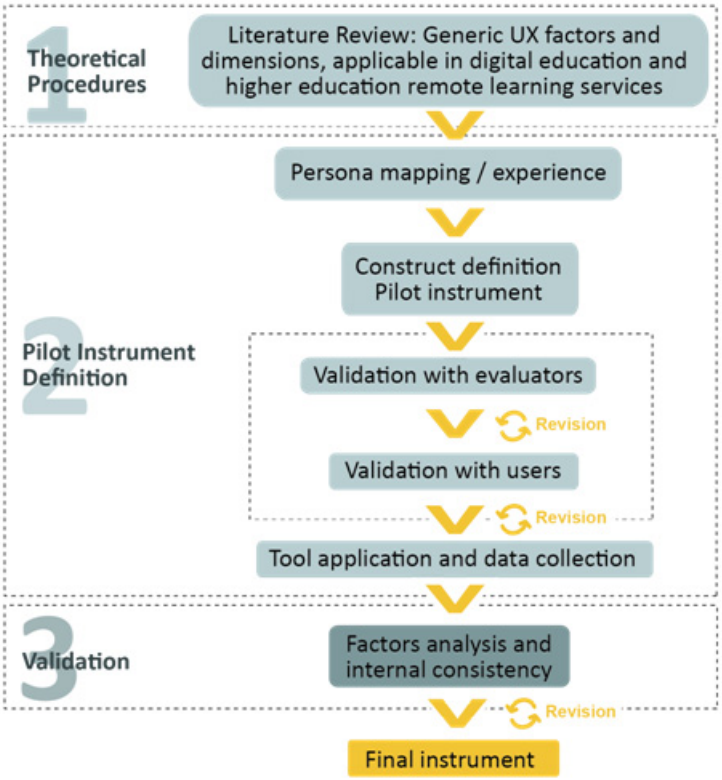
Summarizing the elements found in some definitions of Ux in the literature, it can be seen that it is holistic (it covers all aspects of interaction), its evaluation is done through user responses; it applies to systems-products-services (various interactive systems); encompasses emotions (it is subjective, involving cognitive and emotional aspects and perceptions); is influenced by the user-system-context triad; encompasses the temporal context (before, during and after use) and is divided into hedonic aspects (related to self-realization during interaction with the artifact) and pragmatic aspects (consistent with utility and performance in its use).

UX evaluation is the process of discovering how people use and interpret artifacts, enabling them to be improved interactively (Goodman; Kuniavsky, 2012). This evaluation can be carried out using numerous techniques, and its dimensions or factors must be previously aligned and in line with the user's objective with the artifact. Defining these dimensions is a process that can be based on various methods, such as exploring the literature, consulting professionals within the scope of the evaluation, user surveys, empirical tests, among others.

2. Methodological Procedures

The research presented is classified as applied, qualitative, exploratory and descriptive. In terms of technical procedures, it uses different processes and mixed methods, and is characterized as methodological triangulation. Based on Pasquali's (1998) method for creating scales, three stages were proposed, as shown in Figure 1.

Figure 1: Structure of research procedures



Source: author's own elaboration.

Stage 1 (Theoretical procedures) involved bibliographical research and systematic mapping of the literature, with the aim of identifying Ux dimensions and factors that could be used to structure the pilot instrument.

Stage 2 (Definition of the pilot instrument) used field research to allow greater immersion in the research object (the ESaD service), and consisted of four sub-stages. The first sought to map the main personas and the user's journey in this context, thus raising the Ux objectives and the main touchpoints (CPs) that the instrument would evaluate within the temporal context, complementing the findings of stage 1. Next, the construct, its dimensions and items were defined, structuring a pilot instrument proposal. Subsequently, the instrument proposal was sent to domain experts and ESaD users (via an online questionnaire), with the aim of calculating the content validity coefficient (CVC[2]) of the dimensions and items, and the Kappa index (K[3]). After refinements, the pilot instrument was applied, seeking a statistically adequate sample of ESaD students in order to collect data for the next stage.

Stage 3 (Validation) aimed to verify the validity and reliability of the proposal, and exploratory factor analysis was carried out (AFE)[4] to determine the number of dimensions that influence the set of items and to carry out the internal validation of the instrument.

The project was previously submitted to the Ethics Committee for Research Involving Human Beings of the Santa Catarina State University (CEPSH/UDESC), and received a positive opinion in June 2022 (n. 5.479.694 / CAAE 55656621.0.0000.0118).

