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# Student experience scale: Factor analysis in higher education institutions

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**Introduction:** In the context of higher education, the student experience (SX) has an important impact on student satisfaction and the perceived value of the training service received. For these reasons, higher education institutions (HEIs), which are focused on student-centred learning, need to know more about the experience that results from student interaction with the service and support systems that meet their needs in these institutions. However, despite the progress made in the analysis of SX, further research is still needed to know how to measure and manage it, and for this, it is essential to know the student's perceptions.

**Methods:** For this reason, an SX scale was selected to have a suitable tool for experience management. Thus, the psychometric properties of the selected scale were evaluated in undergraduate students at two Colombian universities. The validation process consisted of an adaptation of the scale, a content validity analysis, an exploratory factor analysis and a confirmatory factor analysis.

**Results:** The results were satisfactory showing the reliability and validity of the student experience scale in the context of universities.

**Discussion:** Therefore, its cross-cultural goodness is confirmed in the student segment and it is suggested to perform this same process for other university audiences.

KEYWORDS

**psychometric assessment, student experience, higher education institutions, student satisfaction, scale validity and reliability**

## 1. Introduction

The student experience (SX) has been a topic of great interest to the higher education services sector since the beginning of 2010 to date (Matus et al., 2021). The changes and trends brought about by globalization and the commercial focus of higher education institutions (HEIs) (Brumby, 2014; Dropulić et al., 2021), have led these organizations to seek financial sustainability and to improve their image and reputation in relation to their competitors (Altbach et al., 2009; Aleixo et al., 2018; Izquierdo-Yusta et al., 2021). Similarly, the constant transformation of HEIs (Friga et al., 2003) has led to their strategic and management approaches being influenced by other factors, for example, the connection with industry (Collofello, 2000; Friedman and Deek, 2003) which is essential to know the relevance of the academic program, especially in the social sciences; the influence of public policies in higher education (Puentes, 2019); the increased use of information and

communication technologies (ICT) that impact on the learning experience in the classroom (Tang and Austin, 2009), among other variables. In this regard, the intensive use of ICT applied to higher education has influenced the roles of teachers and students, as well as the management of HEIs (Izquierdo-Yusta et al., 2021). This increased even more during and after the COVID-19 pandemic (Román, 2020).

Moreover, the concept of SX is characterized by its imprecise use in higher education (Pötschulat et al., 2021) and does not have a universally accepted meaning. This concept is often adapted to the specific objectives of each study, as mentioned by Matus et al. (2021), and in general, it has been a variable widely criticized by some experts due to the inconsistencies that can arise (Tan et al., 2017). Despite this, the focus on defining and developing experience improvement strategies has been an increasing emphasis in recent research studies (le Roux and van Rensburg, 2014; Pötschulat et al., 2021). SX is recognized as a substitute for quality in today's highly competitive educational context (Klaus and Maklan, 2013). However, some consensus has been reached, where authors argue that SX is the result of their interaction with products, services and systems provided by HEIs, especially those that prioritize student-centred teaching and are oriented towards learning processes (Matus et al., 2021).

Another feature of the study of SX in higher education settings is the relationship with several variables. This was evidenced, in the study by Chandra et al. (2018), who found that educational service characteristics have an important relationship with SX and conclude that HEIs should focus on improving experience levels by providing high quality of services to compete in the market and gain profits. Moreover, Klaus and Maklan (2013) said that experience is a key determinant of consumer behavior and becomes a key strategic objective, especially for companies in the service sector. Similarly, Nadiri et al. (2009) concluded that service quality in higher education is related to student experience and satisfaction. In this respect, it is claimed that SX refers to the satisfaction they have with the services and educational programs offered by HEIs (Yap et al., 2022). However, authors such as Izquierdo-Yusta et al. (2021), differentiate satisfaction from experience; for example, satisfaction is more objective and related to the results, while experience is more subjective in nature, taking as a reference not only the result but also the process (Srivastava and Kaul, 2016; Shapiro et al., 2017; Izquierdo-Yusta et al., 2021).

The importance of the study of SX becomes evident given the different theoretical and empirical positions found in research. It is also relevant to understand that students may have varying expectations of the levels of service quality they expect to find in the HEIs where they choose to pursue their training program. For this reason, HEIs are required to understand and manage these expectations effectively to achieve positive student experiences in order to attract and retain students (le Roux and van Rensburg, 2014). This implies the need to develop strategies to solve non-conformities and to carry out continuous improvement aimed at achieving quality in the educational service (Yap et al., 2022). In the case of private HEIs, the pressure is greater as they have to meet budgetary targets to ensure their financial sustainability, therefore they have to create and develop innovative strategies to attract and retain students (Xu et al., 2018). Competition for both students and resources for the development of the substantive functions of research and relations with the external sector in the context of higher education is becoming increasingly intense (le Roux and van Rensburg, 2014). But in this reality, it is important not to lose focus of the fact that HEIs fulfil a social, academic, and educational function. But its greatest commitment is to the offer to students, who rely on the HEIs to help them develop their skills, abilities, competencies, attitudes, and values for their future professional development (Olmos-Gómez et al., 2020). Therefore, students become a consumer of academic services and, consequently, the focus of university activity (González-Marcos et al., 2016).

