

# TRANSLATION AND CULTURAL ADAPTATION OF INSTRUMENTS TO ASSESS THE PREDISPOSITION OF ASSISTIVE TECHNOLOGY USE THAT CONSTITUTES THE MATCHING, PERSON & TECHNOLOGY MODEL<sup>1, 2</sup>

## TRADUÇÃO E ADAPTAÇÃO CULTURAL DE INSTRUMENTOS PARA AVALIAR A PREDISPOSIÇÃO DO USO DE TECNOLOGIA ASSISTIVA QUE CONSTITUI O MODELO MATCHING, PERSON & TECHNOLOGY

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**ABSTRACT:** The Matching, Person & Technology (MPT) conceptual model proposes a user-centered, environment-oriented approach for prescription of Assistive Technology, by means of standardized instruments, in order to facilitate the process of correspondence between user and technology. The aim of the study was to translate and adapt culturally to the Portuguese of Brazil the Initial Worksheet for the Matching Person & Technology Process; History of Support and Healthcare Technology Device Predisposition Assessment - HCT PA that make up the MPT model. The study was attended by two sworn translators, three researchers whose native language was Portuguese and had fluency in English with an area of Assistive Technology, a translator whose native language was English and had fluency in Portuguese and the coordinator of the project, the author of the original instrument, five judges with experience in the area of Assistive Technology and Master's or PhD in Education with an emphasis on Special Education and six health and education professionals with experience in dispensing Assistive Technology for people with disabilities. The research was divided into 5 stages: 1) translation of the instrument, 2) reconciled translation, 3) back translation, 4) equivalence of item analysis and adequacy of the instrument, and 5) pre-test. The results indicated a high index of agreement among the participants and a good cultural equivalence of the instruments. It is concluded that the Portuguese of Brazil versions of the instruments have a good acceptability and are suitable to be used for the prescription of technology for Brazilian users.

**KEYWORDS:** Special Education. Scale of evaluation. Access to technology. Assistive Technology.

**RESUMO:** O modelo conceitual *Matching, Person & Technology* (MPT) propõe uma abordagem centrada no usuário e no ambiente para prescrição de tecnologia assistiva, por meio de instrumentos padronizados, para facilitar o processo de correspondência entre usuário e tecnologia. O estudo teve como objetivo traduzir e adaptar culturalmente para o Português do Brasil os instrumentos *Initial Worksheet for the Matching Person & Technology Process; History of Support e Healthcare Technology Device Predisposition Assessment - HCT PA* que compõem o modelo MPT. O estudo contou com a participação de dois tradutores juramentados, três pesquisadores cujo idioma nativo era o português e tinham fluência em inglês com domínio na área de tecnologia assistiva, um tradutor cujo idioma nativo era o inglês e tinha fluência em português, o coordenador do projeto, a autora do instrumento original, cinco juizes com experiência na área de tecnologia assistiva e Mestrado ou Doutorado em Educação com ênfase em Educação

<sup>1</sup> <http://dx.doi.org/10.1590/s1413-65382519000200001>

<sup>2</sup> Our acknowledgment to the State of São Paulo Research Foundation (*Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP*) for the financial assistance to develop this research - Process N° 2016/16470-4.

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Especial e seis profissionais da educação e saúde com experiência no fornecimento de tecnologia assistiva para pessoas com deficiência. A pesquisa foi dividida em 5 etapas, sendo elas: 1) tradução do instrumento; 2) tradução conciliada; 3) retrotradução; 4) análise de equivalência dos itens e adequação do instrumento; e 5) pré-teste. Os resultados indicaram um alto índice de concordância entre os participantes e uma boa equivalência cultural dos instrumentos. Conclui-se que as versões em português do Brasil dos instrumentos têm uma boa aceitabilidade e são adequados para serem utilizados para a prescrição de tecnologia para usuários brasileiros.

**PALAVRAS-CHAVE:** Educação Especial. Escala de avaliação. Acesso à tecnologia. Tecnologia Assistiva.

## 1 INTRODUCTION

The signatory countries of the Convention on the Rights of Persons with Disabilities have ratified that they would take appropriate measures to facilitate access to Assistive Technology (AT) solutions for those who need them to improve independence in daily life and equal participation in society. In this Convention, countries have committed themselves to establishing laws and policies in order to guarantee the right of access to AT services and resources to all persons with disabilities who need them (Decree no. 6,949, dated August 25, 2009).

Despite the worldwide effort to facilitate access to AT resources and services, it is noted that the rate of abandonment or non-use remains high. International studies continue to indicate that 30% of prescribed resources are abandoned in the first year after acquisition (Federici, Meloni, & Borsci, 2016). Brazilian studies found a lower rate of abandonment, around 20% (Sugawara, Ramos, Alfieri, & Battistella, 2018; A. C. Braccialli, Deliberato, Braccialli, & Araújo, 2016; Cruz & Emmel, 2015). It should be noted that in the poorest countries, access to AT is lower, between 5 and 15 percent of those in need have access (Matter, Harniss, Oderud, Borg, & Eide, 2017).

The abandonment may be related to a failure in the evaluation process due to an incompatibility between the needs of the user, the environment of use and the provided AT. Thus, there is a need to implement AT services that accompany the entire supply process, from the moment of user evaluation to the monitoring of the use of Assistive Technology (Federici & Borsci, 2016).