2 CVC (Hernández-Nieto, 2002) is a method that measures the proportion or percentage of judges who agree on certain aspects of the instrument and its items.

3 Proposed by Jacob Cohen (1960), it is a statistical method for assessing the level of agreement or reproducibility between two sets of data.

4 EFA is a statistical technique that studies correlations between a large number of variables, grouping them into factors (Hair et al., 2018).

3. Results

3.1 Theoretical Procedures

In order to evaluate UX, it is necessary to find ways of measuring its various aspects. Thus, any instrument is structured from an integration of variables that influence this experience in the scope to be evaluated (Han et al., 2001). For a preliminary survey of the variables of the instrument to be proposed, three systematic mappings were carried out.

The first sought to answer which main pragmatic and hedonic quality factors the literature presents. As a result, pragmatic quality listed efficiency, functionality, ease of use, performance, usability, usefulness, security, control, learning, quality of result, accessibility, adaptability, controllability, error prevention, flexibility, ability to help, ability to "multitask". The hedonic category lists satisfaction, interface pleasure, information, memorability, time context, location context, brand history, advertisement, price, expectation, self-fulfillment, group affiliation, social connectivity, acceptability, comfort, convenience, trust, attractiveness, preference, flow, emotion, affection, excitement, intrinsic motivation, presence, commitment, attraction, enchantment, engagement, tangible magic, interaction aesthetics, relevance.

The second systematic mapping of the literature (MSL) sought to answer which Ux factors are used in evaluations in the context of digital education, listing, in the pragmatic dimension, ease of use, resources, accessibility and effectiveness. In the hedonic dimension, factors related to perceived quality of teaching and learning, varied feelings about the product/system, aesthetics and interaction.

The third MSL sought to answer whether the dimensions and factors used to explore or evaluate the constructs of satisfaction, quality or success, as well as critical success factors in digital education, could be related to the Ux approach in ESaD services. As a result, it was possible to directly relate the approaches, listing nine service dimensions (tutoring, pedagogy, instructional design, service, interface design, functionality, content, institution and communication), as well as various Ux attributes related to each of them.

3.2 Definition of the pilot instrument

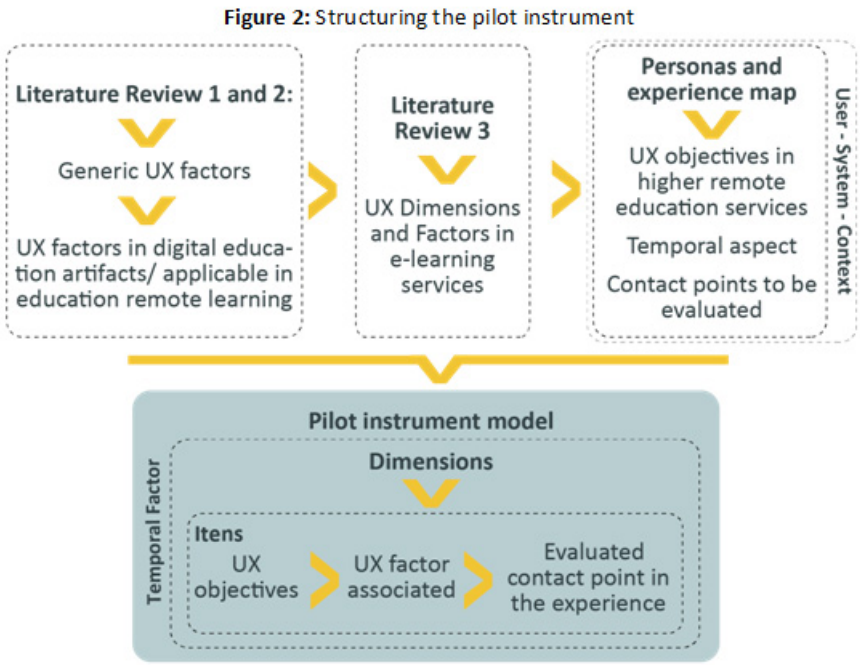
The first step was to understand how different groups of individuals experience this service, answering what the user profile is and which points of contact have a significant influence on the experience of using the distance learning service. Based on the Design Thinking approach [5] (Brown, 2008), exploratory research was used, as well as in-depth semi-structured interviews (with students from public and private institutions/ n=12). The results showed three user profiles with slightly different demographic and service use characteristics - which impact on the number and type of contact points (CPs) used in the experience. The experience mapping surveyed nine PC points before the service, 18 during and five after, both physical and digital.

