DEVELOPMENT, VALIDITY AND RELIABILITY OF DEEP READING ABILITY QUESTIONNAIRE FOR PRIMARY SCHOOL PUPILS

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Article Info	ABSTRACT
	This study describes the development, validity, and reliability processes of a Deep Reading Ability Questionnaire (DRAQ) for primary school pupils in English reading. An instrument with 30 items for measuring deep reading ability was developed and validated using item response data from three experts, 10 primary school teachers, and thirty primary school pupils in Xuzhou City, Jiangsu Province, China. Item analysis was carried out to ensure content and face validity, followed by a reliability assessment measuring internal consistency using Cronbach's Alpha. The DRAQ instrument reported in this study will be utilized in the real study to assess primary school pupils' deep reading ability in English reading. The DRAQ instrument developed can also serve to examine students' deep reading skills in different subjects by replacing the English reading material with material from the other subject.

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INTRODUCTION

In recent years, the focus of English deep learning research has gradually shifted from college students to primary school pupils. This shift from rote memorization to higher-order learning patterns such as comprehension, transfer, and application, parallels the rise of the information society (Chu et al., 2021). There has been a notable movement in the United States towards deep learning-based curriculum reforms for primary school pupils, financially supported by non-profit organizations like Flora and Hewitt Foundation to bolster students' core subject competencies and 21st century skills (Becker et al., 2017). The TESOL international association has actively shifted its focus towards English deep learning, with advocates like Rod Ellis championing task-based English teaching in East Asian contexts, aiming to enhance English proficiency and promote deep learning in language subjects (Sonina, 2023). Wang and Hu (2017) have developed an assessment scale to evaluate pupils' practical English abilities, emphasizing the widespread need to prioritize deep learning in English education for primary schools.

English reading plays a crucial role in enhancing the English language abilities of primary school pupils, developing their thinking qualities, shaping good cultural awareness, and promoting their comprehensive learning abilities (Ismail & Al Allaq, 2019; Magableh & Abdullah, 2020; Wang & Chen, 2016). The improvement of reading skills is thus vital for fostering well-rounded pupils and implementing core subject competencies. In recent years, Chinese experts, scholars, and frontline teachers have increasingly focused on exploring teaching strategies for reading to align with English curriculum reforms. Deep learning, as an essential method for cultivating pupils' core competencies and facilitating curriculum reform (McPhail, 2021), offers new insights for the development of reading instruction and the enhancement of reading abilities (Wang, 2018). As a result, deep reading and the ability to engage in deep reading have gradually become significant goals in English reading instruction.

Deep reading is a complex process that promotes understanding (Gordon, 2023). In this process, readers need to use high-level thinking, such as inferential and deductive reasoning, analogical skills, critical analysis, reflection, and other skills to communicate with the author and then construct new meaning from it. Deep reading focuses on the core arguments and problems needed to solve the problem, and its purpose is to guide the learner to think profoundly in deep reading and cultivate their reflective and practical application abilities (LaRusso et al., 2016). Shallow reading, on the other hand, only emphasizes the formulas and external cues required to solve problems through unreflective memorization; all the pupils need to do is mechanically memorize and practice, resulting in limited conceptual understanding as an inevitable consequence (Entwistle et al., 2014; Liang, 2013). However, current reading instruction is mostly superficial. When society largely neglects deep reading, schools should spare no effort in cultivating pupils' deep reading ability (Mulcare & Shwedel, 2017).

Deep reading ability is based on the theory of deep learning and has the important characteristics of deep learning. Most scholars in China and abroad share certain similarities in their definition of deep reading ability, that is, deep reading ability refers to the learner's capacity to infer, analyze, critically question, reflect, evaluate, imagine, create, and apply knowledge based on understanding the basic meaning of a text, ultimately acquiring higher-order thinking skills and the ability to solve new problems. Through a review of relevant domestic and international literature, the researcher has found that the connotation of deep reading ability mainly includes three aspects: inferential reading skills, critical reading skills, and creative reading skills (Huang, 2017; Lim et al., 2021). These skills are necessary for learners to acquire, process, and output information.

