Development of Quality Education Literacy Scale for Sustainable Development*

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ABSTRACT

The Sustainable Development Goals (SDGs) represent universal objectives aimed at addressing the needs of future generations by balancing economic growth, social justice, and environmental sustainability. Among these goals, ensuring quality education holds a central and strategic role. Teachers serve as critical agents in achieving this goal, acting as key facilitators in the realization of quality education for sustainable development. Accordingly, it is essential for teachers to possess a comprehensive literacy competence that enable them to understand and implement educational programs from the perspective of quality education for sustainable development. However, there is currently a lack of comprehensive assessment tools in this area. To address this gap, the present study aims to develop a valid and reliable scale to measure teachers' levels in quality education literacy for sustainable development. Data were collected from 355 teachers working at various school levels. The scale development commenced with an extensive literature review on sustainable development and literacy in quality education. Subsequently, based on UNESCO's key components of quality education literacy, the core factors to be measured were identified. These factors were defined in direct relation to educational programs, teacher competencies, and sustainable development goals. The content of the scale was designed to reflect the primary elements of the educational process, with appropriate items were developed for each factor. The resulting scale consists of 41 items and three dimensions. Validity and reliability analyses were conducted throughout the development process. The findings demonstrated that the scale is a valid and reliable tool for assessing in quality education literacy for sustainable development. This study contributes to the field by providing a scientifically validated and comprehensive measurement tool in existing relevant literature.

INTRODUCTION

Sustainable development is a holistic approach that aims to integrate economic growth, social progress, and environmental protection in a balanced manner (Kaimovs & Skarupins, 2024). The success of this approach depends on all members of society recognizing the significance of these three dimensions and to acting accordingly. At this point, it becomes essential to equip individuals with the knowledge, skills, and values necessary to contribute effectively to sustainable development. For this reason, the goal of quality education, which is one of the Sustainable Development Goals, plays a critical role in the achievement of sustainable development goals.

Goal 4 of the United Nations Sustainable Development Goals, entitled "Quality Education," aims to ensure inclusive and equitable quality education while promoting lifelong learning opportunities for all (United Nations, 2015). This goal aims to empower individuals not only through the acquisition academic knowledge but also by developing them with essential competencies such as critical thinking, problem-solving, creative thinking, and ethical values. Thus, it enables individuals to become active and responsible citizens at both personal and societal levels.

In this context, as emphasized by UNESCO (2024), aligning education systems with the objectives of quality education is a fundamental prerequisite for fostering long-term societal transformation in support of sustainable development. The goal of quality education for sustainable development emerges as a critical factor, empowering individuals to make informed decisions, formulate sustainable policies, and ultimately contribute to the long-term enhancement of societal well-being (Morelli, 2011).

The effective implementation of the Sustainable Development Goals (SDGs) largely depends on the role of teachers. As key actors in ensuring quality education for sustainable development, teachers occupy an indispensable position. Within contemporary educational paradigms, teachers are no longer regarded

merely as transmitters of knowledge; instead, they are conceptualized as facilitators who inspire students to embrace sustainable lifestyles, promote critical thinking, and nurture a sense of social responsibility.

For this reason, it is imperative that teachers not only possess a comprehensive understanding of the goal of quality education but also demonstrate the capacity to effectively integrate this goal into their classroom practices. Equipping teachers with the necessary competencies to align their pedagogical approaches with the principles of sustainable development is essential for fostering meaningful and enduring change.

At this junture, the concept of literacy emerges as a critical factor. Literacy is defined as the ability of individuals to comprehend, evaluate, and actively engage in educational processes (Cacicio et al., 2023). This concept encompasses not only knowledge of curriculum content, instructional methods, and assessment procedures, but also the capacity to critically analyze such information (Renta-Davids, Camarero & Tierno, 2020). Specifically, for teachers, literacy entails a thorough understanding of the objectives, content, instructional practices, and assessment components of educational programs, as well as the competence to effectively implement these elements (Kwauk, 2020). The possession of curriculum literacy skills by teachers constitutes a fundamental prerequisite for the successful implementation of curricula aligned with sustainable development goals. Nevertheless, in educational contexts aimed at multidimensional and comprehensive aims such as sustainable development, general curriculum literacy skills alone are insufficient.