The next step was the operational and constitutive definition of the construct (Ux in ESaD services) (Rossiter, 2002). Based on the combination of the elements that make up and, at the same time, influence the experience of the ESaD service - identified through the stage of theoretical procedures and mapping of the service experience - it was assumed that the construct was multidimensional, involving: tutoring, course design, administrative support, technological systems, didactic content, didactic material, institutional and course management, institutional communication, institutional image and physical support structure. All these spheres were linked to the temporal approach of the experience (anticipated, momentary and episodic/cumulative) and to the pragmatic and hedonic aspects of UX.

5 Methodology for developing products and services focused on the needs, desires and limitations of users, based on a set of practices and processes for approaching problems based on the experience of the consumer/target audience (Brown, 2008).

Based on the information gathered in the previous phases, the items were formulated. Starting with the time issue, a general Ux objective, a sub-objective (on the part of the user) and a Ux factor to be evaluated for each CP of the service were defined for each dimension. This process is illustrated in Figure 2 below.

Figure 2: Structuring the pilot instrument



Source: prepared by the author.

The stage resulted in a proposal for an instrument made up of 37 items - ten assessing Ux before, 24 during and two after the service. A five-point Likert scale was used in verbal format.

The next stage was content validation, carried out using the content validity coefficient (CVC) and Kappa index (K), with eight experts in the field of distance education [teachers, managers and researchers, four women and four men, aged between 33-54, with master's degrees (three), doctorates (three) or post-doctorates (two)] evaluating the items and the instrument in general using the criteria of relevance and semantics. Regarding the judgment on relevance, of the 37 items, 36 (97.2%) were assessed as relevant, with 24 (66.6%) assessed with perfect agreement (CVI = 1; K = 1) and 12 (33.3%) with almost perfect agreement ($0.75 \leq CVC \leq 0.87$; $0.84 \leq K \leq 0.93$), (overall CVC = 0.94). Only one item had a negative evaluation (CVC = 0.62 and K = 0.84) and was excluded. As for clarity, 35 items (97.2%) were assessed as clearly worded, with 14 (38.8%) having perfect agreement (CVC = 1; K = 1) and 22 (61.1%) having almost perfect agreement ($0.75 \leq CVC \leq 0.87$; $0.84 \leq K \leq 0.93$) (overall CVC = 0.92). According to the suggestions collected, three items were eliminated and 24 had minor wording adjustments.

After refining the previous stage, the content validation process (in terms of semantics) was repeated with 12 distance education students (eight women, four men; ages between 21 and 54 - average of 31 years; six from public institutions and six from private institutions; six above the fifth term and six recent graduates). The 34 items were assessed as clearly worded, with 31 (91%) having perfect agreement (CVC = 1; K = 1) and three (9%) having almost perfect agreement ($0.92 \leq CVC \leq 1$; $0.98 \leq K \leq 1$). No items were removed at this stage, and three items had their wording adjusted.

This resulted in a proposed instrument with 34 items, organized into ten dimensions (institutional image, institutional communication, institutional and course management, technological systems, tutors, course design, teaching content, teaching materials, administrative support and physical support structure).

3.3 Validation

The pilot proposal was structured on the QuestionPro on-line platform®, The free version was pre-tested with two users to assess the dynamics of the application, the way the data was collected and presented, and to check the time it took to fill in (an average of seven minutes).

After prior agreements, the invitation to participate was sent via WhatsApp and email to all ESaD students at one public institution and one community institution - the latter of which presented data within the expected assumptions (a minimum of five times the number of items in the instrument). The sample thus consisted of 181 valid questionnaires, answered by different classes on the Public Management course at the Florianópolis (SC) hub. Of the respondents, 81 declared themselves to be male (37%), 135 female (62%) and one marked other (0.5%). The age range was 18 to 73 years, with an average of 31 years.

The data collected was processed using Factor software (Ferrando; Lorenzo-Seva, 2018).

Although the number of participants in the study was within the range suggested by the literature, we sought to analyze the adequacy of the data in order to proceed with exploratory factor analysis (EFA), which is indicated for such cases. The KMO test 6 (without removing variables) resulted in an overall value of 0.79, considered good, above the minimum acceptable value (KMO = 0.50). Bartlett's test of sphericity7 made it possible to reject the null hypothesis that the variables were not related to each other (chi-square = 1.483.2 and p = 0000), with a 95% confidence interval (CI).