A key element in providing AT is the quality of service delivery, which is the process by which an individual will go through to get a solution that meets his/her needs. In addition to the service, other aspects should be considered: (a) good quality products with affordable prices; (b) the end users and the professionals involved need to know the existing solutions; (c) there must be professionals who evaluate, provide advice and support; (d) there must be policies and procedures in order to decide on the eligibility of certain financing solutions and mechanisms; (e) there must be training in use; (f) there must be follow-up services; and (g) there must be an infrastructure for maintenance and repair of equipment purchased. For the implementation of these measures, it has been proposed the creation of a standard international model for AT supply. Researchers from different countries have proposed the adoption of a model that ensures that: the user remains at the center of all activities; enables interdisciplinary interaction; is applicable to any type or level of disability; and addresses the factors that influenced user satisfaction or the abandonment of AT (De Witte, Steel, Gupta, Ramos, & Roentgen, 2018).

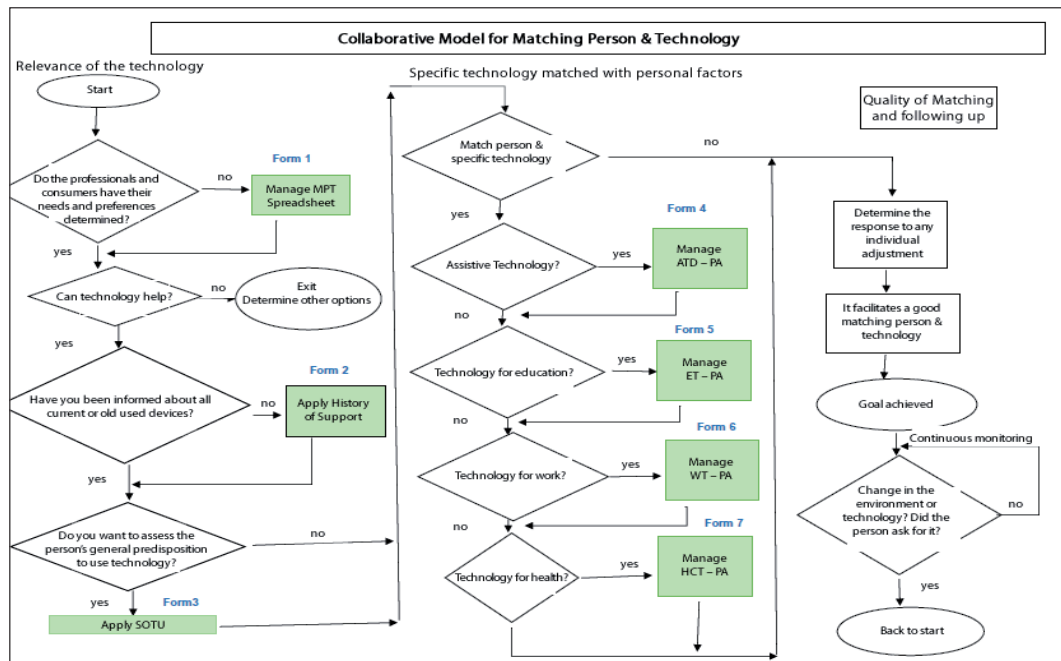
In an Assistive Technology product delivery service, a user needs assessment process should be included with appropriate and standardized assessment tools, as well as trained personnel to work with people with disabilities and their families to perform these assessments. Products cannot be effectively distributed without a replacement plan and loan. Several AT products need to be tested for a short period of time before deciding on their suitability for a specific user. Although this process is commonly available in high-income countries, it is an obstacle in low and middle income countries, especially when one considers the long period of time required to request and purchase an AT product (Smith et al., 2018).

In this perspective, the Assistive Technology Assessment Process (ATA) has been pointed out as a proposal for a service model to provide AT resources, in which the process is user-centered and oriented (L. M. P. Braccialli, Braccialli, & Silva, 2018; Federici et al., 2015; Federici & Borsci, 2016). ATA is based on four pillars: (a) in the biopsychosocial model of the International Classification of Functioning, Disability and Health (ICF), mainly in the dimensions that interfere in the functionality of the user; (b) incorporates the concept Matching, Person & Technology (MPT) and makes use of the tools of this model during the process; (c) considers that overcoming an incapacity transcends the delivery of an AT, in line with the MPT model emphasizes the need to combine the resource to the user, and that the environment of use must be considered; (d) the need for a multidisciplinary team to monitor the whole process (L. M. P. Braccialli et al., 2018).

The MPT model and its instruments have been the most cited in the international literature and used to verify the predisposition to use AT during prescription and delivery (Alves, Matsukura, & Scherer, 2017; A. C. Braccialli, 2017; L. M. P. Braccialli et al., 2018). It is a collaborative approach in which the AT user and the prescriber will work together to select the most appropriate technology for the use of a particular person. The model highlights three areas that influence the use of AT: (a) environmental factors; (b) the needs, personal and psychosocial characteristics and preferences of consumers; (c) and whether the functions and characteristics of the desirable AT is appropriate, whether it can be used without discomfort or stress, cost, ease of use and transportability (Alves, 2013).