Therefore, possessing quality education literacy for sustainable development emerges as a fundemental requirement for teachers within the context of education system transformation. Quality education literacy is a comprehensive competence that extend beyond a mere understanding of educational policies or content; it involves the capacity to comprehend the interconnections between curricular content and susianable development goals, and to develop corresponding pedagogical strategies. Given that sustainable development represents a multifaceted paradigm involving economic, social, and environmental dimensions, teachers must be equipped to analyze this complex framework, interpret curricula accordingly, and adapt their instrucional practices to reflect these principles.

In this regard, quality education literacy differentiates itself from various existing scales in the literature that focus on domains such as sustainability literacy, environmental literacy, citizenship literacy, or general educational literacy. This distinction arises because most of these scales tend to adopt a unidimensional perspective and do not adequately capture the integration of sustainable development within education. Conversely, quality education literacy seeks to synthesize multiple literacy competencies with the core principles of sustainable development and translate them into educational practice.

Quality education literacy envisions teachers as educational leaders who move beyond the traditional role of knowledge transmission by internalizing sustainable development goals and embedding them within the classroom environment. Consequently, teachers are required to possess a comprehensive, multidimensional, and action-oriented competence -namely, quality education literacy for sustainable development. In line with this, the central role of teachers in achieving quality education literacy for sustainable development necessitates the need for a structured and context-specific measurement instrument designed to assess this competence.

In this context, the development of a new scale would allow for the multidimensional assessment of teachers' literacy levels in quality education grounded in sustainable development, thereby addressing a notable gap in the existing academic literatüre. Thus, this type of literacy would not only guide teacher education but also hold strategic professional significance for teachers. At this point, equipping teachers with literacy competencies related to quality education for sustainable development emerges as a critical necessity to drive transformation at both individual and societal levels. The acquisition of this competence by teachers will facilitate the effective implementation of quality education aligned with sustainable development goals. Therefore, the design of tools aimed at measuring and enhancing this specific literacy skill represents a decisive factor for shaping education policies and informing teacher training programs.

As research on quality education for sustainable development has been receiving increased scholarly attenrion worldwide (Hasanova & Safarli, 2024; Karimi, 2025; Rahman & Alias, 2023; Steele & Brown, 2025), its recent emergence as a focal point in our national context- along with the growing interest among teachers and the increasing integration of sustainable development goals into education policies and practices-has brought the issue of quality education to the forefront of the educational agenda.

Therefore, the measurement tool developed within this framework holds considerable significance in advancing quality education literacy for sustainable development. Generating data on how teachers interpret and implement curricula in alignment with sustainable development goals is a crucial for enhancing the effectiveness of educational policies. The primary aim of this study is to develop a valid and reliable scale to assess teachers' literacy levels concerning quality education for sustainable development. To this end, the theoretical foundations of the scale were established through a extensive literature review, an item pool was constructed, and content validity was ensured through expert evaluations. Subsequently, validity and reliability analyses of the scale were conducted. As a result, the developed scale represents a valid, reliable, and ready-to-use instrument for assessing teachers' literacy levels in quality education for sustainable development, thereby contributing meaningfully to the academic literature.

METHOD

As part of the research, a validated and reliable scale was developed to assess teachers' levels in quality education literacy for sustainable development. This section presents a detailed account of the methodology employed and the analyses conducted throughout the scale development process. Methodologically, the study adhered to establish procedures for scale development, ensuring validity at each stage.

Study Group

The research was conducted with a total of 355 teachers. The study aimed to include all groups expected to possess quality education literacy, participants were drawn from various subject areas, experience levels and educational stages. This diversity broadened the scope of the study and enhanced the potential for producing more generalizable findings. The basic demographic information of the study group is presented in Table 1.

Table 1. Basic Demographic Information of the Study Group

	Variable	N
Gender	Female	223
	Male	132
School Level	Preschool	4
	Primary school	104
	Middle school	29
	High school	218
Education Level	Bachelor's degree	220
	Master's degree	119
	Doctorate	16
Years of professional experinece	1-5	121
	6-10	107
	11-15	73
	16-20	42
	21 and above	12
Age	24-29	65
	30-39	193
	40-49	83
	50 and above	14
Subject Area	Maths	34
	Geography	12
	Classroom Teaching	65
	Preschool Teaching	9
	History	13
	Guidance and Counseling Teaching	8
	English Language Teaching	100
	Religious Culture and Ethics	13
	German Language Teaching	9
	Biology	10
	Chemisrty	12
	Turkish Language and Literature	17
	Music	6
	Visual Arts	8
	Physical Education	10
	Turkish Language Teaching	5
	Science	3
	Special Education Teacher	5
	Physics	10
	Information Technologies	3
	Phiolosophy	8

When examining the demographic characteristics of the participating teachers, it is observed that the study includes a total of 355 participants. In terms of gender distribution, female teachers (62.8%) outnumber male teachers (37.2%). Regarding school level, the highest participation comes from high school teachers (61.4%), followed by primary school teachers (29.3%).