Inferential reading skills refer to the ability to anticipate, complete, or complement implicit or absent information within a text, drawing upon previous conceptual and linguistic knowledge and cognitive schemes (Martelletti et al., 2023). These skills contribute significantly to global text comprehension by aiding in making sense of various words, connecting prepositions, and comprehending texts as a whole (Bayat & Çetinkaya, 2020). According to Soto et al. (2019), the inferential reading skills is a cognitively demanding ability that requires learners to read between the lines and make informed estimations about certain outcomes, events, or actions based on their comprehension of the reading materials. Inferential reading skills, identified as higher-level skills, are expected to help pupils comprehend the text better (Samiei & Ebadi, 2021). Many prior studies have contended that inferential reading abilities are essential for learners, citing various reasons. Firstly, these skills enable learners to discern the main idea, identify supporting details, make assumptions, draw conclusions, and make meaningful

inferences. Secondly, their application fosters confidence, particularly among learners with weaker proficiency levels. Thirdly, learners develop the ability to extract meaning beyond literal statements, infer relationships such as sequence, cause, and effect, and grasp the title, theme, and purpose of a passage. Rahayu and Mustadi (2022) further support this notion, demonstrating how these skills facilitate the identification of topic sentences, comprehension of the passage's tone, and a deeper understanding of the text.

Critical reading skills, as a manifestation of critical thinking, have gained prominence in navigating the challenges of a more competitive life (Sultan et al., 2017). Critical thinking, which applies higher order thinking skills and more complex cognitive processes, belongs to one of the skills needed in the 21st century to achieve success either at work or school (Evans, 2020; Muniroh et al.,2022). In fact, critical reading skills may affect the pupils' overall academic achievement (Karademir & Ulucinar, 2017). A fundamental aspect for pupils to cultivate a critical perspective is through the practice of critical reading (Al Roomy, 2022). It is an indispensable prerequisite to acquire critical reading skills to access accurate information and use this effectively in the right place in this era of limitless information flow because it is necessary to have not only good reading but also critical reading skills in order to perceive the changes brought by life and adapt to them (Li & Wan, 2022; Yasemin, 2020). Furthermore, critical reading skills, through the broad lens they provide, function as spectacles that can enable equal participation in life despite economic, social, and cultural diversity (Sultan et al., 2017). Critical reading ability, being a high-level skill, holds significant importance for pupils' long-term success (Aghajani & Gholamrezapour, 2019). Critical reading fosters the generation of fresh insights and nurtures creativity through the exploration of different perspectives on the presented information (Ocak & Karslı, 2022). Critical reading can be expressed as understanding the thoughts presented in the text very well, recognizing the relationships between the thoughts, and reconstructing the existing information by organizing it through own experience (Li & Wan, 2022). On the other hand, pupils who do not have critical reading skills will not be able to distinguish between the facts and opinions, and as a result, pupils can have misunderstandings (Al-Shaye, 2021; Din, 2020).

Dundar et al. (2023) state that creative reading skills include high-level thinking skills. The reader makes research with different perspectives on the writer and text using his or her experience by creative reading and can reach more than what the author wants to tell. Fernandez and Arriola (2022) confirm that reading should not be a passive skill where the reader absorbs the writer's words like a sponge. Reading, which is limited to understanding the author's views and perspectives, contains less meaning than the reader can achieve with creative reading (Kasap, 2019). Bakı (2020) indicates that pupils possessing high creative reading skills exhibit greater tendencies to read and derive enjoyment from books compared to those with lower creative reading skills. Creative reading is a greatly ignored realm of reading skills. Most textbooks devote little or no space to it and when they do so, it is usually incorporated with critical reading. However, it is an area that deserves distinct emphasis, special treatment, and unique techniques (Glaveanu, 2019). Engaging in creative reading demands learners go beyond the literal comprehension, interpretation, and critical reading levels. Within this domain, the readers endeavour to come up with innovative or alternative solutions to this presented by the writer (Danesh & Nourdad, 2017).