Due to its importance, several scales and questionnaires have been developed to assess customer experience, and from these, adaptations have been made to assess SX. These evaluations, together with the comments collected, become an effective tool for improving the quality of both the academic programs and the HEIs themselves (Chandra et al., 2018). But these have been subject to various criticisms, as SX is usually assessed on the basis of satisfaction (Matus et al., 2021), and also because the methods used are questionable (Sabri, 2013; Callender et al., 2014), and insufficient to encompass the concept of experience (Pötschulat et al., 2021). In this respect, research such as that carried out by Pötschulat et al. (2021) has taken the Russell Group study as a source of information. The research identified that HEIs have implemented several strategies, including the establishment of 'student experience' committees, offices, and departments in United Kingdom universities. They also found that there are several measures for assessing the performance of HEIs and among their criteria is "student experience." These measures include national student surveys, the TESTA (Transforming the Student Experience through Assessment) test and the QS World University Rankings. Additionally, Matus et al. (2021) identified that experience is measured by instruments such as the National Survey of Student Engagement (NSSE), the Student Experience in the Research University Survey (SERU-S), the Student Experience Survey (SES) and, the Student Experiential and Engagement Value Index (SEEVI), all of them related to the quality of the education they receive from HEIs, based on satisfaction with the quality of the education they receive. The research by Pötschulat et al. (2021) and Matus et al. (2021) measures differently. The former considers SX as a relevant factor within a broader questionnaire that addresses other variables, while the latter approaches SX as a complex construct that deserves to be studied across several factors.

Against this background and taking into consideration the importance of the study of SX for HEIs, and the already developed and validated proposals of scales in the educational context, this article aims to adapt and confirm the factors of the SX scale proposed by Xu et al. (2018). These authors explored the development of a six-factor scale, consisting of *student-centred*

*service, diversity and global citizenship, co-production of the learning experience, teacher dependence accountability and whole-person development,* which measures SX in the context of higher education, using a mixed-method approach. In this study, the scale was translated into Spanish and adapted to the Colombian context, retaining students from private HEIs as the target population, to assess its psychometric properties and thus provide evidence of its reliability and validity. This was carried out because Xu et al. (2018) designed the scale from an exploratory perspective and in this study, they sought to provide confirmatory validity to the instrument. This article presents the results of the research in the following five sections. First, the theoretical framework of customer experience and SX is established; second, the methodology used is described; third, the results obtained are shown; fourth, the discussion of the findings is addressed; and finally, the conclusions are presented.

## 2. Theoretical framework

### 2.1. Customer experience and student experience

The concept of customer experience and SX is often used indistinctly in the literature. However, it is important to keep in mind that although the concept of SX is born from the customer experience, calling the learner "customer" has brought some disagreements among researchers, and also conflicting positions (Eagle and Brennan, 2007; Matarranz and Garcia-Madariaga, 2021). Pötschulat et al. (2021) claim that "Academic uses largely take 'the student experience' at face value, in the process muddling measures of student satisfaction, socialization outside the university and pedagogy" (p. 4). For this reason, this research distinguishes and differentiates the two concepts, following the objective set by Matus et al. (2021), who conducted a systematic literature review to clarify the concept of SX in higher education. Given this scenario, this research develops a general review of the two terms to contextualize the research conducted, so it first presents a conceptualization of customer experience and then the conceptualization of SX.

#### 2.1.1. Customer experience

In the context of marketing, the concept of customer experience was born at a time when both businessmen and academics noticed that people were not focused on the product but on the satisfaction generated by the experience (Abbott, 1955). In the development of this concept, the contributions of authors such as Kotler (1967) are recognized, Howard and Sheth (1969), who made theoretical contributions to the understanding of the customer experience (Lemon and Verhoef, 2016). This experience implies a successive and gradual process over time, in which the client actively participates from the beginning and even in advance and develops an emotional bonding resulting in a unique and differential experience, standing out from the proposals offered by the current market and which become common for the client (Dewey, 1963). Therefore, from an analysis of human behavior, the importance of emotional aspects in decision-making and experience are pointed out (Holbrook and Hirschman, 1982). Later, Pine and Gilmore (1998) stated that experiences are something different in goods and services, indicating that a consumer buys an experience to become personally involved and enjoy the activities and events that the company planned, to have a memorable time. For these authors, successful experiences are those that a customer finds unique, due to something extraordinary, memorable, and sustainable, which refers to the fact that they will repeat the same behavior in the future.