In order to assist in the evaluation process, based on the MPT model, a series of standardized instruments was developed that, through an individualized and user-centered approach, proposes to make the most appropriate match between the individual and technology (Scherer & Federici, 2015). The MPT model consists of the following instruments: Survey of Technology Use - SOTU, Assistive Technology Device Predisposition Assessment - ATD-PA, Educational Technology Device Predisposition Assessment - ET PA, Workplace Technology Device Predisposition Assessment - WT PA, besides two worksheets: *Initial Worksheet for the Matching Person & Technology Process* and *History of Support Use*.

The author of the MPT model proposes a flowchart to assist the multidisciplinary team in the process of choosing the best instrument for the evaluation and prescription of AT resources for the different contexts (Figure 1).



**Figure 1.** Flow diagram of the use of instruments in the MPT model.

Fonte: A. C. Braccialli (2017).

In order to use MPT tools, the first step is for users and professionals to jointly set goals and targets to be achieved. Next, the template proposes completing the Initial Worksheet for the Matching Person & Technology Process and the History of Support Use worksheets.

The Initial Worksheet for the Matching Person & Technology Process aims to determine which technologies are potentially useful to that user. Completing the History of Support Use allows to identify which technologies have already been used, which ones are desired, and which ones are required for that user (Alves, 2017).

In the next step of the technology prescribing process, the practitioner will have to opt for a specific instrument to match technology, user and environment as shown in Figure 1. In order to prescribe a technology for: education - the Educational Technology Device Predisposition Assessment - ET PA, in our case translated into Portuguese by Braccialli (A. C. Braccialli, 2017), will be used; health - the Healthcare Technology Device Predisposition Assessment will be used; work - Workplace Technology Device Predisposition Assessment - WT PA; and for the predisposition to use Assistive Technology in general - the Assistive Technology Device Predisposition Assessment - ATD-PA, in this case translated by Alves (Alves, 2017; Alves et al., 2017).

In order to favor the use of the MPT conceptual model in Brazil, the study aimed to translate and adapt culturally to the Brazilian Portuguese language the Initial Worksheet for the Matching Person & Technology Process and History of Support and Healthcare Technology Device Predisposition Assessment - HCT PAN instruments.

## 2 METHOD

It is a methodological research that aims at the development, validation and evaluation of methods or instruments. In order to carry out the study, the author was previously asked to authorize the instrument for translation and cultural adaptation. After authorization, the project was sent to the Research Ethics Committee of the Faculty of Philosophy and Sciences of UNESP – Marília, São Paulo, Brazil, and approved - CAAE 52363815300005406.

The study was developed in 5 stages: initial translation; reconciled translation; back translation; equivalence of item analysis; and pre-test.

### 2.1 PARTICIPANTS

Each stage of the study had specific participants:

- initial translation - two sworn translators whose native language was Portuguese and were fluent in English (T1, T2) participated;
- reconciled translation - three researchers whose native language was Portuguese and had fluency in English with a command in the area of Assistive Technology;
- back translation - a translator whose native language was English and fluent in Portuguese and the project coordinator;
- analysis of the back translation - author of the original instrument;
- analysis of items - five judges with experience in the area of Assistive Technology and Master's or Doctorate in Education with an emphasis on Special Education (denominated J1, J2, J3, J4, J5);
- pre-test - six health and education professionals with experience in prescribing and providing Assistive Technology resources for people with disabilities in rehabilitation centers or in School Center (denominated P1, P2, P3, P4, P5, P6).

### 2.2 INSTRUMENTS

The Initial Worksheet for the Matching Person is organized by areas in which people may have loss of function or have strengths. It was designed to be used by education and health professionals working with Assistive Technology users in order to identify the areas to be strengthened through the use of technology or other support/strategies or environmental accommodation. With the worksheet, strengths, difficulties, goals and initial strategies to achieve the objectives are identified and noted. It may involve the prescription of a technology, an alteration in the environment, or both. To prescribe a new technology for an individual, it is best to focus on an area with strengths.

Each item must be considered regardless of whether the professional believes it is relevant to that individual or not. For children, ideally, the worksheet is filled with the collaboration of the parents. The worksheet consists of 12 domains or areas: (1) speech/communication; (2) mobility; (3) dexterity/use of hands; (4) vision; (5) hearing; (6) reading

and writing; (7) domestic activities; (8) health maintenance; (9) recreation and leisure; (10) self-care; (11) work; (12) think, understand and remember. For each domain, the user's strengths and limitations, the goals to be achieved and the interventions needed to achieve them will be filled in the worksheet. Firstly, the initial goals that the professional and the user have established together, including possible alternative goals, should be noted in the respective column. Secondly, what interventions are required to achieve these goals must be determined and they must be written in the space provided on the worksheet. Thirdly, any technologies needed to support the achievement of these goals must be determined.

The History of Support investigates which technologies have been used in the past and why a new type of technology would be the best alternative. It is organized according to the same 12 domains/areas that make up the Initial Worksheet for the Matching Person. For each domain, it must be completed: (a) in the first column, the three technologies or supports/strategies that have already been used by that individual should be listed; (b) in the second column, it should be described which technologies are currently used and determine the time of use in months, percentage of time of daily use and level of satisfaction; (c) in the third column, the supports/technologies used in the past with the same information as in the previous column have to be listed; (d) in the fourth column, the necessary supports/technologies and the predisposition to use them have to be listed.

The purpose of using worksheets is to conduct a comprehensive assessment that considers the individual as a whole, the environments of technology use, and so on. However, to achieve this, the many parts that make up the whole and its relation must be considered.

