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Psychometric Study of a Scale of Measurement of the Digital Stories Creation Using Utellstory

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Abstract: The purpose of this paper is to validate a scale about learning how to use the Utellstory software for the creation of digital stories. The questionnaire was provided to a sample of 142 and 276 students from Masters in Inclusive Education and Early Childhood Education Degree of the University of Córdoba (Spain), respectively. The data were subjected to an analysis of reliability and validity through the use of exploratory and confirmatory factorial analyses. The results revealed an instrument with correct validity and reliability that demonstrate that the model is stable and consistent with the starting theoretical assumptions.

Keywords: validation; questionnaire; digital stories; initial teacher training

1. Introduction

Storytelling is a fundamental educational tool, as well as an important means for the transmission of values and the perpetuation of culture, being useful in the Early Childhood Education stage as well as Primary Education, due to its entertaining character.

At present, as indicated by Reference [1], the literary story needs to become updated to respond to the demands of a new audience who lives immersed in the society of knowledge and information [2]. Without detracting from the paper format, it is necessary to add other multimedia formats that are more attractive and that respond to the interests of the new generations in this digital era. In this respect, children's and youth's literature is undergoing deep transformations in the manners in which to tell stories through digital environments [3]. A very important characteristic of this is that the new reader needs to acquire an active and participative attitude [4], in the process of teaching and learning, becoming the protagonist in the construction of their own knowledge [5–7].

The digital story can be defined as the art of telling stories through the use of multimedia elements such as music, sound effects, images, videos, etc. [8]. It is a resource that brings with it great possibilities for education and didactics, as it possesses an entertaining component that makes it attractive, which is ideal for its becoming a very motivating resource in the area of education [9,10].

During late years, the research about storytelling or digital stories have proliferated notably [11–13]. These studies referenced the advantages of digital stories [14–16], such as the improvement in academic, social and communication skills, imagination, creativity, critical thinking, expression, etc. [17–19]. Also, they help in the development of skills from the design, creation, and publishing of content, promoting collaborative and cooperative learning, which provides numerous benefits to teamwork: Initiative, responsibility, equality of opportunities, etc. [20].

In addition, they learn to use the Internet, as well as to analyze and synthesize the big amount of information they receive, so they have to organize their ideas properly. On the other hand, they learn to solve problems, to take control over their learning process, to reflect about themselves critically [21], and to develop their emotional intelligence [22].

The authors of [23] focused their research on the pedagogical repercussion that is derived from digital storytelling. They say these digital narrations are a pedagogical tool, which promotes the student-centered learning strategies. This tool has the following features: (a) Student active participation, (b) reflexive learning, (c) project-based learning, and (d) effective technology integration.

These benefits provided by the use of digital storytelling, related to the current importance of the use of an active, participative, and inclusive methodology, are fundamental, as they allow reaching the objectives proposed and the development of competencies that are needed for the comprehensive development of the student [19,20]. However, for this, it is indispensable that the teachers have the necessary qualifications, as they must possess the digital knowledge and abilities needed for adding these new digital tools to the classroom, to make the most out of their use [24–26]. Starting from the initial training of the future teachers, it is necessary to promote the development of digital competencies that prepare them to adapt the educational system [27] to the new transformations derived from the digital era, that convert the more traditional methodologies into more innovative, motivational, and autonomous ones for the students [28,29].

There are many studies that have addressed the creation of digital stories through different software programs. Reference [26] proposed an approach that measured the degree of competencies acquired by the students through an evaluation rubric that considered four dimensions: Digital, narrative, creative, and didactic competencies; however, it lacked a research methodology.

Also, the authors in [17] use the collaborative design of the story to promote sociability and creativity in school children, through the use of a Likert-type questionnaire with four response options, with a total of 15 items. In this case, the validation of the instrument utilized was not addressed.

On their part, Reference [20] suggested an approach based on the use of digital stories for improving motivation, linguistic communication, and digital competencies of gifted students in primary education, from a qualitative perspective of research, utilizing participant observation as the technique, as well as the interview and the portfolio as the data collection instrument.

Likewise, Reference [30] addressed the interactive story as a resource for the improvement of the teacher's training, as well as to work with curricular contents within the stage of early childhood education, more specifically in the area of mathematics. The study was presented from a qualitative aspect of research, utilizing direct observation as the technique and field notes as the data collection instrument.