Experience is also the result of the different levels of interaction that the customer has with the elements of the environment designed and created by a service provider organization. As a result of this interaction, unique sensations and knowledge are generated which will be conceptualized as experience (Gupta and Vajic, 2000). In this sense, the experience is the internal and subjective result of all the direct and indirect points of contact that the customer has with the organization. Direct contact refers to the purchasing process and indirect contact refers to all those intentional marketing actions, the same word of mouth recommendations and contacts that have been planned with an employee or representative of the company (Meyer and Schwager, 2007). For Jain et al. (2017) it is an internal, holistic, and subjective reaction to any contact, both direct and indirect, that a customer has with the organization. An excellent customer experience can significantly increase the likelihood of recurring transactions with the company, as well as the likelihood that they will tell their friends and family about it (Kumar et al., 2007). It should be noted that each point of contact, which may or may not be within the organization's control, must be managed (Homburg et al., 2017). The customer experience construct focuses on a customer's cognitive, emotional, behavioral, sensory, and social responses to a company's offerings (Lemon and Verhoef, 2016) and in turn is influenced by sensory, cognitive, behavioral, and relational values (Schmitt, 1999). For Lemon and Verhoef (2016), the customer experience is considered a multidimensional construct understood as the "journey" which the customer undertakes with a company over a period of time, associated with the buying cycle, which implies a proximity to multiple contact points. This journey includes action and performance at all steps of the consumer purchase process, ranging from the pre-purchase, purchase, and post-purchase phases (Lemon and Verhoef, 2016). Fitzsimmons and Fitzsimmons point out that experiences should "create added value by engaging and connecting with customers in a personal and memorable way" (Fitzsimmons and Fitzsimmons, 2006, p. 11).

Several studies have shown that customer experience has a direct influence on satisfaction, loyalty, and customer satisfaction (Anderson and Mittal, 2000; Caruana, 2002; Shankar et al., 2003; Fornell et al., 2006; Klaus and Maklan, 2013; Ali et al., 2016), and in the word of mouth (Keiningham et al., 2007). At the same time, it has been shown that experience has a positive effect on customer

emotions and behavioral intentions, and that this relationship is mediated by customer satisfaction (Tsaur et al., 2007). Therefore, the customer experience must be a priority for marketing and must be managed appropriately to gain an advantage that differentiates it from the competition (Sujata, 2014). Moreover, those experiences categorized as "memorable" have also been found to affect a change in customer behavior in the short term by influencing emotions to establish a close relationship that will influence a rational response, and ultimately the purchase of a product or service (Ahn and Back, 2018). Fatma (2014) developed a conceptual model of the antecedents and consequences of the customer experience, categorizing it into three stages, the pre-experience, the customer experience, and the post-experience. Pre-experience relates the activities of imagining, searching, planning, and budgeting the experience. The experience stage has as its antecedent's brand performance, multi-channel interaction, service interface, physical environment, social environment, price and promotions, and is further categorized into emotional, functional/pragmatic, and relational values and sources. Finally, the post-experience stage addresses issues such as pleasure, entertainment, learning, skills, nostalgia, fantasizing, and evangelization, and in turn has implications for customer loyalty, satisfaction, and value.

In addition, the evaluation of the experience is the result of the comparison between the customer's expectations and the results of the interaction with the company in the different interactions and moments (Ebrahim et al., 2016). Taking into consideration the proposal made by Sheth et al. (1999), the experience is based on the concept of customer attitude, which is the result of three factors, the characteristics of the stimulus, the context, and the situational variables. To measure customer experience, Maklan and Klaus (2011) mention six basic principles; first, it is necessary to evaluate it as an overall perception of customers and not only the shortcomings of their expectations; second, the evaluation is based on the overall value of use and not on the sum of results during some episodes of the service; third, the experience has a broader scope than proposed by the SERVQUAL tool, as it includes emotional and social components; fourth, the experience starts before the first encounter and continues until after the first encounter; fifth, the experience takes into consideration all service encounters in all channels; sixth, the measure should be linked to customer behavior and business performance. These principles provide clarity on the approach by which customer experience should be assessed and highlight the difficulties that may be encountered by research that takes as its benchmark certain scales that are not designed to measure experience as a holistic concept beyond satisfaction.

### 2.1.2. Student experience

Experience in services, such as higher education, is different from others, as such experience is longer and has more interactions with different stakeholders (Xu et al., 2018). Therefore, the competences in the educational model are those that represent the value that the student obtains from his or her experience at HEIs (Dziewanowska, 2017). This competence development makes the process a lengthy one as it involves different aspects of each step including the search for internal and external information and the assessment of past experiences (Lemon and Verhoef, 2016). In the framework of higher education, institutional policies designed to improve the quality of education have focused on SX and have generated various initiatives such as the implementation of best practices in the teaching-learning process, support for diversity and inclusion, among others, where the student plays an active role; in parallel to the usual aspects of assessment, such as the adequacy of learning resources, classroom design, and the achievement of learning outcomes (Calma and Dickson-Deane, 2020).

### 2.1.3. Review of instruments for measurement of the student experience

SX is a relevant factor determining the success of HEIs (Shapiro et al., 2017). Therefore, authors such as Nadiri et al. (2009) assert that universities should focus on attracting, serving, and retaining students, taking into account both their needs and their perceptions before and after the service, as these are directly related to the quality of the service. In the systematic review by Matus et al. (2021), the authors found that the concept is used repeatedly by HEIs for advertising purposes to attract students, as an indicator of quality and/or satisfaction, and goes beyond the teaching-learning process to involve interactions outside the classroom. In this sense, Matus et al. (2021) also conclude that, according to the studies analyzed, the student experience focuses on three aspects, learning and teaching, student engagement and student well-being. In addition, they identified three dimensions, the social, educational, and personal dimensions.

