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Design and validation of a scale for the identification of dyslexia at the beginning of Primary Education

Diseño y validación de una escala para la identificación de la dislexia en el inicio de la Educación Primaria

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Abstract

Dyslexia is a specific learning disorder with a neurobiological basis that affects a significant percentage of students. However, there are no known validated instruments that contribute to the early identification of this problem, which makes educational intervention difficult. This work aims at developing and validating a scale of risk indicators for dyslexia at the beginning of the Primary Education stage (EIRD-EP) in order to favour the detection of this learning problem as soon as they become evident. There was a participation of 458 Primary Education teachers from different state schools and charter schools. The validity of the questionnaire was carried out through content validity together with an exploratory factorial analysis with half of the sample that indicated a four-factor structure, later a confirmatory factorial analysis was carried out with the other half of the sample that revealed a correct adjustment of the model. The results show that the instrument can be used by education professionals to identify students who are at risk of presenting dyslexia.

Keywords: Dyslexia; specific learning difficulties; Primary education; early identification.

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Resumen

La dislexia es un trastorno específico del aprendizaje de base neurobiológica que afecta a un porcentaje importante de estudiantes. Sin embargo, no se conocen instrumentos validados que contribuyan a la identificación temprana de este problema, lo que dificulta la intervención educativa. El propósito del presente trabajo ha sido elaborar y validar una escala de indicadores de riesgo de la dislexia al inicio de la etapa de Educación Primaria (EIRD-EP) con la finalidad de favorecer la detección de este problema del aprendizaje en los primeros momentos en los que se manifiesta. Se contó con la participación de 458 docentes de Educación Primaria de diferentes centros educativos públicos y concertados. La validez del cuestionario se efectúo mediante la validez de contenido junto a un análisis factorial exploratorio con la mitad de la muestra que indicó una estructura de cuatro factores, posteriormente se llevó a cabo un análisis factorial confirmatorio con la otra mitad de la muestra que demostró un ajuste adecuado del modelo. Los resultados ponen de manifiesto que el instrumento puede ser empleado por los profesionales de la educación para identificar a los estudiantes que se encuentran en situación de riesgo de presentar dislexia.

Palabras clave: Dislexia; dificultades específicas de aprendizaje; Educación Primaria; identificación temprana.

INTRODUCTION

Dyslexia is the most common school problem in the child population and one of the main factors linked to school failure and dropout. In fact, one in four cases of academic failure is caused by this difficulty, of which 67% of students with this problem are between eight and eleven years old, and 18% are between 12 and 16 years old (Ruiz-López et al., 2010; Gutiérrez-Fresneda et al., 2021).

Dyslexia is a learning disorder that is first manifested in the development of oral language and in access to the lexicon in written language from early educational levels, especially when the consolidation of the reading-writing process occurs, which occurs during the first year of Primary Education. It can be caused by a combination of deficits in phonological, auditory, and/or visual processing. Similarly, it is usually accompanied by problems related to poor functioning of working memory, deficiencies in syntactic knowledge, problems in processing speed and alterations in prosodic awareness (Collados et al., 2019; Ferrada & Outón, 2019).

Dyslexia symptoms usually appear early, specifically when the process of acquiring reading and writing begins, this being in the first years of Primary Education when this learning problem can best be identified and it is the teachers who can effectively detect the presence of certain difficulties that may be the trigger of this problem, which is why training of this learning disorder is essential for teachers.

Curiously, it is noteworthy that although dyslexia is one of the main causes of learning difficulties, there is little teacher training, especially in least experienced teachers, regarding this learning disorder (Echegaray-Bengoa & Soriano-Ferrer, 2016), as is the case for students who are being trained as future teachers (Gutiérrez-Fresneda & Díez, 2020).