On their part, Reference [31] presented a study focused on the creation of digital stories through videos, starting with a task-based learning methodology, with the questionnaire created by [32] utilized as the instrument, validated through expert judgement.

Lastly, the work by Reference [33] should be highlighted, where the authors utilized a scale created ad hoc, with five response options, to measure the opinions of students enrolled in the Early Childhood Education Degree program, on the learning of the program Plotagón for the design and production of digital stories based on animation. The questionnaire, composed of 27 items, consisted of three dimensions that collected the personal perception of the students about the activities conducted, the contributions of the digital stories to the processes of teaching and learning, as well as their evaluation of this software for their design. The validation was performed through an exploratory factorial analysis (EFA), while the reliability was measured with a study of its internal consistency.

Lastly, the review of the literature indicated that there is a scarcity of research studies related to the design of digital stories and their didactic possibilities, with most of them having a qualitative focus. Therefore, the objective of the present work is to serve as a benchmark to all those research studies that may be conducted at any educational stage related with the design and production of digital stories, by providing an instrument of data collection that is validated and reliable.

The present study is based on the process of validation and analysis of the technical characteristics of the instrument, created ad hoc, and named Questionnaire on the creation of digital stories through the use of Utellstory. More specifically, this research seeks to become a step forward in the development of measurement instruments that are reliable as referring to the design, creation, and production of digital stories, as no studies have been found that have analyzed constructs about this subject. The achievement of the following objectives is sought:

- Compare the underlying structure of the instrument with the theoretical structure considered in its original version.
- Study the validity of the construct through an exploratory factorial analysis (EFA) and a confirmatory factorial analysis (CFA).
- Analyze the reliability of the instrument through the study of its internal consistency.
- Understand the relationship between the different dimensions of the questionnaire through a correlation analysis.

2. Materials and Methods

The present work is focused on the process of validation and analysis of the technical characteristics of an instrument, created ad hoc, and named Questionnaire on the creation of digital stories through the use of Utellstory. For this, two studies were conducted; a pilot study, with half of the sample, and exploratory in character [34]; and another confirmatory study with the entire research sample. The methodological approach selected for both cases was quantitative and poll based. In this sense, no studies were found that analyzed constructs about the learning of the Utellstory software for the creation of digital stories, so that this work seeks to become a step forward in the development of measurement instruments that are reliable in their design, elaboration, and production of multimedia stories.

2.1. Sampling and Participants

The selection of the sample was conducted through convenience, non-probabilistic sampling [35], as the activities of the work conducted in the classroom, as well as the implementation of the instrument, was only performed with the students to whom the researchers of this study taught during the 2017–2018 academic year.

The sample of study 1, corresponding to the exploratory factorial analysis (from here on, EFA), was comprised by a total of 142 students, 16 corresponding to the Masters in Inclusive Education Degree (11.3%), and 126 from the Early Childhood Education Degree (88.7%). The profile of the students, taking into account age and sex, can be observed in the following table (see Table 1):

Table 1. Profile of the exploratory factorial analysis (EFA) students as a function of sex and age.

Age	Women	Men	Total
18–20 years old	98.3%	1.7%	40.8%
21–23 years old	90.9%	9.1%	38.7%
24–26 years old	100%	0%	9.9%
Older than 26	93.3%	6.7%	10.6%

On the other hand, the sample from study 2, corresponding to the confirmatory factorial analysis (CFA), was comprised of 276 students, 29 corresponding to the Masters in Inclusive Education (5.1%) and 247 to the Early Childhood Education Degree (94.9%). The profile of the students, tending to their age and sex, are shown in the following table (see Table 2):

Table 2. Profile of the confirmatory factorial analysis (CFA) students as a function of sex and age.

