



Linguistic Adaptation and Translation Validation of the ‘First Screen’ Tool in Ten Indian Regional Languages

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ABSTRACT

Background: Screening for Specific Learning Disabilities (SLD) in India is limited by the lack of accessible screening tools in many Indian regional languages, which hinders early identification. **Aim:** The present study focused on the linguistic adaptation and adequacy validation of the ‘First Screen’ screening tool, originally developed and validated in English, into ten Indian regional languages. **Methods:** The adaptation process included forward translation, back translation, expert review, iterative revisions, and adequacy and error analyses. Three expert raters evaluated the back-translated items for conceptual equivalence, clarity, and linguistic accuracy. **Results:** Inter-rater agreement for the back-translated items ranged from 81.25% to 97.22%, with six languages showing agreement above 90%. All ten languages met the adequacy threshold of 80%. Error analysis identified 66 items requiring modification due to altered meanings or insufficient conceptual correspondence. The finalized translations were found to be linguistically suitable for use within their respective language groups. **Conclusion:** The ten adapted versions of ‘First Screen’ demonstrated linguistic adequacy for use within their respective language groups, supporting the app’s potential for broader reach in multilingual contexts. Future studies should evaluate the usability and screening performance of the app in real-world settings and extend translation efforts to additional Indian and international languages.

Keywords: specific learning disability, screening tool, linguistic adaptation, early identification

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INTRODUCTION

Over 250 million children in low and middle-income countries (LMICs) are at risk of not reaching their developmental potential (Black et al., 2017; Lu et al., 2016). Among these, India accounts for the highest proportion, with an estimated 65 million children belonging to this vulnerable group (Grantham-McGregor et al., 2007).

When it comes to educational attainment, the upper secondary completion rate has been found to be 38% across LMICs (Khokar, 2017; UNESCO, 2017). National surveys such as the National Achievement Survey Report (NAS) (2021) and Annual Status of Education Report (ASER) (2023) conducted by the Department of School Education and Literacy and Pratham respectively have underscored the lack of foundational academic skills in school-going children in India, the impact of this is reflected in the country’s educational outcomes, with a dropout rate of 11.5% in secondary grades (Ministry of Education, 2024).

One of the major factors contributing to poor educational attainment is the presence of ‘hidden disabilities’ such as Specific Learning Disabilities (SLD) in children (Dnyaneshwar, 2022). Recognising SLD as a formal disability which requires interventions and accommodations, the Rights of Persons with Disabilities Act (RPwD Act) (2016) defines it as “a heterogeneous group of conditions wherein there is a deficit in processing language, spoken or written, that may manifest itself as a difficulty to comprehend, speak, read, write, spell, or to do mathematical calculations and includes such

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conditions as perceptual disabilities, dyslexia, dysgraphia, dyscalculia, dyspraxia and developmental aphasia". While estimates vary, the global prevalence of SLD is reported to be between 5-15% (American Psychiatric Association, 2013), and in India, it is estimated to be 8% (Scaria et al., 2023).

Due to its 'hidden nature', SLD is often overlooked during children's formative educational years (Ahmad, 2015). Attributable to stigma and lack of awareness, parents and teachers often mistake symptoms of SLD as laziness, behavioural issues, or lack of interest in studies, contributing to the problems of under-identification, leading to an "identification gap" and a "treatment gap" (Joseph & Devu, 2022; Sahu et al., 2018).

Beyond lack of awareness, studies emphasize that many developing countries including India, are constrained by the unavailability of trained professionals and, standardized, culturally appropriate screening tools for timely identification of children (Bhavnani et al., 2019; Black et al., 2017; Mukherjee et al., 2014; Petchimuthu et al., 2018). While only a limited number of psychometrically and culturally sound tools exist to screen for developmental delays, there is an even greater scarcity of tools for screening children at risk for SLD (Kanniappan et al., 2025; Misquitta & Panshikar, 2023). This subsequently leads to delay in early detection and intervention, hindering children's ability to reach their full developmental potential, including academic achievement, positive self-concept and self-efficacy, reduced academic anxiety, and a non-stigmatized perception of their disability (Battistutta et al., 2018; de Bree et al., 2022; Singh et al., 2017).