The Healthcare Technology Device Predisposition Assessment - HCT PA is used to assist health professionals in identifying factors that may inhibit the acceptance or proper use of a health technology in the home environment. The instrument is a checklist composed of 43 items, organized in five sessions, that evaluate the impact of using or not using a technology: (1) characteristics of the specific health problem; (2) consequences of the use of healthcare technology; (3) technology characteristics; (4) personal issues that influence deliberations on the use of a technology; (5) user attitudes toward treatment. HCT PA should not be used to determine whether a user should receive a technology; rather, it should be used to determine user concerns about the specific technology being provided. This is so that the best possible adjustment is achieved between technology and user needs and preferences. To this end, the instrument is completed by means of an interview. There is no record of scores; it is used as a guide to organize the information obtained on the impact of the technology on the user.

## 2.3 PROCEDURES

Initially, contact was made with the author of the instruments and requested and obtained authorization for translation and cultural adaptation to the Brazilian Portuguese language. Then, according to the recommendations of different researchers, the study was structured in five stages (L. M. P. Braccialli, 2016; Coster & Mancini, 2015; Guillemin, Bombardier, & Beaton, 1993).

### **2.3.1 FIRST STAGE - INITIAL TRANSLATION**

For the initial translation, it was necessary to adopt the following recommendations: (a) be performed by two translators working independently (Coster & Mancini, 2015; Reichenheim & Moraes, 2007); (b) the native language of the translator must be the language into which the instrument was translated (Beaton, Bombardier, Guillemin, & Ferraz, 2000); (c) there is no communication between translators during the process; (d) there is a coordinator with fluency in the foreign language during the development of independent translation (Coster & Mancini, 2015); (e) at least one translator is familiar with the theme of the instrument to facilitate the translation of specific terms of the area (A. C. Braccialli, 2017, Coster & Mancini, 2015).

Thus, the translation of the instruments was carried out by two sworn translators whose native language was Brazilian Portuguese and were fluent in English, and accompanied by the coordinator of the project whose native language was Brazilian Portuguese, fluent in English, with mastery in the area of Assistive Technology and with prior knowledge of the instruments and the conceptual model. The coordinator had the task of offering advice to translators in case of any doubt regarding the specific terms of the area of knowledge. The instruments were forwarded by e-mail to the translators, accompanied by the following guidelines: 1) use natural and acceptable language for people in general; 2) the translation must be clear, simple and comprehensible; 3) avoid long sentences; 4) focus on conceptual equivalence, not literal translation; 5) consider the age of the public respondent to the questionnaire as well as how they will understand the items; 6) do not use slang or terms that are difficult to understand; 7) avoid double negatives as recommended by Braccialli (A. C. Braccialli, 2017).

### **2.3.2 SECOND STAGE - RECONCILED TRANSLATION**

In the reconciled translation, the best translation for each item of the instrument is sought. In this phase of the process, the participation of professional experts in the field of knowledge and with domain in the language of the original version of the instrument provides a more precise analysis and less difficulties in the following processes, equivalence of items and pre-test (A. C. Braccialli, 2017).

Following Braccialli's recommendations, the comparison between the two versions translated into Portuguese was carried out by three researchers whose native language was Portuguese and had fluency in English with a domain in the area of Assistive Technology (A. C. Braccialli, 2017). The researchers jointly carried out the reading item by item in order to check the points where there were differences, decide which translation was best, suggest a new translation, if necessary.

### **2.3.3 THIRD STAGE – BACK TRANSLATION**

In the back translation stage, it is recommended to consider: (a) the translator has the first language as the language in which the original instrument was constructed and to be fluent in the language into which the instrument was translated (Coster & Mancini, 2015); (b) the coordinator of the translation process and the back translator can discuss the differences and, from the discussions, agree on the best translation (Reichenheim & Moraes, 2007); (c) the back translation version should be forwarded to the original author for review, to ensure that

the translation is accurate and that it maintains the most important features of the instrument (Coster & Mancini, 2015).

Based on these recommendations, the back translation was performed by a sworn translator who had English as a native language and was fluent in Portuguese, and the doubts were jointly discussed and solved with the research coordinator. Then the back translation version was then forwarded by e-mail to the author of the original instrument for analysis.

#### **2.3.4 FOURTH STAGE - EQUIVALENCE OF ITEM ANALYSIS**

In the equivalence of items stage, it is recommended to perform: 1) conceptual equivalence; 2) semantic equivalence; 3) operational equivalence (Reichenheim & Moraes, 2007); and 4) experiential equivalence.

For this stage, a protocol was developed to guide the five judges on the tasks they should carry out and a standardized form that they should fill in for each item of the questionnaires. This protocol contained guidelines on: 1) conceptual equivalence - participants were asked to evaluate whether a given term or expression, even if properly translated, evaluated the same aspect in the new culture; 2) semantic equivalence - each participant evaluated whether the words had the same meaning, if the item had more than one meaning and if there were grammatical errors in the translation; 3) operational equivalence - participants were oriented to assess the relevance and suitability of the instrument and the format of the questions/instructions (for example, whether on printed paper or in electronic form); place of administration (for example, whether in school or the home environment); and the mode of application (for example, whether a face-to-face interview or form filling; 4) experiential equivalence – participants should observe whether the items of the instrument were applicable in the new culture and, if not, replace them with an equivalent item.