The measure of SX takes into consideration the "earnings "obtained by the student because of the quality of the service (Clemes et al., 2008). For Clemes et al. (2013) there are four sub-dimensions of quality: academic development, general education, professional preparation, and personal development. On the other hand, Yap et al. (2022) in their literature review they found the 20 most cited SX attributes, and in their factor analysis these were grouped into five categories. The first relates to the professionalism and competence of teachers, the second focuses on the quality of academic services and support facilities, the third addresses interpersonal connections and external considerations, the fourth concerns program design and course content, and finally the fifth relates to the physical environment and facilities.

The research led by le Roux and Van Rensburg (2014) has a prominent importance as it sought to contribute to the understanding and application of customer/student experience measurement in the higher education environment, the scale contained 18 statements measuring the experience of service encounters with administrative staff. In addition, there was the Student Consumer Questionnaire (SCOQ) developed by Koris and Nokelainen (2015) which sought to identify the categories of SX in HEIs. The questionnaire is divided into two networks, the institutional network, and the learning situation network, in the institutional network the following categories are grouped together: student feedback, graduation, curriculum design,

communication with service staff, rigor. The following categories can be found in the learning situation: grading, classroom behavior, classroom studies, individual studies, teaching methods, course design. Koris et al. (2015) published another article, where they tested their questionnaire on students at one university, finding that students expect HEIs to be "customer" oriented in some but not all educational experiences.

Similarly, Bertaccini et al. (2021) assesses the overall quality of the university experience of graduates in terms of internal and external effectiveness using the ECSI index (European Customer Satisfaction Index). This study identified eight latent variables, motivation to attend HEIs and enroll in study programm, expectations in relation to future work, perceived quality of support facilities, perceived quality of teaching and administrative staff, value of university experience, loyalty and career, external effectiveness of the training program in relation to work and training measuring the external effectiveness of the degree issued by HEIs in relation to the need for further training.

In addition the scale proposed by Xu et al. (2018) was considered as it was applied in higher education, and investigates students' perception of their roles, as well as the study conducted by Naylor et al. (2020) in Australia where it is ratified that students can have different roles, the first referring to students as evaluators, the second, students as participants who are involved in decision making, the third, which identify students as co-creators of the service with a more active role, and finally, in fourth place are students as agents and leaders of change. Reviewing the rigor of the exploratory study by Xu et al. (2018), the authors identified how educational experiences as measured by six factors, namely student-centered service, diversity and global citizenship, co-production of experience and learning, teacher dependence, accountability and whole-person development, influence their satisfaction with their choice of university. For the purposes of this study, this scale is selected for its relevance, the completeness with which the authors designed it, its statistical results, and its recent application. The equations should be inserted in editable format from the equation editor.

# 3. Methodology

## 3.1. Design

This research is quantitative and cross-sectional. The validation procedure of the experience scale was carried out with undergraduate students from private universities in Colombia, including cultural adaptation, which was composed of a careful selection of the scale, translation and back-translation of the scale, and content validity through expert judgement. The questionnaire was then applied, after approval by the Research Ethics Committee of the Universidad del Rosario in the Social Sciences Room, and with the data extracted, an exploratory factor analysis (EFA) was carried out using the Statistical Package for the Social Sciences (SPSS), followed by a confirmatory factor analysis (CFA) using SPSS AMOS. A summary of the validation process is shown in Figure 1.

## 3.2. Sample and participants

The scale was applied at two universities to students, of legal age, enrolled in undergraduate programs with a population of 3,270 students enrolled by the end of 2020 (Ministerio de Educación Nacional, 2022). A total of 484 surveys were collected from undergraduate students by means of convenience sampling. The sample consisted of 58.9% females and 41.1% males. In terms of age, 68% of participants were between 18 and 21 years old, 18.2% of participants were between 22 and 25 years old, and 13.8% were over 25 years old. The students who responded to the survey were in their first year 18.6, 35% in their second year, 26% in their third year, 13% in their fourth year, and 7.4% in their fifth year.

## 3.3. Scale

As mentioned, for the study of SX, the scale proposed by Xu et al. (2018) applied in higher education is considered, which uses a Likert scale of 1–5, which is composed of 24 statements and six factors, which are described as follows:

1. *Student-centered service:* It addresses teaching, service, administrative support, and consideration for students. This factor is relevant in higher education, on which student-centered models of higher quality experience have been designed (Clewes, 2003) and it has also been shown that student-centered teaching leads to student success and higher job satisfaction for teachers (Weimer, 2002).
2. *Diversity and global citizenship*: It includes prospective issues, such as the future of the industry, relationships with students and prospective students, cultural differences and the wider citizenship in which they develop their training experience. In this regard, Tan et al. (2016) found that students' self-esteem and social ties have direct positive effects on their civic behavior, which has an important

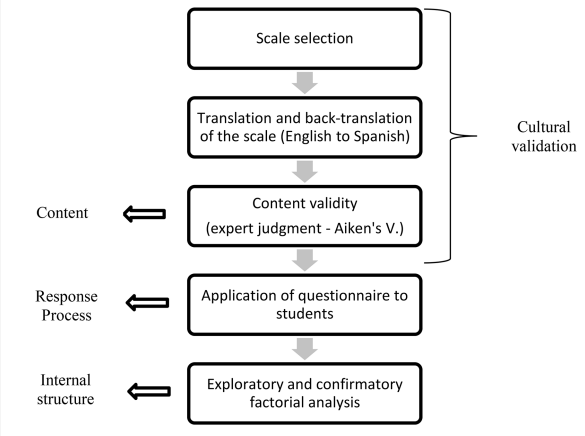


FIGURE 1
Validation process performed.

impact on relationship marketing strategy and on improving students' experience on campus.