Moreover, as India is a culturally and linguistically diverse country with 22 officially recognised languages and home to hundreds more, the existing tools become limited in their linguistic applicability, making them inaccessible to many educators and caregivers. They are also largely proprietary in nature, cover a limited age range and require a certain level of training to administer. Taken together, the current status of screening tools for SLD in India can be said to present a dual challenge: a limited number of indigenously developed instruments and an even greater paucity of tools adapted for use across the country's diverse linguistic contexts (Karande, 2022). This highlights an urgent need for easy-to-use, scalable, standardized screening tools which can be administered at the comfort of a child's home or school environment by a teacher or a caregiver in their regional language (Misquitta & Panshikar, 2023; Mukhopadhyay et al., 2019; Muthusamy & Sahu, 2020).

As a potential solution, Orkids Foundation (New Delhi) developed and validated a cost-effective digital screening tool, for identifying children at risk of SLD in 2020 (Oberoi et al., 2022). This English version of the tool contains 90 items distributed among 9 categories: Reading, Writing, Oral language, Mathematics, Sensorimotor, Social skills, Attention/hyperactivity, Executive Functioning, and Memory. Each item is scored on a 3-point scale: 0 for never, 1 for sometimes, and 2 for always. The statements are framed such that 2 represents a negative result, meaning the child struggles with the given items consistently, while 0 represents a positive result, indicating the child has no difficulty with the given item. A score of 1 reflects that the child is experiencing challenges with the specific task only occasionally. The screening results include a comprehensive plan of action for the caregiver/teacher to work with the child. The results of the validation revealed a sensitivity of 0.81 (95% CI: 0.60-0.93) and specificity of 0.57 (95% CI: 0.43-0.70). The positive likelihood ratio (LR+) and negative likelihood ratio (LR-) was 1.87 (95% CI: 1.32–2.66) and 0.34 (95% CI: 0.15-0.76), respectively. The overall results suggest the tool is accurate at detecting true positives, though less reliable for ruling out negative cases, which is consistent with the purpose of screening tools (Oberoi et al., 2022). The tool was made available on the 'First Screen' app.

While 'First Screen' represents a crucial step towards bridging the "identification gap", it is worth noting that because of the linguistic diversity, an estimated 60-70% children of India's total student population are still taught in their regional languages (Pratham, 2021). Thus, reliance on English or Hindi-only screening tools limits equitable access to early detection, particularly for SLD. Several studies have identified a pressing need for psychometrically robust and linguistically contextualized tools in different Indian languages to ensure accurate identification, assessment and intervention (Chordia et al., 2020; Grover & Laxmi, 2024; Mukhopadhyay et al., 2019; Muthusamy & Sahu, 2020).

In order to increase its outreach and scalability and identify more at-risk children, 'First Screen' was systematically adapted into 10 regional languages apart from English and Hindi: Assamese, Bengali, Gujarati, Malayalam, Marathi, Punjabi, Kannada, Tamil, Telugu and Urdu. This paper explores the methods involved in the process and the subsequent results.

MATERIALS AND METHODS

This study was conducted as part of the process of scaling up the ‘First Screen’ tool (Oberoi et al., 2022) through its translation and linguistic adaptation into ten Indian regional languages. A structured adaptation process, based on selected steps from the framework proposed by Geoffrey Beaton et al. (2000), was followed to ensure linguistic accuracy, cultural appropriateness, and preservation of the original instrument’s integrity while adapting it effectively for the selected Indian regional languages. The following steps were therefore undertaken in the adaptation process:

Step 1: Shortlisting of languages for adaptation: Based on the capacity of the ‘First Screen’ team and the availability of the translators, ten regional languages were chosen by the tool developer. These languages were Assamese, Bengali, Gujarati, Malayalam, Marathi, Punjabi, Kannada, Tamil, Telugu and Urdu. Translators were identified from different regions of the country and a different translator was onboarded for each language. Apart from being proficient in both English and their respective regional language, translators had an average of 15 years of experience in the field of special education and technical knowledge regarding SLD to maintain the semantic and contextual accuracy of the original instrument.