They were also instructed to fill in their identification data in the Equivalence Assessment Protocol; to read carefully the version of the instrument translated into Portuguese, item by item; immediately after reading an item of the instrument respond in the Protocol corresponding to the alternative that he/she considered the most appropriate in relation to the semantic, experiential, conceptual and operational equivalence. If the participant did not agree with the item, suggestions for modifications were requested.

#### **2.3.5 FIFTH STAGE - PRE-TEST**

The last stage consisted of the pre-test with six health and education professionals with experience in prescribing and providing Assistive Technology resources for people with disabilities in Rehabilitation Centers or School Centers. Contact was made with the study participants and, after acceptance, they were oriented on the purpose of the study and on the instruments in question, as well as on the MPT conceptual model. The objective of this stage was to verify the clarity of the instrument and whether there were terms that sounded strange or unfamiliar (Coster & Mancini, 2015). For an instrument to have cultural equivalence, in the pre-test phase, all items should be understood by 90% of the participants (Soárez, Kowalski, Ferraz, & Ciconelli, 2007). Participants were asked to test the instruments with a person with



a physical disability and, after each item, completed a worksheet stating whether the item was clear, whether there was a need for change, and to make suggestions.

### 3 DATA ANALYSIS

The analysis of the reconciled translation stage was performed by means of absolute frequency and relative analysis of each item and presented in tabular form. For the equivalence of item and pre-test stages, the analysis was performed through the concordance index, as proposed by Fagundes (2015).

$$\text{concordance index} = \frac{\text{agreement}}{\text{agreement} + \text{disagreement}} * 100$$

Concordance Index values greater than 90% have very high reliability; between 80% and 89% is considered high, between 66% and 79% is acceptable and values below 66% indicate that the issues are difficult to understand and need to be reviewed (Bauer & Gaskell, 2002).

### 4 RESULTS

The results were presented in the following sequence: 1) reconciled translation; 2) back translation; 3) equivalence of items; 4) pre-test.

#### 4.1 RECONCILED TRANSLATION

The analysis of relative and absolute frequency in relation to the option to translate the items of the instruments for the preparation of the first Portuguese version is presented in Table 1.

Translation option	Worksheet N (%)	History of Support Use N (%)	Healthcare Technology Device Predisposition Assessment N (%)
Equal translations	24 (50)	19 (63)	13 (22)
T 1	12 (25)	8 (27)	22 (38)
T 2	9 (19)	3 (10)	14 (24)
New translations	3 (06)	00 (00)	9 (16)
Total of items translated from each instrument	48 (100)	30 (100)	59 (100)

**Table 1.** Absolute and relative frequency in relation to the instrument translation option.  
Source: The authors.

#### 4.2 BACK TRANSLATION

The author of the instrument considered that all items of the instruments were adequate and there was no need for any modification.

### 4.3 EQUIVALENCE OF ITEMS

In the semantic equivalence analysis of the Initial Worksheet for the Matching Person & Technology Process, an item had a 50% agreement, requiring modification (Table 2). Regarding the analysis of the experimental, conceptual and operational equivalence, all items had 100% agreement between judges, so there was no need for modification.

Original version	Portuguese version	Suggestions
Initial Worksheet for the Matching Person & Technology Process	<i>Formulário Inicial para o processo de correlação Pessoa &amp; Tecnologia</i> (Initial Form for the process of correlation Person & Technology)	<i>Planilha Inicial para o Processo de Correspondência Pessoa &amp; Tecnologia</i> (J1, J3, J4) (Initial Worksheet for the Person & Technology Matching Process)

**Table 2.** Item that required modification in the semantic equivalence of the Initial Worksheet for the Matching Person & Technology Process.

Source: The authors.

In relation to the History of Support Use: Technologies, Special Purpose Devices, and Personal Assistance instrument, an item had semantic equivalence of 20%, thus it was necessary the modification presented in Table 3. For all the other equivalences, the concordance index was superior to 75% and no modifications were required.

Original version	Portuguese version	Suggestions
History of Support Use: Technologies, Special Purpose Devices, and Personal Assistance	<i>Histórico do Uso de Apoio: Tecnologias, Dispositivos com Propósito Especial e Assistência Pessoal</i> (History of Support Use: Technologies, Devices with Special Purpose and Personal Assistance)	<i>História de Uso de Suporte: Tecnologias, Dispositivos Especiais, e Assistência Pessoal</i> (J1, J3, J4) (History of Support Use: Technologies, Special Devices, and Personal Assistance)

**Table 3.** Item that required modification in the semantic equivalence of the History of Support Use: Technologies, Special Purpose Devices, and Personal Assistance instrument.

Source: The authors.

For the Healthcare Technology Device Predisposition Assessment instrument, the Operational Equivalency analysis indicated 100% agreement among participants for all items. Regarding experiential equivalence, 30 items had 100% agreement, 27 items had 75%, and one item had a 50% agreement, so there was a need to revise this item (Table 4). For the final version of the instrument, we opted for the suggestion of participant P1.

Original version	Portuguese version	Suggestions
causing the person considerable distress	<i>está causando uma angústia considerável à pessoa</i> (is causing considerable anguish to the person)	<i>Utilizar o termo desconforto no lugar de angústia</i> (J1) - Use the term discomfort instead of anguish <i>Está causando um sofrimento considerável à pessoa</i> (J2) - It is causing considerable suffering to the person <i>Está fazendo com que a pessoa tenha uma aflição considerável</i> (J4) - It is causing the person to have considerable distress

**Table 4.** Experiential Equivalence of the item for review of the Healthcare Technology Device Predisposition Assessment instrument.