Studies aimed at analysing the knowledge of teachers on this topic are characterized by showing, on the one hand, that teachers, both those who are beginning their professional career and students who are finishing their university studies in the Degrees in Teacher of Early Childhood Education and Primary Education have a series of significant shortcomings on the different linguistic constructs that intervene in dyslexia (phonology, phonetics, syntax, morphology...) that are at the base of the process of teaching written language and in the treatment of the difficulties of the students with this learning disorder (Binks-Cantrell et al., 2012; Piasta et al., 2009; Pina, et al., 2020; Washburn et al., 2011; Gutiérrez & Díez, 2020). On the other hand, when analysing the beliefs and conceptions that teachers have about dyslexia, it becomes clear that their ideas are based more on false myths than on the contributions of research in recent years. Some of these ideas refer to the fact that dyslexia is the result of poor visual perception and not of a phonological processing deficit; that letter or word inversions are the most important criteria in identifying dyslexia; that the use of coloured glasses help in the treatment of people with dyslexia; that dyslexia is not hereditary; or that children with this learning difficulty will outgrow dyslexia over time (Gutiérrez-Fresneda et al., 2021; Washburn et al., 2014). It should be noted that the knowledge teachers have about dyslexia correlates with teaching experience, treatment and intervention with students diagnosed with dyslexia and with other learning difficulties, which has allowed them to acquire greater knowledge about this learning problem (Echegaray-Bengoa & Soriano-Ferrer, 2016; Tamayo, 2017).

The interest in the diagnosis of dyslexia and specifically in the design of instruments allowing for early detection of students with this disorder is a topic of great relevance in the field of learning difficulties. In recent decades different tests have been developed for this purpose, among the best known the Prolexia test, aimed at schoolchildren between 4 and 6 years of age (Cuetos et al., 2020), the Bangor dyslexia test, recognized for its usefulness for the detection of dyslexia in English-speaking students (Milles, 1982), the Cognitive Profiling System, a digital test aimed at learners between 4 and 7 years of age (Singleton et al., 1996), the Dytective test, a digital tool that incorporates a screening test that allows risk situations to be detected in cases of dyslexia (Rello, 2018), and the DST-J: Test for the detection of dyslexia in children (Fawcett & Nicolson, 2013) which has allowed the identification of the aspects in which the greatest limitations are presented by students who suffer this learning disorder. Having said that, all these instruments are standardized tests aimed at specialized professionals whose purpose is to evaluate students individually with great amounts of time to determine whether or not they suffer from dyslexia.

Nevertheless, prior to carrying out this personalized assessment, previous detection in the classroom of the students who are at risk of presenting dyslexia is necessary which, if done with adequate instruments, will improve the effectiveness of the detection and consequently the educational intervention. However, there are very few existing instruments aimed at teachers so that they can quickly and reliably identify schoolchildren who are at risk of presenting this learning disorder.

In this veil, and since dyslexia is one of the main learning difficulties, teachers need validated tools that help them identify students who are at risk of presenting dyslexia, especially at times when the first manifestations of this disorder become apparent. Hence the objective of this work, which aims to develop and validate a scale that allows the quick and reliable identification of students in the first levels of Primary Education who present symptoms of dyslexia at the beginning of the reading and writing acquisition process.

METHOD

Participants

A total of 458 teachers participated in the validation process of the scale, 25.3% of which were men and 74.7% women, all workers in the early years of Primary Education belonging to state and charter schools, all of them with several years of experience and having worked with students with dyslexia and other learning difficulties. Regarding the time of teaching experience, 35.6% had been practicing the profession between 10 and 14 years, 46.7% between 15 and 19 years and 17.7% more than 20 years. All of them voluntarily responded to the online questionnaire designed for the validation of the scale. A simple random sampling process was followed.

An informed consent letter was issued with the purpose of informing the educators of the objective and procedure of the study, in addition to ensuring the privacy and confidentiality of the participants' data.