Step 2: Forward translations: The entire “First Screen” tool included 45 items on tool introduction, sub-skills explanation, demographics and results interpretation, 90 items evaluating a child’s skills on Reading, Writing, Oral Language, Mathematics, Motor and Sensory, Social skills, Attention/hyperactivity, Executive Functioning and Memory and 9 attention checks which do not contribute to the child’s final screening score. As the validation process for the English to Hindi translation is currently in progress, all the aforementioned items were translated from English into the ten regional languages by the respective translators (Oberoi et al., 2022).

Step 3: Back translations: All back translations were done by ten independent translators who were blinded to the purpose of the study and had no knowledge of the tool. These translators were fluent in English and their respective regional language and comprised of professional teachers and laypeople who had no specialized training or knowledge of SLD.

Step 4: Review of back translations: All back-translated versions of the tool across languages were reviewed by a member of the ‘First Screen’ team, a psychologist by profession with over a decade of experience in the field of SLD, to assess adequacy and conceptual accuracy. The reviewer possessed in-depth familiarity with the original tool and was proficient in both English and Hindi. As the task involved an analytic review rather than linguistic translation, proficiency in the respective regional languages was not essential.

Step 5: Iterative changes to forward translations: Based on the reviewer's feedback, iterative changes were made to the forward translations. Each suggested change was carefully reviewed and incorporated accordingly to ensure that the translated versions maintained conceptual equivalence with the original English tool while remaining linguistically appropriate for the target population.

Step 6: Analysis of adequacy and errors: A team of three special educators evaluated the accuracy of the back translation of each item across languages by comparing it to the original item. Each evaluator placed the translation of a given item into one of the following three categories: Adequate Translation (AT), Partially Adequate Translation (PAT), and Inadequate Translation (IT) (Silva et al., 2023) (See table 1). To minimize bias, evaluators were given a three-day gap between each language evaluation and were instructed to complete the evaluation for each language in one session on the designated date and were also blinded to the ratings given by fellow raters.

Table 1: Description of Analysis Parameters

Parameters	Description
Adequate Translation (AT)	Translation conveys the same meaning as the original item and is acceptable for the target population. This means that an item has been judged to have adequate semantic, idiomatic, experiential and conceptual equivalences.
Partially Adequate Translation (PAT)	Translation is understandable but has concerns such as sentence structuring, is not fully idiomatic, or only partially maps to the intended meaning.
Inadequate Translation (IT)	Translation does not convey the intended meaning and needs replacement or major revision.

Following the adequacy ratings, a quantitative analysis was done to generate Inter-Rater Reliability (IRR) values using the percent agreement method (Park & Kim, 2015) across the three- AT, PAT and IT categories. Items having an IRR value of 1 under the Adequate Translation category were finalized to be included in the final version whereas items which had been categorised as PAT or IT by at least one of the raters were further qualitatively analysed by interviewing the respective rater independently about their reasonings. The reasons were then categorized into three main types: changed meaning, missing information and grammatical or structural errors (See Table 2). The errors were also categorized as a primary or secondary concern for the flagged item.