For primary school pupils, why does deep reading ability matter? Influenced by examination-oriented education, today's Chinese primary school reading instruction prioritizes efficiency for exam preparation, hindering the development of pupils' deep reading abilities (Lai, 2020; Luo, 2020; Wang, 2017; Xie, 2019). For instance, text interpretation remains confined to processing surface-level information, emphasizing measurable knowledge and skills. This superficial approach fosters a shallow understanding of reading (Bai et al., 2024). In fact, in many places, including China, deep reading ability has only recently received attention from a few researchers and teachers (LaRusso et al., 2016). Shallow reading instruction in schools, combined with a superficial reading atmosphere outside of them, makes it necessary to implement effective deep reading instruction. The primary school stage is a crucial period for cognitive development, during which pupils gradually develop their logical thinking, creative thinking, and critical thinking abilities (Lucas & Spencer, 2017). According to "English Graded Reading Standards for Primary and Secondary School Students in China (Experimental Draft)" (Wang & Chen, 2016), pupils' reading abilities are categorized into nine levels. Within this framework, sixth-grade primary school pupils are recognized as being in a significant phase of cognitive development. During this critical period, pupils' capacities for logical thinking, abstract thinking, creative thinking, and critical thinking

are progressively formed and enhanced (Rezaei Nazari et al., 2020). Consequently, fostering deep reading abilities during primary school is essential for pupils' overall cognitive development and academic success.

From the previous studies, there is a need to develop deep reading ability questionnaires. This is because there is currently no unified standard for questionnaires assessing English deep reading ability both in China and internationally (Skjæveland, 2020). The available deep learning ability questionnaire does not assess pupils' deep reading ability (Lai, 2020). This suggests that the general deep learning ability questionnaire is insufficient to meet the instrument's validity in measuring the necessary for English reading field. Consequently, based on the research results of previous deep learning ability measurement tools, this study took into account the cognitive characteristics of primary school pupils and developed the Deep Reading Ability Questionnaire (DRAQ) for English reading. This questionnaire includes three dimensions: inferential reading skills, critical reading skills, and creative reading skills.

METHOD

Sample

A pilot study was conducted to assess the reliability, validity, and practicality of the research instruments in a primary school setting (Gani et al., 2020). Porta defines a pilot study as a small-scale test of methods and procedures intended for use on a larger scale (Sharma & Bagga, 2019). Some studies suggest that a pilot study involving around 30 participants is optimal (Aithal & Aithal, 2020). In this study, the primary school involved for this study is in Xuzhou City, Jiangsu Province, China. Convenience Sampling is affordable, easy and the subjects are readily available (Mweshi & Sakyi, 2020). Thus, the researcher had employed purposive sampling to ensure that selected classes exhibited Piagetian cognitive levels (Maurya & Khan, 2021).

The pupils who were involved were 30 sixth-grade primary school pupils with equivalent academic qualifications to the targeted real sample and were randomly selected from a public primary school in Xuzhou City. The trial survey was administered to these 30 pupils to evaluate the research instruments. The average age of the sample is 12 years. The choice of sixth grade is because pupils before the fifth grade have not yet accumulated or understood much English knowledge, and their learning habits have not yet developed into a more organized system. Pupils in the sixth grade are a good fit for the subjects of this study since they have some basics in vocabulary and grammar and are generally motivated to learn English well.

The time limit for the DRAQ in this trial was 45 minutes. Approximately 16 pupils, or 53% of the sample, were female, while 14 pupils, or 47%, were male. Although the gender distribution was not balanced, this limitation was disregarded as the primary objective was to validate and test the reliability of the DRAQ. Alongside the 30 pupils who participated in the reliability survey, the study also engaged three content validity experts specializing in English education and curriculum studies to ensure the validity of the instrument. These experts provided critical insights and feedback on the DRAQ, contributing to a comprehensive evaluation of its effectiveness in a primary school setting.

Development of Deep Reading Ability Questionnaire

Deep reading ability will be measured using the Deep Reading Ability Questionnaire (DRAQ). DRAQ was adopted and adapted from the Deep Reading Ability Assessment Instrument by Lai (2020) and the Critical Thinking Skills and Creative Thinking Skills sections in the Deep Learning Ability Scale developed by Shen (2021), following discussions with three English education experts. These experts have been chosen based on their qualifications and over 10 years of experience in English education. The experts are, (i) an associate professor at Nanjing University of Posts and Telecommunications in English education, (ii) an associate professor at Jiangsu Normal University in English education and (iii) a Doctor of Philosophy lecturer at Liuzhou City Vocational College in curriculum studies. Their role is to review the list of questions for the DRAQ, ensuring they are appropriate for the pupils' level and primary school English reading setting. This adaptation ensures that all items are aligned with the English curriculum and the specific dimensions of English reading ability being evaluated, as outlined in "English Graded Reading Standards for Primary and Secondary School Students in China (Experimental Draft)" (Wang & Chen, 2016).