Source: The authors.

In the conceptual equivalence analysis of the Healthcare Technology Device Predisposition Assessment instrument, 44 items had 100% agreement; 12 items had 80%, and two items had a 50% agreement, needing to review these items (Table 5). After analyzing the two items, it was decided in relation to the item “*não é um paciente obediente*” (is not an obedient patient) to perform a new translation and was modified to “*não é um paciente colaborador*” (not a collaborative patient); as for the item “*é, no geral pessimista*” (is generally pessimistic), the translation was maintained since it was very close to the suggestion of participant J1.

Original version	Portuguese version	Suggestions
is not a compliant patient	<i>não é um paciente obediente</i> (is not an obedient patient)	<i>Não é um paciente disciplinado</i> (J1) (is not a disciplined patient) <i>Não é um paciente tolerante</i> (J4) (is not a tolerant patient) <i>Não é um paciente em conformidade</i> (J5) (is not a patient in compliance)
has a poor general outlook	<i>é, no geral, pessimista</i> (is generally pessimistic)	<i>Tem uma visão geral pessimista</i> (J1) (Has a pessimistic general outlook) <i>Tem uma perspectiva geral fraca</i> (J4) (Has a poor general outlook) <i>Tem uma baixa perspectiva geral</i> (J5) (Has a low general outlook)

**Table 5.** Suggestions regarding the conceptual equivalence of the Healthcare Technology Device Predisposition Assessment instrument.

Source: The authors.

Regarding semantic equivalence, 29 items had 100% agreement, 25 items 80%, and 2 items had 50% agreement and needed revision (Table 6). For the item “*surgiu recentemente*” (recently emerged), after the analysis, we opted for the suggestion of the judge J3. As for the item “*está causando uma angústia considerável à pessoa*” (is causing considerable anguish to the person), according to the judges’ suggestions, the term anguish was replaced by discomfort.

Original version	Portuguese version	Suggestions
of recent onset	<i>surgiu recentemente</i> (recently emerged)	<i>Começou recentemente</i> (J3) (Recently started) <i>De início recente</i> (J4) (Recent start) <i>Caso mantenha “O problema de saúde”, ficaria bom traduzir “é de início recente”</i> (J5) (If “The health problem” is kept, it would be good to translate into “is of recent beginning”)
causing the person considerable distress	<i>está causando uma angústia considerável à pessoa</i> (is causing considerable anguish to the person)	<i>Utilizar o termo desconforto no lugar de angústia</i> (J1) (Use the term discomfort instead of anguish) <i>Causa desconforto considerável à pessoa</i> (J4) (Causes considerable discomfort to the person) <i>Caso mantenha “O problema de saúde”, ficaria bom traduzir “está causando desconforto considerável à pessoa”</i> (J5) (If “The health problem” is kept, it would be good to translate into “is causing considerable discomfort to the person”)

**Table 6.** Semantic Equivalence of the English/Portuguese version of the item that needs revision.

Source: The authors.

#### 4.4. PRE-TEST

The concordance index between the participants in the pre-test of the Initial Worksheet for the Matching Person & Technology Process was greater than or equal to 90% for all items, suggesting that the instrument is easy to understand and to be applied. However, one participant suggested improving information on completing the instrument (Table 7).

Suggestions
Detailed explanation on how to complete the worksheet in relation to more details on what accommodations are and where to put examples of technologies. (P1)

**Table 7.** Suggestions for modifications in the Initial Worksheet for the Matching Person & Technology Process instrument

Source: The authors.

The analysis of the concordance index in the pre-test was 100% for all items of the History of Support Use: Technologies, Special Purpose Devices, and Personal Assistance instrument. However, only one participant made two suggestions (Table 8).

Suggestions
Add the “ <i>não necessário</i> ” (not necessary) option in the instrument (P3)
Difficulty in understanding the meaning of “ <i>atividades domésticas</i> ” (domestic activities) (P3)

**Table 8.** Suggestions for modifications in the instrument History of Support Use: Technologies, Special Purpose Devices, and Personal Assistance instrument.

Source: The authors.

The pre-test of the Healthcare Technology Device Predisposition Assessment instrument indicated that there was no need to modify any item, the analysis indicated 100% agreement for all items and there was no suggestion of modification.

The detailed explanations of use and analysis of the instrument are presented in the manual, therefore, after the pre-test, there was no need to modify any of the instruments, since the suggestions referred to doubts about the application.

## 5 DISCUSSION

Effective deployment of Assistive Technology devices relies on competent assessments and service providers who are properly trained and able to identify the needs and goals of the user. For the appropriate match of Assistive Technology product and user, an assessment process is required with appropriate assessment tools and trained personnel to work with people with disabilities and their families (Smith et al., 2018).

The need to establish a standard international method for the provision of Assistive Technology has been pointed out. Standardization based on a conceptual model and on appropriate assessment tools would make the comparison of services and results obtained possible, as well as the verification of the impact of existing policies and guidance of the development of new policies (De Witte et al., 2018).

Studies have emphasized the importance of the MPT model as well as of its instruments during the technology supply process (Alves et al., 2017; A. C. Braccialli, 2017; L. M. P. Braccialli et al., 2018).