Age	Women	Men	Total
18–20 years old	96.3%	3.7%	39.1%
21–23 years old	92.2%	7.8%	37.3%
24–26 years old	100%	0%	12%
Older than 26	93.8%	6.3%	11.6%

2.2. Data Collection Instrument

The instrument utilized for the research was named Questionnaire on the creation of digital stories through the use of Utellstory, based on the one utilized by reference [33]. Thus, the questionnaire was anonymous, administered online, and was comprised by open-ended questions that were polythematic in character (25 items). It had a Likert-type response scale with five response options, where 1 corresponded to total disagreement, and 5 to total agreement for the dimensions "Characteristics of the digital stories", "Development of abilities", and "Evaluation of Utellstory" (see Table 3). It also included independent variables related to academic (degree) and sociodemographic (age and sex) characteristics, as well as electronic devices used daily:

- Dimension 1: Characteristics of the digital stories refers to the aspects related to the stories themselves, such as motivation, enjoyment, degree of attention of the students, comprehension of facts and feelings, transmission of beliefs and values, etc., and encompassed a total of 13 items.
- Dimension 2: Development of academic and socio-affective dimensions was composed of 7 items, alluded to the contributions of stories to the development of abilities in the students, such as oral and written expression, affectivity, socialization, or artistic sensibility.
- Dimension 3: Evaluation of the Utellstory software was used for the production of digital stories; it is comprised by 5 items that refer to the ease of their creation, the time invested, the learning difficulties, as well as the perception of the interface.

Table 3. Dimensions of the questionnaire.

Dimension	Items
Factor 1: Characteristics of the digital stories	The story is entertaining The story maintains the attention of the students The digital story facilitates the comprehension of facts and feelings The digital story promotes creativity The digital story is a motivating resource for the students The digital story promotes the transmission of beliefs and values The digital story allows simulating situations of everyday life The digital story promotes the ability of making decisions The digital story develops the processes of attention and dialogue The digital story allows the development of objectives established in the curriculum The digital story allows the development of contents established in the curriculum The digital story facilitates the acquisition of abilities/skills for problem resolution The digital story promotes personal autonomy
Factor 2: Development of abilities	The digital story promotes oral expression The digital story helps develop artistic sensibility habits The digital story promotes the entertainment and relaxation of the students The digital story helps develop oral expression The digital story helps the development of written expression The digital story helps the development of affectiveness The digital story promotes the process of socialization
Factor 3. Evaluation of the Utellstory software	The application Utellstory facilitates the creation of digital stories The application Utellstory reduces the time used in the creation of a digital story The application Utellstory has an intuitive environment and is easy to use Learning how to use the application took a lot of time I have had difficulties in the creation of a digital story through the application Utellstory

2.3. Data Analysis

As previously mentioned, study 1 consisted of the pilot use of the instrument, allowing its adaptation and contextualization to the object of study population. It allows detecting possible difficulties in the understanding of some items by the students, as well as verifying their index of discrimination and its factorial structure. The implementation of the instrument was conducted through the Google Forms software, which facilitated its completion, and was completed in person in the classroom at the end of the activity. The procedure was monitored by the researchers so that they could detect difficulties in its comprehension and clarify doubts during its implementation.

Once the collection of data was completed, the content of the items was analyzed through an EFA, without the need to normalize the data, as it showed to have adequate values (K-S, $p > 0.5$) [31,36]. For this, Pearson correlation matrices were utilized, together with the procedure to determine the number of factors "Optimal implementation of parallel analysis" [5], and the method for the extraction of common factors "Robust Maximum Likelihood", with a "Weighed Oblimin" rotation [37]; its internal consistency was analyzed as well (Cronbach's alpha). The software utilized for these analyses was SPSS (version 23) and Factor Analysis.

Once the characteristics of the instruments observed in study 1 were analyzed, a second study was conducted with the final research sample. The information collection procedure followed the same guidelines of study 1.

As in the previous case, the normalization of the sample was not necessary, as it showed Kolmogorov–Smirnof test values with $p > 0.5$. Afterwards, structural equation models were created with the same software, evaluating the model adjustment through the following statistical tests: χ^2/degrees of freedom [38], the comparative fit index (CFI), incremental fit index (IFI), normed fit index (NFI), the Tuker-Lewis index (TLI) [31,39,40], root mean residual (RMR), the root mean square error of approximation (RMSEA) [41], and the expected cross validation index (ECVI).

Lastly, for the whole sample, a correlational study was conducted of the different factors of the instrument.

3. Results

3.1. Exploratory Factor Analysis

The EFA allowed establishing the comparisons between the composition of the instrument and the theoretical structure considered initially, contributing fundamental elements to verify its validity and to improve the questionnaire on the basis of the results obtained. In this sense, the following criteria were considered: A determinant of the matrix of correlation with a value of 0.000; KMO = 0.942; Bartlett's sphericity test with a significance of 0.000; and a root mean square residual: RMSR =0.056. Once the criteria were verified, the EFA was applied to the original version of the questionnaire, composed of 25 items and 3 dimensions, adjusting the factors to be extracted to 3.