3. *Co-production of experience and learning*: This factor considers the active role of the student in their formative process and looks at the contributions the student makes in the classroom, their participation in projects, relationships with peers and demonstrated leadership. In fact, co-production models have also been developed on this factor, such as the one proposed by McCulloch (2009) who mentions that it is the appropriate way to understand the relationship between the student and the university in the "marketized" context of higher education. Further, in more recent contexts, the importance of the student's active participation in the co-creation of the experience was recognized (Dropulić et al., 2021).
4. *Teacher dependence*: The relationship that students have with their teachers is fundamental to their experience. This factor inquiries about the behavior of teachers, the motivation they develop in the learning experience, the extent to which they deliver knowledge, the teaching methods they use to attract attention and how they can influence the personal issues of their students. Similarly in the study by Yap et al. (2022), the teacher factor and teacher competencies were found to have a significant relationship with satisfaction and SX.
5. *Accountability:* This factor relates to the student's behavior in assuming academic responsibilities to self and others, as well as their ability to solve problems. In this regard, Havenga and De Beer (2016) stated that self-management and acceptance of responsibility are part of the learning process that determines the academic success of students.
6. *Whole-person development*: It addresses issues such as social responsibility, ethical behavior of students, and the conditions for creating well-rounded students. It is also important to mention that there are different elements of the environment that can influence the SX, their learning process and their personal development (Jones, 2018).

To adapt the scale, the first step was the translation from English to Spanish by two bilingual experts in the field of marketing. Second, the scale was back translated into English and reviewed by two experts, who agreed with the original version, only made an observation on the perceived value instrument, since the translation mentioned the word "career" and "degree" was suggested as more appropriate. Table 1 shows the codes and items in both English and Spanish.

## 3.4. Statistical procedures

For the analysis of the scale, a validation process was carried out consisting of a content validity analysis, an Exploratory Factor Analysis (EFA), and a Confirmatory Factor Analysis (CFA). There is a description of each aspect below.

### 3.4.1. Content validation

The Aiken V statistic was used to validate the content of the scale (V). This statistical test is the result of the evaluation of a group of expert judges on a series of aspects of a scale (Aiken, 1980; Aiken, 1985). The possible outcomes are evaluated from zero (0) to one (1), where a value of one implies a perfect level of agreement among the judges, and a value of zero implies widespread disagreement. The value of this statistic is considered acceptable after values greater than 0.7 (Merino and Livia, 2009). For this study, the following aspects of the Spanish version of the scales were assessed: relevance, pertinence, response induction, sufficiency, clarity, and wording, as well as the scale of the response, and each of these aspects was evaluated on a scale of one (1) to five (5). Eight professionals, all with master's degrees, seven of them marketing or related professors, with average experience in research processes as well as one entrepreneur, were invited to give their judgement for the scale of student experience.

### 3.4.2. EFA

Based on the results obtained in the content validation, a EFA was carried out to determine the possible grouping of the items of each of the scales in the student population under study. The Kaiser–Meyer–Olkin (KMO) statistic and Bartlett's test of sphericity (BTS) were used to check whether the data were suitable for this type of analysis. In the case of the KMO it was considered adequate for values greater than 0.80 (Godfrey et al., 2019) and for the BTS it was assessed that the $X^2$ value was sufficiently large with significance (value of $p$) less than 0.05. Subsequently, using the criteria established by Cronbach (1951), Godfrey et al. (2019), and Comrey and Lee (2013), the EFA was carried out using the principal components method with VARIMAX rotation, eliminating items with factor loadings of less than 0.60. It should be noted that the exact number of factors to be extracted was set at six.

### 3.4.3. CFA

The development of the CFA was based on the conformation of the factors of the EFA. The univariate and multivariate normality of the items of each of the scales was established, where it was found that they did not fit this type of distribution. Due to the above, for the operationalization of the CFA, estimations were made based on maximum likelihood. The bootstrap (i.e., 2,000 bootstrap samples with 95% confidence intervals) was used, taking Oppong and Agbedra (2016) as a reference for this procedure.

The CFA results were evaluated using the following statistics: Chi-square ( $X^2$ ), minimum discrepancy ratio ( $X^2/df$ ), comparative form index ( *CFI* ), normed fit index ( *NFI* ), Tucker-Lewis index ( *TLI* ), incremental fit index ( *IFI* ), goodness-of-fit index ( *GFI* ), adjusted goodness-of-fit index ( *AGFI* ) and root mean square error of approximation ( *RMSEA* ). According to the CFA literature, especially the works of Marsh et al. (2004), Hooper et al. (2008), and Useche et al. (2020), the recommended thresholds for each of the statistics were defined in Table 2.