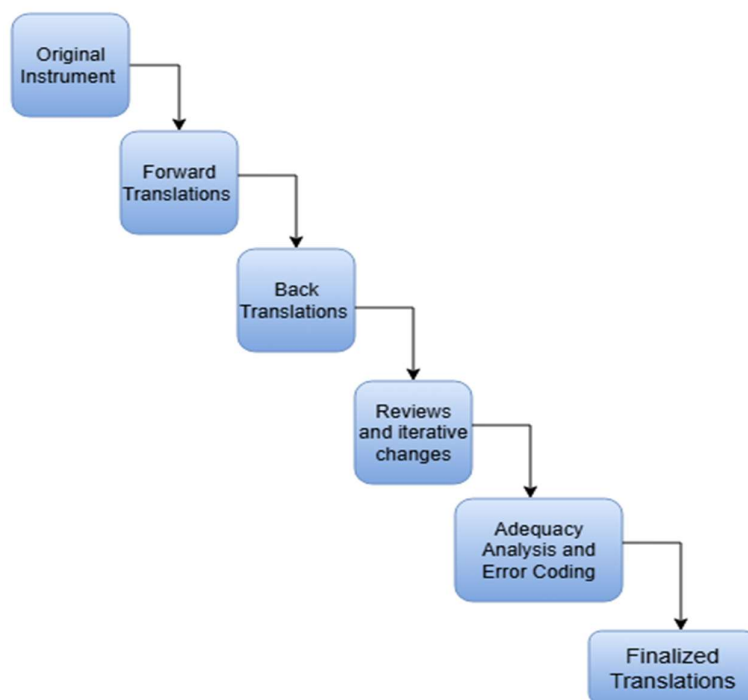
Table 2: Description of Error Codes

Error Code	Description
Changed Meaning	Translations with changed meaning were those that had the errors of missing, changed or inclusion of words or sentences such that they impacted the meaning of the original item itself.
Missing information	Translations with missing information had one or more pieces of information missing from the back translations in a way that did not impact the meaning of the original item or the broader sub-skill assessed.
Grammar or structural	Translations with grammatical or structural errors included those with grammatical changes in the back-translated versions, including spelling, punctuation mistakes and/or complex structuring.

Step 7: Revisions based on errors: The quantitative analysis and classification of errors made it possible to rank items according to how they affected the tool's conceptual fidelity and allowed for reviews and modification of items with changed meaning and missing information.

Step 8: Finalization of translated versions of the tool: The final translated versions of the tool were now ready for testing with targeted users. Figure 1 illustrates the process of translation and adaptation of the 'First Screen' Tool.

Figure 1: Flow Chart illustrating the process of 'First Screen' Adaptation



RESULTS

The first phase of forward translations included translations for a total of 144 items in each language. These 144 included 90 scored items and 54 unscored items from the 'First Screen' tool.

Following the forward translations, the adequacy analysis for all languages (Table 4) and the IRR values thus generated for each back-translated item across the AT, PAT and IT categories showed that Assamese and Telugu had the most robust back translations with minimum inadequacies reported. In both these languages, 97.22% of total items had 100% rater agreement for AT. On the other hand, Tamil had the highest number of items flagged as either PAT or IT. However, none of the languages reported a percent agreement rate lower than 80% under the AT category. An overall analysis showed that a significant majority of all the translated items across languages, i.e., 90.62%, had an IRR value of 1 under AT category, signifying that all raters agreed that these back-translated versions were sufficiently close to the original items. Additionally, of the total items translated across languages (n=1440) only seven were deemed either partially adequate or inadequate by all the raters, i.e., had an IRR value of 1.

Table 3: Results of Adequacy Analysis

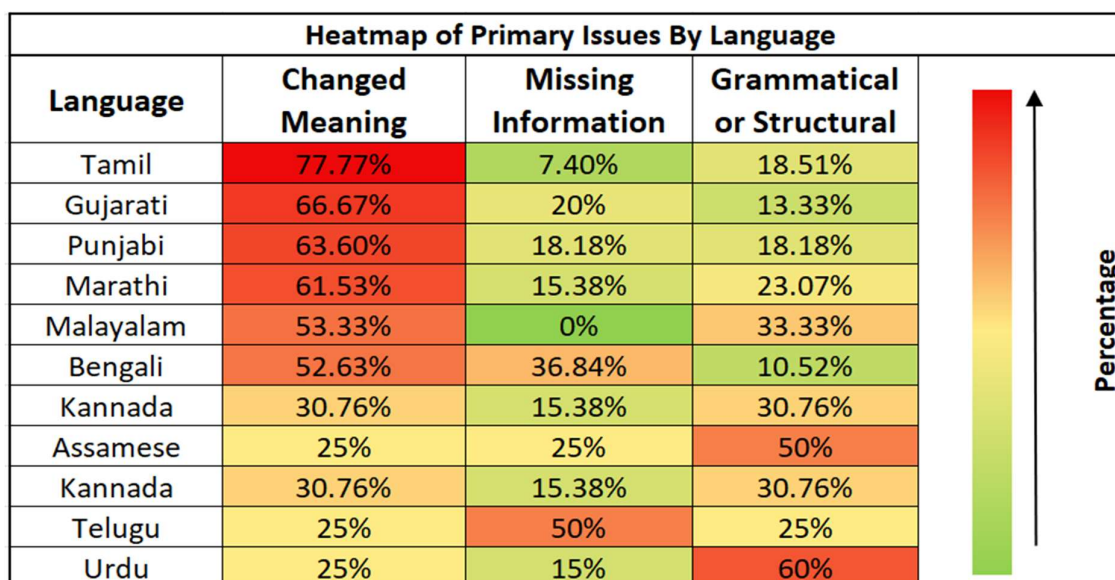
Language	Adequate		Partially Adequate		Inadequate		Items for qualitative analysis (n=135)
	Items with Complete Agreement (IRR = 1)	% Agreement	Items with Complete Agreement (IRR = 1)	% Agreement	IRR = 1	% Agreement	
Assamese	140	97.22%	0	0.00%	0	0.00%	4
Telugu	140	97.22%	0	0.00%	0	0.00%	4
Punjabi	134	93.06%	0	0.00%	0	0.00%	10
Kannada	134	93.06%	2	1.39%	0	0.00%	10
Marathi	131	90.97%	1	0.69%	1	0.69%	13
Malayalam	131	90.97%	0	0.00%	0	0.00%	13
Gujarati	129	89.58%	0	0.00%	0	0.00%	15
Bengali	125	86.81%	1	0.69%	0	0.00%	19
Urdu	124	86.11%	0	0.00%	0	0.00%	20
Tamil	117	81.25%	1	0.69%	1	0.69%	27