Based on these assumptions, to adapt culturally and make available in the Brazilian Portuguese language the Initial Worksheet for the Matching Person & Technology Process and History of Support and Healthcare Technology Device Predisposition Assessment - HCT PA instruments, which make up the MPT model, can bring advantages in developing new instruments. A culturally adapted version enables the comparison of data between different cultures and countries, and the quantification of how much the results differ or are similar in different regions (Coster & Mancini, 2015).

The Initial Worksheet for the Matching Person & Technology Process and History of Support instruments should be used at the beginning of the assessment process to verify the predisposition to use AT resources associated with other instruments that are already available in the Brazilian Portuguese language, ET PA Br (A. C. Braccialli, 2017) and ATD PA Br (Alves, 2017).

The process of translation and cultural adaptation must follow a rigorous and solid scientific system in order to avoid mistakes. Thus, the process in this study was based on international guidelines and each step was rigorously followed (L. M. P. Braccialli, 2016; Coster & Mancini, 2015; Guillemin et al., 1993; Reichenheim & Moraes, 2007).

There is a concern that the initial translation should be carried out by two or more translators independently, allowing different writing choices and the comparison of translations to ensure a more accurate final version. The recommendations were followed, and the translators were independently assisted by the project coordinator, who was fluent in

English, had previous knowledge of the instrument and expertise in the area of knowledge, which was useful in guiding the translators in relation to specific terms of the area (Coster & Mancini, 2015).

The item reconciliation stage was carried out by a team of experts in the field of knowledge and with a domain of the original version of the instrument, which enabled a more precise analysis and less difficulties in the processes that followed, according to Braccialli (A. C. Braccialli, 2017).

The participation of the author of the original instruments in the analysis process helped to guarantee the equivalence of the new version with the original one (Lapa et al., 2017)

Rigorous care in the previous stages seems to have been fundamental in ensuring that, in subsequent phases, item equivalence and pre-test, there was a high degree of agreement. It is also worth noting that the participation in the pre-test of professionals with extensive experience in AT supply services and with users with disabilities made identifying the difficulties and the understanding of the items of the instruments possible; to make final adjustments to the Portuguese version and verify the feasibility of using the instrument in the Brazilian context.

The final version of the instruments translated and adapted to Brazilian Portuguese language presented a good level of acceptability and comprehension, being suitable for use by multiprofessional teams that provide Assistive Technology resources for users with disabilities.

It is worth noting that the availability of the instruments in the Brazilian Portuguese language will enable systematized assessments to facilitate the prescription of Assistive Technology resources in a more assertive way and to reduce their abandonment after acquisition.

## REFERENCES

- Alves, A. C. de J. (2013). *Tecnologia Assistiva: identificação de modelos e proposição de um método de implementação de recursos* (Doctoral dissertation). Universidade Federal de São Carlos, São Carlos, São Paulo, Brazil.
- Alves, A. C. de J. (2017). *Avaliação de tecnologia assistiva predisposição ao uso - ATD PA Br versão brasileira*. Brasília: Universidade de Brasília.
- Alves, A. C. de J., Matsukura, T. S., & Scherer, M. J. (2017). Cross-cultural adaptation of the assistive technology device–Predisposition assessment (ATD PA) for use in Brazil (ATD PA Br). *Disability and Rehabilitation: Assistive Technology*, 12(2), 160-164. DOI: <https://www.tandfonline.com/doi/abs/10.1080/17483107.2016.1233294?journalCode=iidt20>
- Bauer, M. W., & Gaskell, G. (2002). *Pesquisa qualitativa com texto: imagem e som: um manual prático*. Rio de Janeiro: Vozes.
- Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, 25(24), 3186-3191.
- Braccialli, A. C. (2017). *Tradução e Adaptação Transcultural do Instrumento Educational Technology Predisposition Assessment - ET PA* (Master's thesis). Faculdade de Filosofia e Ciências, Universidade Estadual Paulista Júlio de Mesquita Filho, São Paulo, Brazil.