TABLE 1 Items in English and Spanish.

| Factors | Code | English items | Spanish items |
|---|---|---|---|
| 1. Student-centered service | SCE1 | Teaching is student-centered. | En mi universidad la enseñanza está centrada en el estudiante |
| | SCE2 | The school/university provides good service to me. | Mi universidad me brinda un buen servicio |
| | SCE3 | The school/university provides enough administrative support to me. | Mi universidad me brinda suficiente apoyo administrativo |
| | SCE4 | The school/university cares about the students. | Mi universidad se preocupa por los estudiantes |
| 2. Diversity and global citizenship | DYC1 | I am aware of the future state of the hospitality and tourism industry. | Soy consciente del estado futuro de la industria para la cual me estoy formando |
| | DYC2 | I can share with future students some information about the school and university education. | Puedo compartir con futuros estudiantes información sobre la educación escolar y universitaria |
| | DYC3 | The school/university helps me develop local and global citizenship. | Mi universidad me ayuda a desarrollar la ciudadanía local y global |
| | DYC4 | The school/university helps me recognize cultural differences. | Mi universidad me ayuda a reconocer las diferencias culturales |
| | DYC5 | I have the opportunity to learn from other students. | Tengo la oportunidad de aprender de otros estudiantes |
| 3. Co-production of experience and learning | CPEA1 | I can express my rights and opinion. | Puedo expresar mis derechos y opiniones |
| | CPEA2 | I contribute to the learning in class. | Contribuyo al aprendizaje en clase |
| | CPEA3 | I actively participate in group projects and class discussions. | Participo activamente en proyectos grupales y debates en clase |
| | CPEA4 | I teach my fellow students. | Enseño a mis compañeros de estudio |
| | CPEA5 | I can play the role of leader. | Puedo desempeñar el papel de líder |
| 4. Teacher dependence | DDM1 | Teachers provide suggestions to my personal and life issues. | Los profesores proporcionan sugerencias para mis problemas personales y de vida |
| | DDM2 | Teachers motivate me to learn. | Los profesores me motivan a aprender |
| | DDM3 | The teachers provide me with everything I need to learn. | Los profesores me proporcionan todo lo que necesito aprender |
| | DDM4 | The teachers use ways which appeal to our generation to teach us. | Los profesores usan formas que atraen a nuestra generación para enseñarnos |
| 5. Accountability | RES1 | I am trained to take responsibilities for other people. | Estoy capacitado para asumir responsabilidades para otras personas |
| | RES2 | I am trained to be responsible for myself. | Estoy capacitado para ser responsable de mí mismo |
| | RES3 | I am trained to fix problems by myself. | Estoy capacitado para solucionar problemas por mí mismo |
| 6. Whole-person development | DIP1 | The school/university is a small community where I perform civil responsibility. | Mi universidad es una pequeña comunidad donde realizo responsabilidad social |
| | DIP2 | The school/university creates all-rounded students. | Mi universidad crea estudiantes integrales |
| | DIP3 | The school/university creates ethical students. | Mi universidad fomenta el comportamiento ético de los estudiantes |

When the CFA did not meet the recommended threshold, especially the RMSEA, we proceeded to assess which variables had standardized regression values of less than 0.6 for elimination, as well as the modifications in the covariances of the errors of each of the factors from the largest and theoretically most parsimonious modification indices as outlined by Marsh et al. (2004).

Finally, the convergent analysis of the scale factors was carried out, for which the Extracted Variance (AVE), reliability evaluated from the CR statistic, as well as Cronbach's Alpha (α) were determined. In the case of the AVE, it was considered acceptable with values greater than 0.5, for the CR values greater than 0.7, and finally for α values greater than 0.8. In addition, convergent validation was developed using the Maximum Shared Variance (MVS) and Average Shared Variance (AVS) statistics, being considered acceptable when MVS and AVS were lower than AVE.

## 4. Results

Regarding the content of this scale, the judges presented a high level of agreement for the aspects of pertinence (V = 0.97), relevance (V = 0.99), induction to the answer (V = 1.00), sufficiency (V = 0.98), as well as for clarity and wording (V = 0.90); only the scale aspect of the answer was considered acceptable, so the V statistic was 0.82. Considering these results, where the validity of

the content of the scale was observed, it was proceeded to the execution of the EFA. In the case of the KMO statistic, the value obtained was 0.93, thus the variables were partially correlated. Likewise, for the Bartlett's Test of Sphericity the value was $X^2 = 9{,}538.17$ with value of $p = 0.00$, thus the data were suitable for the execution of an EFA (Table 3).