A qualitative analysis of the 135 items (Table 5) marked as having PAT or IT showed that in six of the ten languages (Bengali, Gujarati, Malayalam, Marathi, Punjabi, Tamil), the majority of the flagged items had changed meaning as a primary concern, and two (Assamese and Urdu) had grammatical or structural concerns. Only Telugu had missing information as a primary concern.

Table 4: Error Analysis across Languages

Language	Items Flagged	Changed Meaning		Missing Information		Grammatical or Structural	
		Primary	Secondary	Primary	Secondary	Primary	Secondary
Tamil	27	77.77%	3.70%	7.40%	14.81%	18.51%	22.22%
Gujarati	15	66.67%	13.33%	20%	40%	13.33%	-
Punjabi	11	63.6%	18.18%	18.18%	18.18%	18.18%	9.09%
Marathi	13	61.53%	30.76%	15.38%	23.07%	23.07%	30.76%
Malayalam	15	53.33%	-	-	20%	33.33%	6.67%
Bengali	19	52.63%	21.05%	36.84%	15.78%	10.52%	-
Kannada	13	30.76%	15.38%	15.38%	-	30.76%	23.07%
Urdu	20	25%	10%	15%	10%	60%	-
Assamese	4	25%	50%	25%	25%	50%	25%
Telugu	4	25%	-	50%	-	25%	-

Graph 1: Heatmap of Primary Concerns by Language



The graph (Graph 1) shows a heatmap of the primary concerns across flagged items.

Items from the seven languages that had changed meaning or missing information as a primary concern in the majority of their flagged items ($n=66$) were sent back for review.

DISCUSSION

Given the 8% incidence rate of Specific Learning Disabilities (SLD) in India and the barriers related to its under-identification encountered in LMICs, the present study aimed to help bridge this identification gap across various cultural and linguistic groups by adapting the screening tool, “*First Screen*”, into ten regional languages. Considering the lack of indigenously developed and methodically translated screening tools in the country, this adaptation process contributed to the broader efforts being made to make healthcare and educational resources more accessible and inclusive.

In the initial phase, ten experts who had more than a decade of experience in the field and who were native speakers of their respective languages were contacted and developed the forward translations. These professionals were chosen so as to maintain the semantic, idiomatic, experiential and conceptual equivalence of the items, which is conventional in linguistic adaptations of tools (Beaton et al., 2000).

Following the forward translations, back translations were done by laypeople who were fluent in the specific regional languages as well as English and had no specialized knowledge of learning disability, closely representing the intended target population of parents and teachers. The resultant back-translations proved crucial for quality control and highlighted the discrepancies between the original and translated items and any potential loss of meaning.

Given that all translations were undertaken within the same broader cultural context and the objective was to maintain conceptual fidelity across languages rather than modify content, a formal Content Validity Index (CVI) was not computed for the target-language versions. As the tool has already been psychometrically validated and this study focused solely on producing linguistically accurate translations, it relied more heavily on the expertise of the translators rather than committee reviews to preserve the conceptual fidelity of the original tool. Adequacy of translations was thus ensured through multiple reviews by a member of the *First Screen* team and iterative changes by experts. Depending on the reviews, while items in some languages including Punjabi and Bengali were back-translated, reviewed and retranslated multiple times, items in languages like Urdu and Malayalam were retranslated only once.