One item was removed, as indicated by the measure of sampling adequacy (MAS), and we proceeded to analyze the number of factors to be extracted.

As a first test, the parallel analysis (PA) method was configured to extract ten factors (as proposed in the pilot instrument), resulting in an unsatisfactory grouping of the items, as well as 11 with cross-factorial loadings and values close to each other.

The result suggested the extraction of two factors (CI = 95%). The structure proved to be multidimensional (UniCo > 0.86 and ECV > 0.75)8, The instrument can thus be divided into two sub-scales, which can be added together to form a single overall score.

Considering the bifactor structure, new EFAs were carried out in order to adjust the items. The first analysis reassessed the adequacy of the sample (MSA), indicating acceptable values for all the items. Thus, attention was paid to the factor loadings of each item, and those that did not reach the minimum value were eliminated one by one (in order to minimize the removal of questions from the instrument). At this stage, two items were removed and one obtained a cross-load on two factors (not yet removed). A new EFA was carried out, indicating adequate loadings of all the items on their respective factors.

Considering the adjusted structure, the KMO test resulted in 0.84, considered optimal. Bartlett's test of sphericity again allowed the null hypothesis to be rejected (chi-squared = 1,521.6; df = 435; p = 0.000010). The final factor structure showed adequate fit indices, with χ^2 (df) = 4858; gl = 376; Root Mean Square Error of Approximation (RMSA) = 0.00; Comparative-Fit Index (CFI) = 0.99 and Tucker Lewis Index (TLI) = 1.04.

6 KMO (Kaiser-Meyer-Olkin Measure of Sampling) is a statistic that indicates the proportion of variance in your variables that may be caused by underlying factors (Hair et al., 2018).

7 Bartlett's test of sphericity tests the hypothesis that its correlation matrix is an identity matrix, which would indicate that its variables are uncorrelated and therefore unsuitable for detecting structure (Hair et al., 2018).

8 UniCo (Unidimensional Congruence) and ECV (Explained Common Variance) are statistical inference measures that indicate the dimensionality of the instrument (Hair et al., 2018).

The H coefficient was 0.94 (factor 1) and 0.93 (factor 2) (above 0.80), confirming that the set of items represents the target construct (experience in distance education services) and indicating the replicability of the factor structure in future studies.

Finally, values of 0.90 were obtained for composite reliability and 0.94 for McDonald's omega (ω)9, considered optimal, indicating the reliability of the instrument.

4. Discussions

Ux in an ESaD service is perceived as a consequence of various factors related to the service offered, such as the core service - linked directly to the desire to achieve the Ux objective in question - and the supporting elements - which help to achieve the main goal. These elements are interrelated within a lapse that occurs over time, in which the student interacts with different points of contact, with some interactions being unique in the journey (e.g. the admission process) and others being permanent (e.g. interaction with the VLE system). The structuring of an evaluation tool based on this context resulted in the scale for evaluating distance education services by user experience (Ease-Ux).

The proposal consists of 31 items, organized into factor 1 (13 items) and factor 2 (18 items). Despite having fewer items, factor 1 accumulates a greater weight in explaining the latent trait, considering that, of the variance accumulated after extracting the two factors, 37% derives from factor 1 and 8% from factor 2.

Considering the structure of factor 1, it can be seen that its items are related to the experience with contact points during and after the service. The items with the highest factor loadings are related to resources directly linked to learning itself and its general evaluation: tutors, their knowledge, their ability to pass on content and evaluate students; the usefulness, organization and relevance of the course subjects; the content itself; the attractiveness and interactivity of the teaching material and the final evaluation of the whole experience. These items are linked to the main objective of Ux in ESaD - learning, i.e. the central and explicit service.

Factor 2 encompassed 18 items dealing with the experience with points of contact before and, some, during the service. The items with the highest factor loadings are related to supporting or complementing the achievement of the main Ux objective, and are related to the image of the course; the means of communication and information used during the experience; the selection process that allows students to enter the institution; the various technological systems (which are fundamental support in distance learning courses); the availability of human resources (teachers/tutors and administrative teams); the academic organization and physical structure of the hub. These items are related to implicit, complementary and supplementary services. Factor 1 (with the greatest impact) was therefore labeled as core elements, and factor 2 as support elements.