Instrument

Data was collected using an instrument designed from the information present in the scale for the identification of indicators of dyslexia in adolescents of secondary education together with the consideration of other components included in different validated instruments such as the Prolexia tool, the Cognitive Profiling System and the DST-J: Test. This task was carried out through an open-source survey composed of 24 items, aimed at providing teachers with a greater understanding of students with difficulties in learning written language. The method chosen to review content validity was the calculation of descriptors to determine the validity index, obtained from the evaluation of 18 experts, nine counsellors from educational centres with extensive experience in the field of learning difficulties and nine university teachers with empirical publications in prestigious journals on learning disabilities and developmental disorders. In this sense, the criteria proposed by Skjong & Wentworht (2000) were taken into consideration, (a) experience in making judgments and decision-making based on evidence (degrees, research, publications, position, experience and awards, among others), (b) reputation in the community, (c) availability and motivation to participate, and (d) impartiality and inherent qualities such as self-confidence and adaptability. Additionally, interobserver agreement was evaluated using the Fleiss kappa index, which establishes moderate agreement as results in the ranges 0.41-0.60, substantial agreement in the ranges 0.61-0.80, and almost perfect agreement 0.81-1.00. A 4-point Likert scale was used that addressed the representativeness, relevance, adequacy, comprehension, ambiguity, and clarity of the items (Abal et al., 2017). After the metric analysis of the items, the elimination of 4 of them was recommended (low correlations, increases in Cronbach's alpha if the item is eliminated...) leaving the scale composed of 20 items.

The purpose of the final version of the scale is to design and validate a tool that allows identifying students who may present dyslexia from the first moments in which they come into contact with written language. It is an instrument composed of different types of items, to respond with a Likert scale of four levels (1: Strongly agree; 2: Agree, 3: Disagree; 4: Strongly disagree). Table 1 shows the final scale.

Table 1. Final version of the dyslexia risk indicators scale at the beginning of the Primary Education.

Items	Average	Typical Deviation	Asymmetry	Kurtosis
1.- Limitations in verbal fluency and lack of vocabulary.	3.56	.32	.46	-.83
2.- Difficulties in reading and writing long and infrequent words.	3.83	.51	.71	-.15
3.- Greater ability of manual skills than of linguistic ones.	3.60	.71	.38	.26
4.- Problems in phonological awareness and in the association of correspondences between phonemes and graphemes.	3.75	.12	.12	-.27
5.- Presence of errors in reading: omissions, substitutions, inversions...	3.96	.24	-.15	-.48
6.- Errors in the tracing of letters and numbers.	3.11	.37	.16	-.72
7.- Limitations in auditory and short-term memory.	3.56	.48	.32	.51
8.- Excessive pressure on the paper when writing with association of problems with the digital clamp	2.87	.58	-.37	.26
9.- Attentional and concentration problems in carrying out tasks.	3.75	.68	.14	-.68
10.- Lack of motivation and lack of interest, especially in linguistic tasks.	3.80	.51	.37	-.29

Items	Average	Typical Deviation	Asymmetry	Kurtosis
11.- Problems in the clarity and structure of their oral presentations.	3.31	.29	-.28	-.53
12.- Deficiencies in following instructions and oral explanations.	3.68	.14	.61	-.81
13.- Personal distrust, insecurity and low self-esteem.	3.72	.33	.82	.14
14.- Lack of reading fluency and expressiveness.	3.93	.20	-.15	.31
15.- Deficiencies in remembering the information received through reading.	3.82	.17	.39	.17
16.- Writing making natural and arbitrary spelling errors.	3.95	.21	-.23	-.57
17.-Deficiencies in calculation (alignment) and in mathematical reasoning.	3.46	.38	.24	-.48
18.- Problems to maintain the continuous stroke of the letters when writing.	3.51	.42	-.37	.65
19.- Irregular handwriting and misalignment in writing.	3.11	.58	.52	-.29
20.- Problems in the organization and planning of school tasks.	3.27	.39	.63	-.41

Process

The process of design, validation, reliability analysis and exploratory and confirmatory factor analysis of the scale consists of different stages. Initially, the first version of the scale was developed based on the bibliography on the subject and professional experience. In the second stage, the content validity was analysed using the Delphi method (Astigarraga, 2008). This method indicates the need for expert judgment to validate the scale, after verifying its reliability. In this sense, a validation process analogous to that conducted by Mérida et al. (2015) was carried out, qualitatively and quantitatively analysing the opinions of the experts.