In terms of educational background, most teachers hold a bachelor's degree (62%), while a smaller percentage have completed a master's degree (33.5%) or a doctoral degree (4.5%). Examining the distribution of years of service, most teachers are within the first 15 years of their careers, with the largest group consisting of those with 1-5 years of experience (34.1%).

Regarding age distribution, most teachers fall within the 30-39 age group (54.4%), followed by those aged 40-49 (23.4%) and 24-29 (18.3%). When analyzed by subject area, English teachers (28.2%) have the highest participation rate, followed by classroom teachers (18.3%) and mathematics teachers (9.6%). Although participation from other subject areas is lower, the presence of teachers from various disciplines highlights the diversity of the research group.

DATA COLLECTION PROCESS

Before determining the core components of the scale for quality education literacy for sustainable development, an extensive literature review was conducted on the topics of sustainable development and quality education literacy. During this phase, previous studies and relevant literature were examined to establish a knowledge base on the relationship between quality education literacy and sustainable development. The factors that the scale intends to measure were identified based on the core components of quality education literacy as defined by UNESCO. These factors delineated the scope of the scale and specified which aspects of education literacy would be assessed from a sustainable development perspective. Drawning on the identified factors, items representing each were developed to enable participants to evaluate education literacy from multiple dimensions. Particular attention was given to ensuring that each item in the item pool was clear and measurable. To evaluate the face and content validity of the draft scale, expert opinions were solicited prior to its implementation. Feedback was gathered from a total of ten experts, comprising two professors, six associate professors and two assistant professors. Following the experts' recommendations, revisions were made to the wording of five scale items, and two new items were added, thereby enhancing the scale's comprehensiveness. Consequently, the final draft scale, consisting of 50 items was prepared. This expert review process aimed to strengthen both the content and linguistic validity of the scale, ensuring that it was grounded on a strong foundation based on expert feedback. This stage is critical to ensure that the developed measurement tool can be used validly and reliably within the academic context.

Expert Opinion

To evaluate whether the items in the measurement tool corresponded to the intended measurement objectives and adequately represented the target construct, expert opinions were sought. The experts assessed the clarity, comprehensibility and compliance of the items with scientific standards. This process aimed to enhance the validity and reliability of the measurement tool, thereby ensuring more accurate and objective results.

The distribution of the participating experts based on gender and academic titles is presented in Table 2.

Table 2. Distribution of Participating Experts by Gender and Academic Title

Variable	Subcategory	N	%
Gender	Female	2	20
	Male	8	80
Academic Title	Professor	2	20
	Associate Professor	6	60
	Assistant Professor (Dr.)	2	20
Department	Curriculum and Instruction	7	70
	Measurement and Evaluation	3	30
Total		**10**	**100**

Table 2 presents the distribution of the experts consulted in the study according to gender, academic title, and departmental variables. In terms of gender distribution, 20% of the participants were female (n=2), while 80% were male (n=8), indicating a predominance of male participants in the sample. Regarding academic titles, 20% of the experts held the title of professor (n=2), 60% were associate professors (n=6), and 20% were assistant professors (n=2). The most represented academic title in the sample was associate professor. In terms of department distribution, 70% of the participants specialized in Curriculum and Instruction (n=7), while 30% worked in Measurement and Evaluation (n=3). This distribution suggests that the study was primarily evaluated by experts in the field of Curriculum and Instruction. In conclusion, the expert group consisted predominantly of male academics, associate professors, and specialists in Curriculum and Instruction.

The content validity study of the Quality Education Literacy Scale for Sustainable Development involved both a review of existing studies in the field and expert consultations, with data collected through expert evaluations. To determine inter-expert agreement, the Content Validity Ratio (CVR) and Content Validity Index (CVI), developed by Lawshe (1975), were used. As part of this study, a panel of 10 experts in the field was asked to evaluate the content validity of the scale items. The experts were asked to categorize each item as "revised," or " removed". Based on the expert evaluations, the Content Validity Ratio (CVR) for each item was calculated using the following formula:

$$Content\ Validity\ Ratio\ (CVR) = \frac{number\ of\ experts\ indicating\ a\ measurement\ item\ is\ essential}{total\ number\ of\ experts\ that\ answer\ to\ that\ item} - 1$$

According to Lawshe (1975), the critical CVR value for a panel of 10 experts is calculated as 0.62. In this context, items with a CVR value of 0.62 or higher are considered to have content validity. Based on this criterion, the Content Validity Index (CVI) was also calculated. The CVI value was determined by taking the average of the CVR values of the retained items in the scale. As a result of the analysis based on expert opinions, only the items that met the content validity criteria were included in the measurement instrument.