The greater weight of the factor that deals with items linked to the central service can be analyzed according to the profile of the student who uses the distance learning service, as it identifies a greater pragmatism towards the end goal of the experience. Thus, items that have a more direct relationship with this end are more highly valued. It is understood that the items that address elements of tutoring, subjects, content and teaching material are correlated in an integrated learning process. On the other hand, support items, although important, are less perceived or have less impact on the main journey, such as institutional communication at various stages of the experience, processes related to course management and the institution, evaluation of technological elements and human support in general (tutoring or secretariat).

9 Composite reliability and McDonald's omega are reliability measures to quantify random measurement errors that exist in a sum or average score generated by a multi-item measurement scale (Hair et al., 2018).

Although the items are statistically in a bifactor structure, we tried to regroup them into aspects/sub-factors to better organize the results: image of the institution (pre-experience - initial and final perceptions of the reputation of the course and the institution and its link to the overall experience); communication (perceptions of the adequacy of the information provided by communication channels before and during the course); processes (perceptions of the efficiency and adequacy of the registration, selection, enrollment and course management processes); technology (perceptions of the usability, accessibility and usefulness of the various technological resources used during the course); support (perceptions of the access to and quality of human support, including tutoring and administrative support); structure of the hub (perceptions of the adequacy and availability of the hub's physical facilities); tutoring (perceptions of the skills and attitudes demonstrated by teachers, tutors, monitors and the evaluation and feedback processes); subjects and content (perceptions of the applicability, importance, relevance, offer and organization of the course's didactic content); didactic material (perceptions of the quality, interactivity and suitability of learning resources and supports); image (post-experience) and structure of the hub (perception of the suitability and availability of technological facilities, such as internet, computers and equipment).

5. Final considerations

In a scenario of expanding distance learning, institutions need tools that can help them manage the services they offer, a fundamental issue in attracting and retaining students, and one of the possibilities is to evaluate the experience offered.

Considering the lack of Ux tools focused on this issue, the research questioned how to propose a tool to evaluate the user experience throughout the course, allowing periodic evaluations aimed at improving the management of HEIs. It is believed that by proposing Ease-Ux, the main objective has been achieved.

The development of the scale made it possible to review the literature in various aspects, delving deeper into the object of study and surveying dimensions, factors and metrics both generic and also applied to educational artifacts (especially in distance education), which made it possible to collect data for structuring the instrument. It was possible to draw up three personas as extreme profiles of the service, and the mapping of the user's journey indicated 12 points of contact before, 18 during and five after the service. In addition, the Ux objectives in the context were identified, making it possible to relate them to the main touchpoints to be evaluated. Based on the data collected in the previous phases, it was possible to integrate the knowledge towards the construction of the pilot instrument, resulting in an initial structure made up of 37 items, distributed in ten factors. With the pilot instrument, we moved on to the content validation of the instrument, which took place with the participation of experts and students, allowing for greater certainty in the definition of the dimensions and items. The validation of the instrument indicated a two-dimensional structure - with essential and supporting elements that group together items related to the core service and supplementary/complementary ones. The final factor structure showed that the instrument was a good fit and confirmed that the set of items represents experience in distance education services, indicating that the structure could be replicated in future studies.

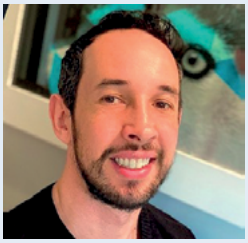
After all the above steps, the result was the Ease-Ux, made up of 31 items, assessing Ux before, during and at the end of the service.

It is understood that user experience (UX) has become a critical factor for the success of products and services in an increasingly digital world. The survey results in a scale to evaluate it effectively, capable of providing valuable insights into users' perception and satisfaction with the distance learning service. The inclusion of open questions can provide additional qualitative data and deepen the understanding of the experience.

A limitation of the research is the sample size at the instrument validation stage. Although within the recommended standard, it could have been larger, increasing the statistical precision of the results.

It is believed that the proposed scale addresses the lack of validated instruments for evaluating Ux in the context of distance education. In this way, HEIs can benefit from having a unique instrument available, allowing them to systematically and reliably measure students' perception of the quality of the experience with the service offered. In addition, the results can indicate the strengths and weaknesses of the educational environment, identifying areas that need to be improved in order to enhance user satisfaction and engagement. The proposal also contributes to the literature and future studies dealing with Ux and services in education.

Biodata and author contacts



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