According to Lai (2020), referencing the "China's Standards of English Language Ability", it is focused on the specific criteria for levels 4 to 9 in the overall reading comprehension scale, which correspond to the improving and proficient stages. Combined with the connotation of deep reading ability and the six key abilities of deep learning, Lai (2020) develops a dimensional table for English deep reading ability. All three dimensions, encompassing Inferential Reading Skills, Critical Reading Skills, and Creative Reading Skills from Lai's instrument are retained. However, the questionnaire is aimed at assessing the deep reading ability in English of middle school students. A minor modification was made to align the items with the targeted sample and primary school English reading level examined in this study.

In particular, the language of the questionnaire was designed to be as simple as possible and easy to understand for primary school pupils. The sections on Critical Thinking Skills and Creative Thinking Skills from the Deep Learning Ability Scale developed by Shen (2021) are preferable because the questionnaire assesses critical thinking skills by evaluating how well individuals "consistently perceive and appreciate the similarities and differences between different cultures, critically question the author's viewpoints and text structure from multiple perspectives, and frequently reflect on and evaluate the text to form their own understanding"; and assesses creative thinking skills by evaluating how well individuals "consistently explore the content of the text, frequently propose unique viewpoints and questions, and demonstrate creative writing skills." These sections are easily adapted and can be modified according to the purpose of the study.

The DRAQ consists of 30 items designed to measure the sixth-grade primary school pupils' English deep reading ability, which includes three dimensions: inferential reading skills, critical reading skills, and creative reading skills, each dimension consisting of ten questions. The Likert scale is a practical questionnaire type instrument used to measure and quantify the opinions and attitudes of participants (Kusmaryono et al., 2022). Since its development by Rensis Likert in the 1920, it is frequently used measurements in the social sciences (Alhassan et al., 2022). In this study, a five-point Likert scale is used to measure respondents' agreement with a variety of statements. For each item, respondents are given five options to choose, they are the (i) strongly disagree; (ii) disagree; (ii) somewhat agree; (iv) agree and (iv) strongly agree.

RESULTS AND DISCUSSION

Validity

It is crucial to develop a valid and reliable instrument for research purposes. Validity and reliability served as tools within an essentially positivist epistemology, as highlighted by Watling (Chris Siew-Har & Ramasamy, 2022). These characteristics are widely regarded as fundamental in research instruments, whether in the form of tests, interviews, observations, or questionnaires (Akyıldız & Ahmed, 2021; Mohajan, 2018). In essence, validity and reliability are pivotal criteria for determining the usefulness of these instruments (Cohen et al., 2017). There are two aspects of validity examined: content validity and face validity. Validity pertains to the extent to which a measure accurately assesses what it intends to measure (Masuwai et al., 2024). An instrument is deemed valid when there is confidence that it measures what it is expected to measure (de Barros Ahrens et al., 2020). There are six steps involved in content validity procedure which has been inspired by Yusoff (2019) and the procedure is explained in Table 1.

Table 1. Content validity steps and explanation

Content validity steps	Procedure explanation
1. Preparing content validity form	This content validity form provides a brief overview of the research objective, the study framework, the purpose of the DRAQ instrument, the domains used in the instrument, the sample involved, and instructions for experts to validate the instrument and the scale used.

2. Selecting review panel of experts	In this step, it is important to determine the number of experts needed, as this will influence the acceptable cut-off score for the CVI. This study employed three experts, aligning with the research purpose and following Polit and Beck (2006) and Polit et al. (2007), which suggest an acceptable CVI value of 1 when using three to five experts.
3. Conducting content validation	Content validation can be conducted through face-to-face or non-face-to-face methods. Due to the pandemic, this study utilized only the non-face-to-face method.
4. Reviewing domains and items	Experts are encouraged to provide verbal or written comments on items related to the domains specified in the content validity form. All comments are reviewed to refine the final items in the instrument.
5. Providing score on each item	Experts are also requested to score the items based on the provided scale after thoroughly reviewing all items in the instrument.
6. Calculating Content Validity Index (CVI)	