- Braccialli, A. C., Deliberato, D., Braccialli, L. M. P., & Araújo, R. de C. T. (2016). Tecnologia assistiva: aquisição e abandono de uso por pessoas com deficiência física. Paper presented at the 7th 'Congresso Brasileiro de Educação Especial', São Carlos, São Paulo, Brazil.
- Braccialli, L. M. P. (2016). Tecnologia Assistiva e produção do conhecimento no Brasil. *Journal of Research in Special Educational Needs*, 16 (s1), 1014-1017. DOI: <https://doi.org/10.1111/1471-3802.12355>
- Braccialli, L. M. P., Braccialli, A. C., & Silva, F. C. T. da. (2018). *Modelos conceituais e instrumentos para prescrição e acompanhamento de uso de Tecnologia Assistiva: análise teórica* (pp. 81-92). Bauru: Canal 6.
- Coster, W. J., & Mancini, M. C. (2015). Recommendations for translation and cross-cultural adaptation of instruments for occupational therapy research and practice. *Revista de Terapia Ocupacional da Universidade de São Paulo*, 26(1), 50-57. DOI: <http://dx.doi.org/10.11606/issn.2238-6149.v26i1p50-7>
- Cruz, D. M. C. da, & Emmel, M. L. G. (2015). Políticas Públicas de Tecnologia Assistiva no Brasil: Um Estudo Sobre a Usabilidade e abandono por Pessoas com Deficiência Física. *Revista Faculdade Santo Agostinho*, 12(1), 79-106.
- De Witte, L., Steel, E., Gupta, S., Ramos, V. D., & Roentgen, U. (2018). Assistive technology provision: towards an international framework for assuring availability and accessibility of affordable high-quality assistive technology. *Disability and Rehabilitation: Assistive Technology*, 13(5), 467-472. DOI: 10.1080/17483107.2018.1470264
- Decree nº 6,949, de 25 de agosto de 2009*. Promulga a Convenção Internacional sobre os direitos das pessoas com deficiência e seu protocolo facultativo, assinados em Nova York, em 30 de março de 2007. Retrieved from [http://www.planalto.gov.br/ccivil\\_03/\\_ato2007-2010/2009/decreto/d6949.htm](http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/decreto/d6949.htm)
- Fagundes, A. J. F. M. (2015). *Descrição, definição, e registro de comportamento*. São Paulo: Edicon.
- Federici, S., & Borsci, S. (2016). Providing assistive technology in Italy: The perceived delivery process quality as affecting abandonment. *Disability and Rehabilitation: Assistive Technology*, 11(1), 22-31. DOI: 10.3109/17483107.2014.930191
- Federici, S., Corradi, F., Meloni, F., Borsci, S., Mele, M. L., Dandini De Sylva, S., & Scherer, M. J. (2015). Successful assistive technology service delivery outcomes from applying a person-centered systematic assessment process: a case study. *Life Span and Disability XVIII*, 1, 41-74. Retrieved from [http://www.lifespan.it/client/abstract/ENG290\\_2](http://www.lifespan.it/client/abstract/ENG290_2). Federici.pdf
- Federici, S., Meloni, F., & Borsci, S. (2016). The abandonment of assistive technology in Italy: a survey of National Health Service users. *European journal of physical and rehabilitation medicine*, 52(4), 516-526.
- Guillemin, F., Bombardier, C., & Beaton, D. (1993). Cross-cultural adaptation of health-related quality of life measures: Literature review and proposed guidelines. *Journal of Clinical Epidemiology*, 46(12), 1417-1432.
- Interministerial Ordinance No. 362, dated October 24, 2012*. Dispõe sobre o limite de renda mensal dos tomadores de recursos nas operações de crédito para aquisição de bens e serviços de Tecnologia Assistiva destinados às pessoas com deficiência e sobre o rol dos bens e serviços. Retrieved from <http://www.fazenda.gov.br/acesso-a-informacao/institucional/legislacao/portarias-interministeriais/2012/arquivos/portaria362.pdf>

- Lapa, C. de O., Rocha, G. P., Marques, T. R., Howes, O., Smith, S., Monteiro, R. T., ... Spanemberg, L. (2017). Tradução e adaptação transcultural do Questionário de Função Sexual (SFQ) para o português do Brasil. *APRS Trends Psychiatry Psychother. Trends Psychiatry Psychother*, 3939(22), 110-115. DOI: <http://dx.doi.org/10.1590/2237-6089-2016-0089>.
- Law no. 13,146, July 6, 2015*. Institui a Lei Brasileira de Inclusão da Pessoa com Deficiência (Estatuto da Pessoa com Deficiência). Retrieved from [http://www.planalto.gov.br/ccivil\\_03/\\_ato20152018/2015/lei/113146.htm](http://www.planalto.gov.br/ccivil_03/_ato20152018/2015/lei/113146.htm)
- Matter, R., Harniss, M., Oderud, T., Borg, J., & Eide, A. H. (2017). Assistive technology in resource-limited environments: a scoping review. *Disability and Rehabilitation: Assistive Technology*, 12(2), 105-114. DOI: 10.1080/17483107.2016.1188170
- Reichenheim, M. E., & Moraes, C. L. (2007). Operacionalização de adaptação transcultural de instrumentos de aferição usados em epidemiologia. *Revista de Saúde Pública*, 41(4), 665-673. DOI: <http://dx.doi.org/10.1590/S0034-89102006005000035>
- Scherer, M. J., & Federici, S. (2015). Why people use and don't use technologies: Introduction to the special issue on assistive technologies for cognition/cognitive support technologies. *NeuroRehabilitation*, 37(3), 315-319. DOI: 10.3233/NRE-151264
- Smith, R. O., Scherer, M. J., Cooper, R., Bell, D., Hobbs, D. A., Pettersson, C., ... Bauer, S. (2018). Assistive technology products: a position paper from the first global research, innovation, and education on assistive technology (GREAT) summit. *Disability and Rehabilitation: Assistive Technology*, 13(5), 473-485. DOI: 10.1080/17483107.2018.1473895
- Soárez, P. C. de, Kowalski, C. C. G., Ferraz, M. B., & Ciconelli, R. M. (2007). Tradução para português brasileiro e validação de um questionário de avaliação de produtividade. *Revista Panamericana de Salud Pública*, 22(1), 21-28.
- Sugawara, A. T., Ramos, V. D., Alfieri, F. M., & Battistella, L. (2018). Abandonment of assistive products: assessing abandonment levels and factors that impact on it. *Disability and Rehabilitation: Assistive Technology*, 13(7), 716-723. DOI: 10.1080/17483107.2018.1425748

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Received on: 14/01/2019

Reformulated on: 06/03/2019

Accepted on: 03/04/2019