Twenty expert teachers in learning difficulties, specialist teachers of therapeutic pedagogy, hearing and language teachers and school counsellors participated in the expert judgment, all of them with a good reputation among the educational community, availability, motivation to participate, impartiality and teaching experience from 8 to 20 years; these experts were 10 women and 8 men, aged between 35 and 57 years. Participation was anonymous, through a virtual platform enabled to assess the level of consistency in each of the items with respect to the validity criteria proposed by Escobar-Pérez & Cuervo-Martínez (2008). These authors propose four basic criteria: *Clarity*, the item is easily understood; *Coherence*, the item is related to that evaluated; *Relevance*, the item is essential to evaluate what is intended and *Sufficiency*, the proposed items are sufficient to fully evaluate what is intended. These criteria were assessed with scores between 0 and 3, with 3 being the maximum value of the scale.

When evaluating the content analysis, regarding the criterion of clarity of the instrument, most of the expert judges made a satisfactory assessment, granting a score of 3 (M = 2.96) so they considered that the reagents were adequate for the level of the students. In relation to the criteria of coherence and relevance, the experts agreed that the test items are related and are essential to achieve what is intended to be evaluated (Coherence M = 2.87; Relevance M = 2.93). Regarding the sufficiency category, most of the experts marked option 3, thus considering that the number of tasks was sufficient to

reach the objective of the instrument (M = 2.91). Interobserver agreement analysis was supported by the Fleiss kappa index (2000), obtaining the following results; for the clarity variable a result of 0.81 was obtained, for the coherence variable a value of 0.78 was reached, for the sufficiency variable a result of 0.83 was achieved, while for the relevance variable a result of 0.93 was reached, which corresponds to a very high agreement among the experts.

In the next stage, through intentional non-probabilistic sampling, the scale was administered to 458 teachers and its reliability was analysed. Subsequently, a dimensional analysis of the construct was conducted, carrying out an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) together with the analyses of favourable and unfavourable fit of the obtained model.

Statistical analysis

For data analysis, the statistical program SPSS version 23 was used and internal consistency and reliability were measured. First the data obtained from expert judgment were analysed. In this analysis the means were calculated to obtain the value relative to the clarity, necessity and adequacy of the items on the scale. On the other hand, an evaluation of the reliability of the scale was preformed using Cronbach's Alpha coefficient, which made it possible to analyse the global reliability and the reliability and individual variances of each item. Finally, the AFE and AFC were carried out, through which the data obtained from the Kaiser-Meyer-Olkin & Bartlett tests were analysed, as well as the eigenvalues and communalities. After carrying out the CFA, an analysis of favourable and unfavourable fit was carried out with the EQS version 6.2 software, to verify that the model obtained from the AFE and the CFA was adequate.

Results

The results obtained in each of the analysis carried out are presented below. The EFA made it possible to compare the underlying structure of the instrument with the theoretical structure from which it was based, offering important information to study the validity of the construct and improve the questionnaire considering the data obtained.

In order to analyse the feasibility of using factor analysis to determine the construct validity of the EIRD-EP Scale, the Kaiser-Meyer-Olkin (KMO) measurements were used and the Bartlett Sphericity Test. The KMO adequacy measurement obtains a score of .8362, a value considered adequate (Hair et al., 2004), while the Bartlett Sphericity test presents a significant value of 205.041 (p = 0.000). These findings indicate that it is possible to carry out the Exploratory Factor Analysis (Kaplan & Saccuzzo, 2006).

Exploratory factor analysis

Once the feasibility criteria were verified, an exploratory factorial analysis was carried out with the extraction of principal components and the Varimax method of orthogonal rotation with half the sample, which reflects four factors that explain 73.45% of the variance, oscillating the communalities between .65 and .96.

From the observation of the rotated factors of the matrix and the factorial weight of each one of the items (Table 2), it is verified that all the items present loads greater than .4

that are grouped into 4 dimensions. Items with loads greater than .4 which appear in more than one factor have been located taking into account the highest load. The internal consistency indices of each factor were quite acceptable (See Table 2), with the Cronbach's Alpha values obtained as follows: Oral Language α = 0.892, Instrumental Learning α = 0.987, Graphomotor Development α = 0.835 and Cognitive Abilities α = 0.873.