After following the steps for validity, all items in the DRAQ were verified by the experts. To ascertain the validity of the instrument (Deep Reading Ability Questionnaire), it was presented to experts in the fields of English education and curriculum studies. Based on their observations and suggestions, necessary adjustments were made to the final draft versions of the instruments. The first expert is an associate professor at Nanjing University of Posts and Telecommunications in China, with more than 10 years of experience in English education. He has actively published in English education studies and frequently gives talks on the subject. The second expert is an associate professor at Jiangsu Normal University in China, with over 10 years of experience in English education and several publications in English education studies. The third expert is a lecturer at Liuzhou City Vocational College in China. She holds a doctorate in English curriculum studies and was chosen as an expert due to her active involvement in the field and her numerous publications in this area.

As mentioned by Beck (2020), quantifying experts' degree of agreement regarding the content relevance of an instrument, such as averaging experts' ratings of item relevance and using a pre-established criterion of acceptability is needed. Item ratings are typically on a 4-point ordinal scale, but according to Almanasreh et al. (2022), a 3- or 5- point rating scale can be used. But they advocate using a 4-point scale to avoid having a neutral and ambivalent midpoint. With a panel of five and fewer experts, all must agree on the content validity for their rating to be considered a reasonable representation of the universe of possible ratings (Almanasreh et al., 2022). In this study, content validity was assessed by three experts specifically assigned to evaluate the DRAQ. This questionnaire consists of 30 items rated on a 4-point scale, excluding the neutral option, where 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant. The questionnaire was given to all three experts, and the content validity index (CVI) was calculated. Table 2 presents the data collected for content validity and the CVI value for the DRAQ.

Prior to the calculation of CVI, the relevance rating was recorded as either "X" or "-"; where "X" is the relevance scale of 3 and 4, and "-" is the relevance scale of 1 and 2. Therefore, in columns 1, 2, and 3, this study simply noted "X" or "-" based on the chosen relevance scale. Subsequently, for each item, the I-CVI is calculated by determining the proportion of experts who rated it as either 3 or 4, divided by the total number of experts. For instance, if an item was deemed quite or highly relevant by four out of five judges, its I-CVI would be 0.80. Researchers utilize I-CVI information to assist them in making revisions, eliminations, or substitutions of items (Yazid et al., 2023).

From Table 2, almost all CVI values received a score of 1, except for item 6, item 8, item 11, and item14. This demonstrates a high percentage in X instead of -. DRAQ, shows I-CVI value of 0.94 (94%). The reason for this is that, according to feedback from experts, few questions were not aligned with the cognitive characteristics of pupils, which they may not be able to understand in depth. As a result, a few amendments were made to these items. After further discussion with the experts, this study managed to accept all the items by enhancing sentence structures and simplifying problem scenario/situation in four items. Therefore, the DRAQ instrument is content validated. Subsequently, the validated DRAQ instrument was tested for reliability.

Table 2. Content validity

Item Rated 3 or 4 on a 4-point Relevance Scale for DRAQ				
Item	Expert 1	Expert 2	Expert 3	Number in Agreement	Item CVI
1	X	X	X	3	1
2	X	X	X	3	1
3	X	X	X	3	1
4	X	X	X	3	1
5	X	X	X	3	1
6	-	X	X	2	0.67
7	X	X	X	3	1
8	-	X	X	2	0.67
9	X	X	X	3	1
10	X	X	X	3	1
11	X	-	-	1	0.33
12	X	X	X	3	1
13	X	X	X	3	1
14	X	X	-	2	0.67
15	X	X	X	3	1
16	X	X	X	3	1
17	X	X	X	3	1
18	X	X	X	3	1
19	X	X	X	3	1
20	X	X	X	3	1
21	X	X	X	3	1
22	X	X	X	3	1
23	X	X	X	3	1
24	X	X	X	3	1
25	X	X	X	3	1
26	X	X	X	3	1
27	X	X	X	3	1
28	X	X	X	3	1
29	X	X	X	3	1
30	X	X	X	3	1
				Mean I-CVI = 0.94	

Note: I-CVI = the expert in agreement divided by the number of experts.