The analysis showed that the factors extracted explained 67.5% of the variance. On their part, the commonalities had values between 0.324 for item 10 and 0.910 for item 21, without finding any item under 0.3 [42]. These results urged us to maintain the initial structure of the instrument intact. Taking into account the matrix of rotated factors and the weight of each item according to factor (see Table 4), the correspondence with the different dimensions of the instrument with loads higher than 0.3 can be observed.

In order to guarantee the reliability of the instrument, its internal consistency was analyzed with the Cronbach's alpha coefficient [43], for the instrument as a whole ($\alpha = 0.940$), as well as the three factors extracted ($\alpha = 0.944$ for factor 1; $\alpha = 0.873$ for factor 2 and $\alpha = 0.723$ for factor 3). In the first two cases, the results obtained had a high reliability, while in the last, the reliability was acceptable.

Table 4. Matrix of rotated factors (EFA).

Variable	F 1	F 2	F 3
V 1	0.532	-	-
V 2	0.665	-	-
V 3	0.545	-	-
V 4	0.501	-	-
V 5	0.639	-	-
V 6	0.548	-	-
V 7	0.654	-	-
V 8	0.787	-	-
V 9	0.641	-	-
V 10	0.888	-	-
V 11	0.907	-	-
V 12	0.774	-	-
V 13	0.772	-	-
V 14	-	0.794	-
V 15	-	0.447	-
V 16	-	0.358	-
V 17	-	0.974	-
V 18	-	0.495	-
V 19	-	0.778	-
V 20	-	0.630	-
V 21	-	-	0.626
V 22	-	-	0.463
V 23	-	-	0.566
V 24	-	-	−0.597
V 25	-	-	−0.605

3.2. Confirmatory Factorial Analysis

The confirmation of the model previously obtained through the EFA was performed through a confirmatory factorial analysis, utilizing "Maximum Likelihood" as the estimation method. The results obtained led to, firstly, the elimination of items 5 and 9, corresponding to the first dimension, as the indices of modification indicated the existence of covariances among the errors associated to the items belonging to different factors; and, secondly, the elimination of items 24 and 25 (third dimension), as their factorial load was below 0.4. Once the model was reformulated, the following results were obtained (see Figure 1).