TABLE 2 Thresholds for model evaluation.

| Statistic | Recommended threshold |
|---|---|
| $X^2$ | Mejor cuanto menor y con $p$-valor >0.05 |
| $X^2$ / df | < 5 |
| CFI | > 0.90 |
| NFI | > 0.90 |
| TLI | > 0.90 |
| IFI | > 0.90 |
| GFI | > 0.80 |
| AGFI | > 0.80 |
| RMSEA | < 0.08 |

The CFA of the SX scale did not present a good fit, the values of the statistics were: $\chi^2 / df = 4.24$, CFI = 0.92, NFI = 0.90, TLI = 0.91, IFI = 0.92, GFI = 0.86, AGFI = 0.82 and RMSEA = 0.08. Therefore, DYC2 and DYC4 were covaried to find a better fit of the CFA. With the modified CFA the fit was improved, with the new value of the statistics $\chi^2 / df = 3.99$, CFI = 9.33, NFI = 9.13, TLI = 9.20, IFI = 9.33, GFI = 0.87, AGFI = 0.82 and RMSEA = 0.07. Table 4 shows the standardized regression weights for each of the items assessed by the instrument.

The Analysis of Variance Extracted (AVE), the reliability assessed from the CR statistic and Cronbach's Alpha statistic (α) were considered high. Thus, demonstrating the convergent validity of the factors. Similarly, the discriminant validity of the scale was confirmed as MVS and AVS were lower than AVE. Table 5 shows the results of the convergent and discriminant validity and Figure 2 shows the CFA with regression weights and covariance values between factors.

## 5. Discussion

This study analyzed the psychometric properties of the SX scale in HEIs. The statistical results of the exploratory and confirmatory factor analyses for the Colombian case,

TABLE 3 Factor loadings of the EFA SX scale.

| Item | Factor one | Factor two | Factor three | Factor four | Factor five | Factor six |
|---|---|---|---|---|---|---|
| SCE1 | 0.73 | | | | | |
| SCE2 | 0.77 | | | | | |
| SCE3 | 0.82 | | | | | |
| SCE4 | 0.79 | | | | | |
| DYC1 | | 0.70 | | | | |
| DYC2 | | 0.73 | | | | |
| DYC3 | | 0.68 | | | | |
| DYC4 | | 0.61 | | | | |
| DYC5 | | 0.64 | | | | |
| CPEA2 | | | | 0.63 | | |
| CPEA3 | | | | 0.76 | | |
| CPEA4 | | | | 0.74 | | |
| CPEA5 | | | | 0.78 | | |
| DDM1 | | | 0.74 | | | |
| DDM2 | | | 0.72 | | | |
| DDM3 | | | 0.65 | | | |
| DDM4 | | | 0.71 | | | |
| RES1 | | | | | | 0.63 |
| RES2 | | | | | | 0.80 |
| RES3 | | | | | | 0.82 |
| DIP2 | | | | | 0.708 | |
| DIP3 | | | | | 0.697 | |

TABLE 4 Result standardized values of the AFC regression SX scale.

| Item | Factor one | Factor two | Factor three | Factor four | Factor five | Factor six |
|---|---|---|---|---|---|---|
| SCE1 | 0.81 | | | | | |
| SCE2 | 0.88 | | | | | |
| SCE3 | 0.85 | | | | | |
| SCE4 | 0.88 | | | | | |
| DYC1 | | 0.68 | | | | |
| DYC2 | | 0.82 | | | | |
| DYC3 | | 0.86 | | | | |
| DYC4 | | 0.84 | | | | |
| DYC5 | | 0.80 | | | | |
| CPEA2 | | | | 0.78 | | |
| CPEA3 | | | | 0.83 | | |
| CPEA4 | | | | 0.75 | | |
| CPEA5 | | | | 0.78 | | |
| DDM1 | | | 0.70 | | | |
| DDM2 | | | 0.88 | | | |
| DDM3 | | | 0.83 | | | |
| DDM4 | | | 0.86 | | | |
| RES1 | | | | | | 0.70 |
| RES2 | | | | | | 0.94 |
| RES3 | | | | | | 0.90 |
| DIP2 | | | | | 0.91 | |
| DIP3 | | | | | 0.91 | |

TABLE 5 Convergent and discriminant validity result.

| Factors | α | AVE | CR | MVS | AVS |
|---|---|---|---|---|---|
| SCE | 0.91 | 0.73 | 0.91 | 0.60 | 0.32 |
| DYC | 0.89 | 0.65 | 0.90 | 0.60 | 0.49 |
| CPEA | 0.86 | 0.62 | 0.86 | 0.49 | 0.40 |
| RES | 0.87 | 0.73 | 0.89 | 0.49 | 0.35 |
| DDM | 0.88 | 0.68 | 0.89 | 0.59 | 0.47 |
| DIP | 0.91 | 0.84 | 0.91 | 0.51 | 0.47 |

confirmed the factor structure proposed by Xu et al. (2018). However, it was necessary to eliminate two items, one of them from the factor of co-production of the learning experience on whether the student can express his/her rights and opinions. This factor is composed of five items, i.e., the remaining four items measure the students' perception of the co-production of their experience and may not contribute enough to the understanding of this topic. The second item eliminated corresponded to the factor of integral development of the person that asked if the university is a small community where the student performs social responsibility. This item may be ambiguous or redundant since three items that measure responsibility and another five items that measure diversity and citizenship and refer to these topics, so this topic would already be widely addressed. Originally, the study developed by Xu et al. (2018) assessed SX with higher education service in Hong Kong from an exploratory factor analysis. In this research, we went a step further by conducting both exploratory factor analysis and confirmatory factor analysis. In this way, the reliability and validity of the scale can be tested in another cultural context.