Another type of validity assessed in this study was face validity. The purpose was to measure pupils' English deep reading ability. Face validity refers to whether the questionnaire appears, at first glance, to measure what it is intended to measure. Questionnaires with a clear purpose, even to uninformed respondents, are said to have high face validity. This type of validity can be evaluated by asking individuals to rate the validity of a questionnaire based on their perception. To assess the validity of the DRAQ, 10 primary school teachers from non-English subject areas in Xuzhou, China, were randomly selected to answer the question such as "Which items in the questionnaire can measure the English deep reading ability of primary school pupils?" The background of non-English teachers is crucial in evaluating face validity to ensure the questions are understandable and clear. This approach was to ensure that the questionnaire appears clear to the study's sample, which included pupils with low to moderate English proficiency.

For face validity assessment, all ten teachers were affirmative for all 30 items in the DRAQ. They agreed that all items in the instrument could measure deep reading ability, but only one person disagreeing with item 3. This finding indicates a high degree of face validity among non-English teachers. Therefore, the DRAQ instrument is considered face validated.

Reliability

The last procedure is to determine the reliability of DRAQ, before it can be applied to a real sample in the research field. Reliability refers to the consistency with which an instrument measures what it is supposed to measure. It reflects the instrument's ability to produce consistent scores or values when applied to the same individuals under identical conditions but at different times. While an instrument may possess reliability without validity, it cannot achieve validity without reliability (Aithal & Aithal, 2020). As mentioned by Schrepp (2020), the reliability coefficient is the degree to which the instruments measure whatever they are measuring consistently. To determine the reliability of the instruments to be used in the actual study, as mentioned above, a pilot study was conducted on 30 pupils as respondents with similar characteristics to the real participants of the study and they were not involved in the main study. The data obtained from the DRAQ was analysed using IBM Statistics SPSS software, to test the instrument's reliability coefficients, using Cronbach's Alpha values. Cronbach's Alpha reliability coefficient normally ranges between 0 and 1. The closer Cronbach's Alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale. If the obtained reliability coefficient is greater than 0.70, it indicates that this instrument is reliable and suitable for use in actual studies (Sürücü & Maslakci, 2020). The results showed that, the reliability coefficients of the questionnaire items are as in Table 3.

Table 3. The reliability coefficients of Cronbach's Alpha for the questionnaire

Dimension	Number of Items	Alpha value (α)	Total Alpha value (α)
Inferential reading skills	10	0.991	
Critical reading skills	10	0.990	0.997
Creative reading skills	10	0.990	

Based on Table 3, the results indicate that the reliability coefficient is at a high level, proving the items in the questionnaire to be excellent to be used in the actual study.

CONCLUSIONS

This study aimed to develop a Deep Reading Ability Questionnaire (DRAQ) for primary school pupils, with the expectation that additional empirical research of this nature will be undertaken by innovative and interested English education experts. The questionnaire underwent a rigorous verification process, and its reliability was thoroughly assessed. Both content validity and face validity were evaluated and found to be satisfactory, indicating that the instrument effectively measures what it is intended to measure and appears appropriate for its intended purpose. This foundational work lays the groundwork for further studies and refinements, ensuring that the DRAQ can be a valuable tool in assessing and enhancing the deep reading abilities of primary school pupils.

For future research, it is recommended to explore the relationships between this questionnaire and other deep reading ability questionnaires. Since this research was conducted with a sample of only 30 pupils, future research should test the questionnaire on a larger and more diverse sample from different cultures to ensure its generalizability. Nevertheless, the instrument described here could be used by researchers to investigate pupils' deep reading ability in other subjects, such as Chinese reading, by substituting the English reading content with content from another subject. Additionally, researchers can explore whether pupils' deep reading ability can be developed through a specific intervention program. The results of this study have ascertained that the developed DRAQ could be a useful tool for assessing the deep reading ability of primary school pupils in English reading. However, further work is needed to continue validating the instrument. It is particularly important for future studies to examine the relationship between this instrument and other deep reading ability questionnaires. Other studies might also investigate the application of the DRAQ with different samples to see how it performs in various contexts. Therefore, it is believed that the DRAQ could be effectively used in future research to assess whether primary school pupils' deep reading ability can be enhanced through specific intervention programs. This will help to further validate the instrument and expand its applicability in educational research.

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