Table 2. Rotation of factors of the dyslexia risk indicators scale at the beginning of Primary Education. Communalities, explained variance and Cronbach's Alpha

Items	F1	F2	F3	F4	Com.
Oral Language (OL)					
1.- Limitations in verbal fluency and lack of vocabulary.	.678				.651
2.- Problems in the clarity and structure of their oral presentations.	.746				.723
3.- Failure to follow instructions and oral explanations	.779				.748
Instrumental Learning (IL)					
4.- Problems in phonological awareness and in the association of correspondences between phonemes and graphemes.		.976			.968
5.- Presence of reading errors: omissions, substitutions, inversions...		.952			.911
6.- Reading lacks fluency and expressiveness.		.938			.946
7.- Deficiencies in remembering the information received through reading		.965			.943
8.- Writing with natural and arbitrary spelling errors.		.978			.914
9.- Difficulties in reading and writing long and infrequent words.		.965			.938
10.- Deficiencies in calculation (alignment) and in mathematical reasoning.		.849			.822
Graphomotor Development (GD)					
11.-Errors in the tracing of letters and numbers.			.803		.758
12.-Excessive pressure on the paper when writing with associated problems with the digital clamp.			.824		.801
13.- Problems to maintain the continuous stroke of the letters when writing.			.867		.823
14.- Irregular handwriting and misalignment in writing.			.912		.894
Cognitive Abilities (CA)					
15.- Attentional and concentration problems in carrying out tasks.				.876	.834
16.- Limitations in auditory and short-term memory.				.743	.715
17.- Greater ability of manual skills than of linguistic ones.				.889	.862
18.- Lack of motivation and lack of interest, especially in linguistic tasks.				.834	.807
19.- Problems in the organization and planning of school tasks.				.875	.861
20.- Personal distrust, insecurity and low self-esteem.				.852	.812
Cronbach's Alpha	.892	.987	.835	.873	
Number of items	3	7	4	6	
Variance explained	15.73%	27.29%	12.17%	18.26%	
Total explained variance		73.45%			
Cronbach's Total Alpha		.896			

Items	F1	F2	F3	F4	Com.
Kaiser-Meyer-Olkin		.87			

Confirmatory factor analysis

The favourable fit indices of the four-factor model indicated on the scale demonstrate a good fit of the model. However, after the EFA, the data from the second half of the sample were subjected to an AFC to corroborate the fit of the model.

Following Tomas & Oliver (1998), a series of indices were calculated; the root mean square error of approximation (RMSEA); favourable fit indices: GFI, AGFI and PGFI; and indices that use the standard independence model as the basis for comparing the NFI, relative fit index (RFI), non-normed fit index (NNFI), and comparative fit index (CFI). From an analytical perspective, the factor loadings and the percentage of variance explained for each item were compared. Table 3 shows that the chi square (S-B2) is significant for the model and its standard value is below the recommended cut-off value of less than 3 (Bollen, 1989). The RMSEA indicates a reasonable fit of less than 0.08 (Browne & Cudeck, 1992), as well as NNFI, CFI and IFI values that exceed the recommended cut-off value and are shown to be close to the unit (>.90) (Loehlin & Beaujean, 2017).

Table 3. Favourable fit of the scale of dyslexia risk indicators at the beginning of Primary Education.

Model	$S-B\chi2$	gl	$S-B\chi2$/g.l.	RMSEA	CFI	IFI	NNFI
4 factors –20 items	435.60	237	2.12	.006	.957	.952	.932

Note. $S-B\chi2$ = Satorra-Bentler scaled chi square gl = Degrees of freedom; RMSEA= Root mean square error of approximation; CFI= Comparative Fit Index; IFI= Bollen Incremental Fit Index and NNFI = Non-normalized Bentler-Bonett index of fit.

Regarding the review of the reliability of each of the four factors (Table 4), it is observed that Cronbach's alpha values are above the recommended value of 0.70 (Fornell & Larcker, 1981). Similarly, it is found that the composite reliability and the average variance extracted are higher than the recommended 0.5 (Bagozzi & Yi, 1988), which reflects adequate reliability.