Considering the results, the scale performs well in the Latin American context and its cross-cultural goodness is confirmed. This contributes to the development of the study of the student experience in Spanish-speaking contexts, but it should be noted that although it is an important step, cultural adaptation is recommended for future research in other countries. The scale retains the original six factors (student-centred service, diversity and global citizenship, co-production of the learning experience, trust in the teacher, accountability, and the development of the whole person) and the instrument is made up of 22 items, which allow the evaluation of the experience from the key characteristics of the higher education process from the student's point of view.

In accordance with the results, the scale helps to provide broad and sufficient information for educational management and to establish coherence between the characteristics of the

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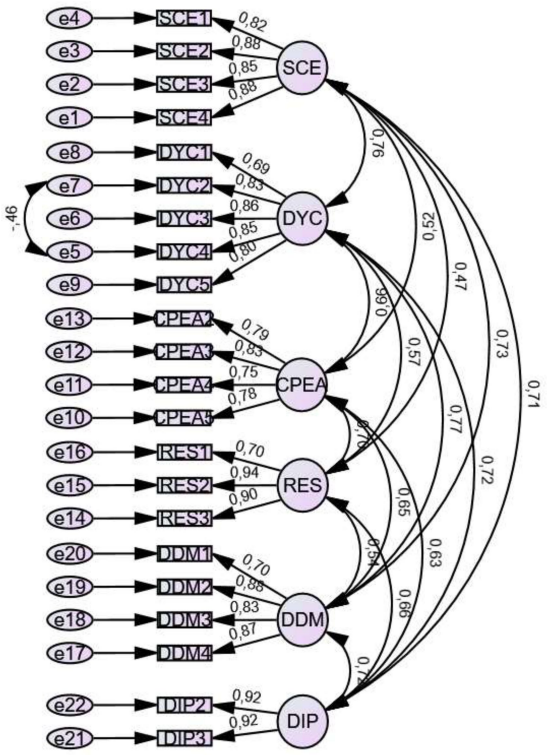


FIGURE 2
CFA with regression weights and covariance values between factors. It is important to note that the software was used in the Spanish language, so the comma "represents the decimal separation".

teaching-learning process and the administration of the resources and mechanisms that allow this process to be perceived as high quality by the students. The psychometric properties and the statistical results make it possible to have confidence in the measurement made by this instrument, and at the same time to perceive the satisfaction of the students. In this way, this instrument ends up being a part of the decision-making process in academic, administrative, research and welfare terms, based on the student's experience within the institution. In other words, the academic managers will be able to count not only on the feedback achieved in the classroom about the teaching work, but they will also be able to review the teaching work connected to the different points where the student interacts with the institution's complementary services.

The measurement of SX based purely on the perception of the individual contributes to generate information corresponding to the evaluation of what the institution has done and at the same time to the evaluation of what the institution itself requires, projected on the needs reported by the students. Although academia argues for the prioritization of teaching in the work of the HEIs, this instrument allows us to find the relevance of these HEIs being managed based on the principles of customer service, considering the particularities demanded by the academy from the principles of knowledge construction.

## 6. Conclusion

The HEIs require tools such as the SX scale to truly monitor the contribution they can make to their students in their vocational training process. To this end, the information gathered must have the characteristics of transferring the definition of experience from a 360° vision where the student reports each aspect that he/she perceives as necessary or complementary to his/her training. For HEI administrators, this culturally sensitive scale also serves as a management tool to determine future strategic plans, short-term action plans and budget management for the different academic bodies.

From a statistical and data quality perspective, the SX scale presents an appropriateness among both its component factors and items, in which the categories designed for measurement are captured in a meaningful way. The various indicators of instrument quality and reliability allow those implementing the instrument to be confident that their efforts in administering the instrument will result in a good collection of information. Finally, this instrument contributes to strengthening both the theories and the conceptualization of what the experience represents for a student in higher education. This is fundamental for the development of the concept of university according to the socio-economic contexts in different times. The SX scale ratifies and enables the study of the best ways to learn and manage learning in HEIs.

## 7. Limitations

The findings showed that the SX scale has satisfactory psychometric properties and high reliability and can be applied to university students to find out their perceptions of their university experience. However, there may be some limitations given that the validation and adaptation process is based on a Colombian context and its applicability in other countries, including Spanish-speaking countries, could generate other results. In this sense, semantic equivalences carried in the translation process may have an important implication. Therefore, a cross-cultural evaluation of the scale before use is suggested.

On the other hand, factor analysis allows us to demonstrate the validity and increase the reliability of the scale but given its interpretation and the use given to the scales in this study, as well as the population, in this case university students, it may differ from the results applied to other populations and for other purposes.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The study with human participants was approved by the Research Ethics Committee of the Universidad del Rosario. Consent was signed online on the form sent, in accordance with national legislation and institutional requirements.

## Author contributions

MA: methodology, validation, and original draft-writing. AG: data analysis, results writing, and supervision. YC: writing-revising and editing. All authors have read and accepted the published version of the manuscript.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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