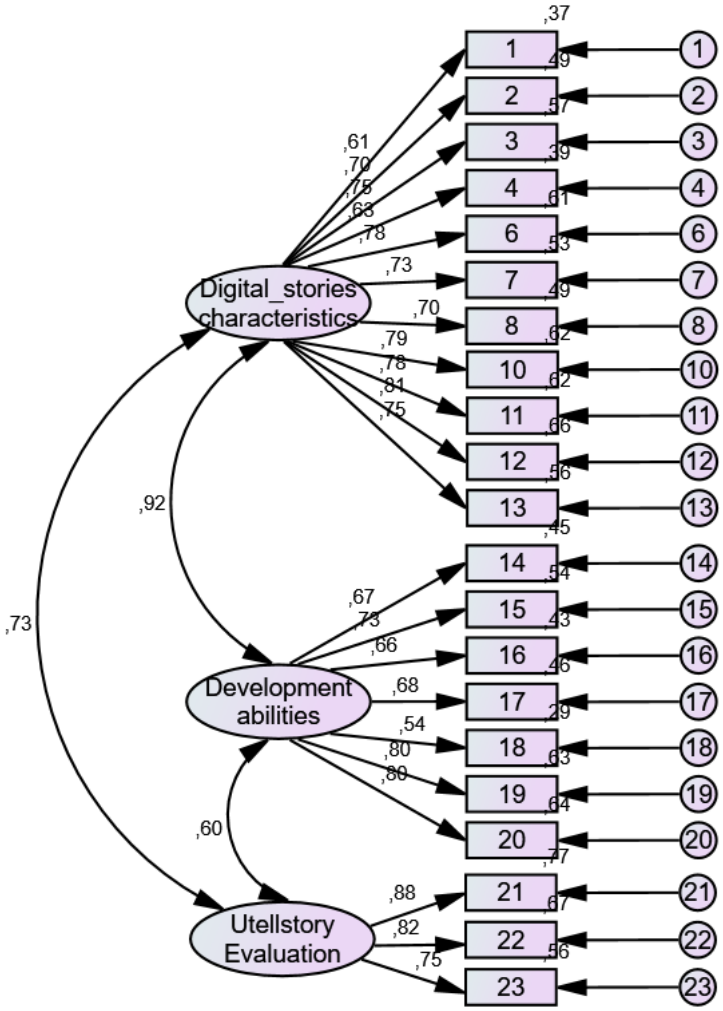

Figure 1. Model of three factors Confirmatory Factorial Analysis (CFA).

To evaluate the goodness-of-fit of the model identified, the χ^2/degrees of freedom test, the comparative fit index (CFI), the incremental fit index (IFI) and the normed fit index (NFI), the Tuker-Lewis index (TLI), the root mean residual (RMR), the root mean square error of approximation (RMSEA), and the expected cross validation index (ECVI) were utilized (see Table 5):

Table 5. Adjustment indices of the model.

	χ^2	df	*p*	χ^2/df	CFI	IFI	NFI	NNFI	SRMR	RMSEA	ECVI
Eval.	200.646	151	0.004	1.32	0.987	0.987	0.950	0.982	0.044	0.032	1.46

The set of indices had appropriate values (χ^2 with a probability of 0.004, values equal to or lower than 0.06 in the case of RMSEA and close to or higher than 0.95 in the case of CFI, IFI, NFI, and NFI [28], which allows confirming the model proposed, thus guaranteeing the validity of the construct of this instrument.

Focusing on the reliability of the instrument, the internal consistency was analyzed, globally as well as according to individual factors, obtaining the following results (see Table 6):

Table 6. Internal consistency of the instrument.

Dimension	Reliability
Factor 1: Characteristics of the digital stories	α = 0.929 (n = 11)
Factor 2: Development of the abilities	α = 0.865 (n = 7)
Factor 3. Evaluation of the Utellstory software	α = 0.851 (n = 3)
Total	α = 0.947 (n = 21)

Table 6 shows all the coefficients for each of the factors and the instrument itself, displaying values higher than 0.700, an index that grants the instrument with a high internal consistency [43].

3.3. Correlational Analysis

In this section, the correlational study of the three dimensions of the questionnaire, corroborated by the factorial analyses performed, is addressed. The data obtained through the use of Pearson's correlation test, performed to verify the relationship between the three dimensions of each scale, can be observed in the following table (see Table 7).

Table 7. Relationship of the bivariate correlations of the items of the three dimensions of the questionnaire.

	Characteristics of the Digital Stories	Development of the Abilities	Evaluation of the Utellstory Software
Characteristics of the digital stories	1	0.805 **	0.645 **
	-	0.000	0.000
	276	276	276
Development of the abilities	0.805 **	1	0.510 **
	0.000	-	0.000
	349	276	349
Evaluation of the Utellstory software	0.645 **	0.510 **	1
	0.000	0.000	-
	276	276	276

Note: **: The correlation is significant at 0.01 (two-way).

As a function of the data obtained, it can be confirmed that there is a relationship between dimension 1 (Characteristics of the digital stories) with dimension 2 (Development of abilities) and dimension 3 (Evaluation of the Utellstory software), as R = 0.805 and p = 0.000; R = 0.645 and p = 0.000, respectively, given the two-way significance at n.s. = 0.01. The relationship between them is high, as defined by references [44,45].

Likewise, it can be confirmed that there is a relationship between dimension 2 (Development of abilities) and dimension 3 (Evaluation of the Utellstory software), as the R = 0.510 and p = 0.000, with a two-way significance of n.s. = 0.01. The relationship between them is moderate, as pointed out by the previously cited authors.

4. Discussion and Conclusions

The main objective of this study was to analyze the technical characteristics of the instrument "Questionnaire on the creation of digital stories through the use of Utellstory" by utilizing an adapted version of the "Questionnaire on the learning of the Plotagón software in Higher Education" from reference [33], as in this case, the software utilized for the design, creation, and production of digital stories was Plotagón, instead of Utellstory. In the study by reference [33], the authors only performed

an exploratory analysis of the questionnaire, while in the present one, both an exploratory as well as a confirmatory analysis were performed of the dimensions of the questionnaire utilized.