Table 4. Scale Reliability

	F1	F2	F3	F4
AVE	.68	.79	.76	.73
CR	.86	.93	.87	.92
$\sqrt{}$ AVE	.78	.74	.71	.68
α	.863	.956	.857	.862

Note. AVE = V Mean variance extracted; CR= Composite reliability; $\sqrt{}$ AVE = square root of AVE; α = Cronbach's alpha

Finally, a discriminant validity analysis was carried out with the calculation of the correlations between the factors (Table 5). All load values appear below the threshold that

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Kline (2005) recommends (.85) for each factor. Likewise, the Fornell & Larcker (1981) criterion is met, which indicates that the square root of the AVE must be greater than the correlation it has with any other construct.

Tabla 5. Correlations between factors

	F1	F2	F3	F4
F1	.78			
F2	.365	.74		
F3	.416	.323	.71	
F4	.284	.271	.245	.68

Note. F1= Oral Language; F2= Instrumental Learning; F3= Graphomotor Development; F4= Cognitive abilities. The diagonal offers the values of $\sqrt{\text{AVE}}$.

DISCUSSION AND CONCLUSIONS

The objective of this work has been the elaboration and validation of a scale to identify schoolchildren who are at risk of presenting dyslexia in the first levels of Primary Education, given the importance of early identification to intervene as soon as possible in said learning problem. This work is based on the need to have scientifically validated instruments for the detection and educational intervention of learning difficulties and more specifically of dyslexia at the beginning of compulsory education.

The resulting instrument is called the *Dyslexia Risk Indicators Scale at the Beginning of Primary Education* (EIRD-EP), which has been validated with a sample of 458 teachers from different state and charter schools. The study has shown that the questionnaire has good psychometric properties and constitutes a valid and consistent alternative to identify students who are at risk of presenting dyslexia and who therefore require a differentiated follow-up in order to favour the verification or not of this learning disorder.

In the present work, the analysis plan made it possible to approach the factorial structure of the scale. It was found that the *EIRD-EP* instrument has adequate validity, therefore its application is suitable for teachers who work in the first school levels of Primary Education since it has a consistent factorial structure. Factor analysis indicate a structure made up of four factors, with high coherence from a theoretical point of view. The factorial solution obtained is consistent with the theoretical explanations and research carried out on dyslexia (Cuetos et al., 2017; Luque, 2018; Outón & Suárez, 2010; Smith-Spark & Fisk, 2007) that defend that it is not only a difficulty in reading, but other facets that are also present in this disorder must be attended to (see Appendix).

The four factors of the scale jointly explain 73.45% of the variance. The first factor, *Oral Language*, named after the meaning of the items with the greatest weight, explains 15.73% of the variance. Scoring high in this dimension implies limitations in linguistic development at the verbal level, which constitutes a handicap not only for adequate school and social communicative development, but also for the process of acquiring reading and writing, as these learnings are directly linked to the process of acquiring written language (Gutiérrez-Fresneda et al., 2021; Sala-Torrent, 2020), which requires dynamics aimed at

lexical development, clarity and organization of speech, and oral comprehension ability to follow instructions and simple explanations.

The second factor, *Instrumental Learning*, explains 27.29% of the variance. Students who are assessed with high scores in this factor should be a cause for concern by teachers because they present relevant limitations in the learning process, which shows that these students require more individualized and specialized attention from an early age. They manifest relevant difficulties in the skills that constitute the basis of school learning such as command of phonological awareness, phoneme-grapheme and grapheme-phoneme correspondence processes, reading decoding, orthographic representation of words, fluency and prosody in reading, the automation of simple numerical operations and deductive logical reasoning. The importance of this situation is defended by the current prevention models (Arrimada et al., 2020; Jiménez, 2019) that emerge as an alternative to the wait-for-failure models that have prevailed in recent decades and that have not managed to reduce school failure and dropout.

The third factor, *Graphomotor Development*, explains 12.17% of the variance. Schoolchildren who score high in this dimension require proposals that stimulate the skills involved in the adequate development of fine motor skills, as well as in the improvement of motor relaxation and fluidity of movement. For this purpose, the exercise of graphomotor skills, manual eye coordination, spatial orientation, as well as pictographic and scriptographic techniques is required. Different authors (González, 2018; Sanz, et al., 2020) defend the importance of early identification of these difficulties for the design of an effective early intervention to improve school performance.