In each revision phase, experts retained some translations as they were, asserting that as per their expertise no other version reflected the original statement better, while changing some items with a modified version that reflected the original item more accurately. This suggests that for some items the initial translated versions were likely adequate by themselves but the back-translated versions were potentially marked as partially adequate or inadequate due to a lack of exact idiomatic equivalence.

The final back-translations were once reviewed by three evaluators who were experts in the field and could hence identify and mark the translations as Adequate, Inadequate or Partially Adequate depending upon how accurately they reflected the meaning of the original items. This enhanced the credibility of the process and gave an objective perspective on the back-translations for all languages. The quantitative analysis of the adequacy rating showed a minimum of 81.25% inter-rater agreement across all languages indicating the adequacy of the translations (Hartmann, 1977).

The results of these reviews were found to be both consistent with and contrary to the prevalent patterns in English–Indian language translations, which are largely influenced by three important factors: morphological complexity, structural distance from English, and resource availability and lexical borrowing (Patel et al., 2018). Languages like Tamil, which was marked for the highest number of inaccuracies, are known to have more complex, agglutinative morphology compared to other languages, which may have contributed to greater translation difficulty. This is also consistent with the findings that Dravidian languages are generally more structurally distant from English and therefore more difficult to translate than Indo-Aryan languages (Dewangan et al., 2021). However, in the present study, other Dravidian languages such as Telugu and Kannada showed fewer inaccuracies, which is contrary to this pattern. This contradiction may be attributable to differences in lexical availability across languages, particularly with respect to terminology related to learning disabilities and associated difficulties along with any variations and subjectivity in terms of lexical choice.

Additional qualitative comments by the evaluators on the back translations provided a more comprehensive analysis of their efficacy and areas of improvement, thereby strengthening the tool's real-world usability and functionality. For each language, while changed meaning and missing information errors were considered more critical due to their potential to alter the intended meaning of the items, grammatical and structural errors were deemed less impactful, as they likely resulted from differences in the grammar rules of the respective languages and were adequately tapping into the broader sub-skill being assessed.

The overall limited number of items with IRR of 1 under PAT or IT category also showed that the back-translations of the majority of the items across languages were adequately close to the original items in English. Considering the time and resource constraints as well as the overall adequacy ratings, only items from the seven languages (Tamil, Gujarati, Punjabi, Marathi, Malayalam, Bengali and Telugu) which had more than 50% of flagged items with changed meaning or missing information were selected and sent back for final reviews.

The current screening methods for SLD involve using a combination of brief paper-based tools such as PRASHAST checklist, SLD-SQ and LDST and a case history from the parents or the child's teachers. While useful, these methods primarily cater to professionals and together cover only English, Hindi, Kannada, and Marathi speaking populations. The *First Screen* translations thus expand upon the current screening landscape by providing a comprehensive screening option that brings together ten regional languages and makes it accessible to both-professionals and parents.

As *First Screen* is a screening tool that only aims to identify children at risk and requires subsequent diagnostic procedures, its effective use by parents and educators plays a critical role in early detection. Translations of such tools further expand access, enabling the identification of a wider range of at-risk children and facilitating timely, potentially customised interventions.

LIMITATIONS AND FUTURE SUGGESTIONS

While this study has initiated the process of instrument adaptation, further research is required to assess the app's applicability with targeted users, including teachers, parents and children, particularly in underprivileged and rural areas and to measure the translated versions' reliability and validity.

Additionally, the app's efficacy and universal applicability might be increased by translating it into additional languages and adapting it for usage in other countries, especially other LMICs, where the availability of tools is limited.

CONCLUSION

This study aimed to address the identification gap for Specific Learning Disabilities in India by linguistically adapting the '*First Screen*' tool into ten regional languages, and found that all translations demonstrated required adequacy. These findings suggest that a wider range of stakeholders who work with children and are proficient in these languages can access the app and conduct screenings,

increasing the likelihood of early identification and support, particularly in resource-poor areas where shortages of trained professionals are common. While the scope of the study was limited to linguistic adaptation, it represents an important step toward operationalizing the rights to accessibility and inclusive education outlined in national policies.

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CONFLICT OF INTEREST

None

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