The results from the exploratory factorial analysis (EFA), as well as those obtained from the confirmatory factorial analysis (CFA) confirmed a primary model comprised by three dimensions. Firstly, the EFA explained 67.5% of the total variance explained, which allowed establishing the comparison between the instrument created and the theoretical structures previously considered in the present study. Secondly, the CFA was performed to confirm the data obtained in the EFA. Thus, the results obtained pointed to the need to eliminate various items from the scale. More specifically, a total of four items were eliminated, with the final instrument composed by 21 items instead of the original 25. Two of the items removed belonged to dimension 1 of the questionnaire, and the other two items from dimension 3. Therefore, the resulting CFA was comprised of a total of 21 items and 3 dimensions, named: 1) Characteristics of the digital stories (11 items); 2) contributions of the digital stories to learning (7 items); and 3) evaluation of the Utellstory software for the design, creation, and production of digital stories (3 items). These data confirm the three-dimensional structure proposed in the study by Reference [33]. However, some of the items from this scale had to be eliminated from the analysis, as their factorial loads were lower than 0.40 [42].

The first factor, "characteristics of the digital stories", encompassed aspects related to the characteristics of the digital stories, considering that it dealt with a fundamental educational tool that entails a medium for the transmission of beliefs and values that has a character of entertainment, and which promotes creativity, the making of decision, conflict resolution, and personal autonomy, aside from helping in the achievement of objectives and the contents of the curriculum [9,10,28,30]. All of these characteristics, found in the first factor, refer to previous scientific studies, which analyzed the characteristics and the potential of digital stories [4,5,20,29].

The second factor, "contributions to the development of academic and socio-affective competencies" refers to the contributions of the digital stories related to the development of competencies linked to academic development, such as the development of oral and written language, the improvement of oral expression and communication, as well as the promoting of the acquisition of competencies related to the process of socialization of the individuals and the development of greater affectivity. These contributions have been evaluated and included in previous studies by previous researchers [17–19]. These studies have pointed out how the training in the use of these digital tools, such as the case of digital stories, contributes to the acquisition of competencies of the teachers-in-training, and how this also affects the students that these teachers will teach in the stages of early childhood education and primary education [20,46].

The third and last factor, "evaluation of the Utellstory software", contained information related to the evaluation of the software employed for the creation and production of the didactic digital stories. More specifically, it referred to aspects such as the application's environment, the time employed, or the ease of the creation of the stories. In this sense, the data coincided with those obtained in the research study by Reference [33], but studies similar to the present one that can confirm or contradict the data obtained in this work have not been found in the literature search.

As for the relationship of the dimensions from the questionnaire, correlations between them were found. Nevertheless, the highest found was between the characteristics of the digital story and the contribution to the development of academic and socio-affective competencies. This makes sense, taking into account previous data, which pointed to the relationship between a positive perception of the characteristics of the information and communication technologies (ICT) and their contributions related to the development of competencies and the improvement of constructive learning [20,46].

Based on what has been previously described, the main objective of the present work has been achieved, as the instrument that focused on the creation of digital stories through the use of free software (Utellstory) has been confirmed and validated. This allows us to provide a significant advance for the development of reliable measurements or instruments for the design, creation, and production of digital stories, given the present lack of validation studies that confirm the dimensional structure or

the construct related to the creation of digital stories and the didactic possibilities they bring, as most of the studies are qualitative in character [20,30,47]. Therefore, it can be concluded that this study represents a benchmark contribution to the study of the phenomenon and the development and validation of a scale about digital stories in Spain.

It should be pointed out that one of the limitations of the study was that the sample was not a true representation of the population object of study. Future studies will intend to broaden the study sample so that it is representative of the study population, allowing us to generalize the findings obtained. Likewise, it should not be forgotten that there is a great variety of software for the creation of digital resources, such as the case of digital stories, which makes difficult the generalization of a single instrument for measuring the phenomenon under study.

Lastly, it is important that future teachers become aware of the importance these digital resources have in the process of teaching and learning, as they are a magnificent pedagogic innovation, which will result in more significant learning for their students [24,30]. A greater awareness, as well as the initial and permanent training of teachers on ICT, can be reflected in a more positive evaluation or perception of the contribution of audiovisual resources to learning.

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