Finally, the fourth factor, *Cognitive Abilities*, explains 18.26% of the variance. Schoolchildren who score high in this dimension show cognitive and emotional processes that must be addressed as a priority. In this sense, deficiencies in attention and concentration capacity, limitations in working memory, problems in organization and personal planning are directly related to school difficulties (Ares et al., 2021; Gutiérrez, 2020; Ortiz et al., 2017), which requires their identification and the implementation of measures that contribute to their re-education and improvement. Similarly, the early detection of problems of demotivation, mistrust, insecurity and low self-esteem are facets that require special attention so that the training process carried out in schools does not generate emotional problems that trigger frustration and abandonment of the educational system, the latter a very worrying situation in Spain, since according to the last report issued, the rate of early educational dropout stands at 16% (Eurostat, 2021).

In short, detecting the incidence of students who are at risk of presenting dyslexia or other learning difficulties is an aspect of great relevance, especially in early ages, since it allows the implementation of effective action that contribute to re-education and training improvement for these schoolchildren, since, as has been shown, early intervention is one of the best means of achieving positive results in the academic progress of schoolchildren (Gutiérrez et al., 2021; 2018; Luque, 2018; Ramirez & Martin, 2020). In this sense, the instrument presented in this work constitutes a resource of great value for the identification and treatment of learning difficulties. One of the advantages of this tool is that it allows us to quickly identify schoolchildren who are at risk of presenting dyslexia, or other learning difficulties, avoiding extensive and costly individualized examinations.

The results obtained in the AFE and AFC, allow us to point out that the "*EIRD-EP*" instrument constitutes a valid and reliable educational resource for the early detection of students who are likely to present dyslexia or other learning problems that may interfere in

educational success. This scale is a brief, easy and quick to administer tool that aims to help teachers, pedagogues, psychologists and all those professionals related to dyslexia and learning difficulties to identify students who are at risk of presenting dyslexia or other learning difficulties in addition to generating positive attitudes towards the implementation of inclusive methodologies. Similarly, it allows researchers to delve into the study and treatment of dyslexia, its background and the consequences it can have on the development of learners.

A limitation of the present work that would be interesting to consider in future studies is that the socio-family context has not been included, which could contribute to offering more information by adding some items referring to family members on the evolutionary development of the apprentice. Similarly, it would be desirable in future studies to carry out longitudinal analysis to find out the academic progress of students detected with dyslexia based on the measures implemented from the detection at an early age.

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Appendices

Appendix

Final version of the dyslexia risk indicators scale at the beginning of the Primary Education stage (EIRD-EP)

Items	Strongly agree	Agree	Disagree	Strongly disagree
Score	3	2	1	0

Oral Language (OL)

1.- Limitations in verbal fluency and lack of vocabulary.

2.- Problems in the clarity and structure of their oral presentations.

3.- Failure to follow instructions and oral explanations.

Instrumental Learning (IL)

4.- Problems in phonological awareness and in the association of correspondences between phonemes and graphemes

5.- Presence of reading errors: omissions, substitutions, inversions...

7.- Deficiencies in remembering the information received through reading

8.- Writing with natural and arbitrary spelling errors.

9.- Difficulties in reading and writing long and infrequent words.

10.- Deficiencies in calculation (alignment) and in mathematical reasoning.

Graphomotor Development (GD)

11.-Errors in the tracing of letters and numbers.

12.-Excessive pressure on the paper when writing with associated problems with the digital clamp.

13.- Problems to maintain the continuous stroke of the letters when writing.

14.-Irregular handwriting and misalignment in writing.

Cognitive Abilities (CA)

15.-Attentional and concentration problems in carrying out tasks.

16.- Limitations in auditory and short-term memory.

17.- Greater ability of manual skills than of linguistic ones.

18.- Lack of motivation and lack of interest, especially in linguistic tasks.

Items	Strongly agree	Agree	Disagree	Strongly disagree
Score	3	2	1	0
19.- Problems in the organization and planning of school tasks.				
20.- Personal distrust, insecurity and low self-esteem.				