During this process, it was determined that the CVR values of the items exceeded the critical value of 0.62. This indicates that all the items in the scale are appropriate in terms of content validity. Based on the analyses and expert opinions, it was decided that the items meeting the validity criteria would remain in the scale, and after necessary revisions, content validity was ensured for these items. As a result, the content validity of the analyzed scale was confirmed based on the experts' opinions, and only the items meeting the validity criteria were retained in the scale.

Data Collection Tool

A literature review was conducted to develop a quality education literacy scale for sustainable development, and existing examples were examined. Studies published by UNESCO and the United Nations were thoroughly reviewed. In the process of developing a quality education literacy scale for sustainable development, the theoretical framework of the scale was first established, and a literature review was conducted accordingly. During the factor identification phase, the key components defined by UNESCO were used to strengthen the content validity of the scale. In this regard, the components that constitute a quality education literacy scale for sustainable development were carefully analyzed, and the factor structure of the scale was developed. Based on the identified factors, an item pool was created, and the statements to be included in the scale were evaluated for conceptual coherence and measurability. Thus, the aim was to ensure that the scale is a theoretical, comprehensive, and valid measurement tool. A total of 50 items were created in the item pool, focusing on the sub-dimensions of positive statements. A 5-point Likert-type scale was used to evaluate the items, with response options ranging from "strongly disagree", "disagree", "somewhat agree", "agree" to "strongly agree."

Implementation

During the implementation phase, after obtaining the necessary ethical permissions and approvals, the draft scale was administered by the researcher to the designated study group. Data was collected from a total of 355 participants. The process began with providing participants detailed information about the purpose of the scale and instructions on how to complete it. Participants were also encouraged to contact the researcher should they have any questions or uncertainties while completing the scale. The collected data were carefully organized and recorded for subsequent statistical analysis. This stage represents a critical step in ensuring the validity and reliability of the data collection process.

FINDINGS

The findings obtained during the research process will be presented under the headings of validity findings and reliability findings.

Findings related to validity

An Exploratory Factor Analysis (EFA) was conducted to assess the construct validity of the scale. In the research, data collected from 355 teachers working in different educational levels and subjects were transferred to the SPSS software, and Exploratory Factor Analysis (EFA) was applied to evaluate the construct validity of the scale.

Validity Testing of the Scale through Exploratory Factor Analysis (EFA)

To test the construct validity of the developed scale, Exploratory Factor Analysis (EFA) was performed. Before conducting the EFA, the suitability of the data for factor analysis was evaluated through the Kaiser-Meyer-Olkin (KMO) sample adequacy test and the Bartlett's Test of Sphericity. The results of these analyses are presented in Table 3 below.

Table 3. KMO and Bartlett's Test Results

KMO Sample Adequacy		,914
Bartlett Sphericity Test	~ x^2	24716,881
	sd	820
	p	,000

Table 3 shows that the KMO value of 0.91 indicates that the data is highly suitable for factor analysis (Kaiser, 1974). Additionally, the significance level ($p<0.001$) obtained from the Bartlett's Test of Sphericity reveals that there is sufficient correlation between the data, allowing for factor analysis. In the context of the factor analysis, Principal Component Analysis (PCA) was used to determine the factor structure of the scale, and the Varimax Rotation Method was chosen for factor rotation. The following criteria were considered during the factor analysis process (Tabachnick & Fidell, 2019).

1. Factor Loading Value**:** Items with factor loading values below 0.30 were removed from the scale.
2. Cross-Loading: Items that loaded on more than one factor, where the difference between the factor loadings was less than 0.10, were eliminated.

The communalities (contribution to common variance) for the 50 items in the scale, as well as the item-total correlation values, were also examined. Based on these criteria, repeated factor analyses were conducted, resulting in the removal of a total of 9 items. The final scale structure consists of 41 items. The factor analysis revealed a three-factor structure for the 41-item scale. The final version of the scale and its factor loadings are presented in Table 4.

Table 4. Factors and Factor Loadings

Items	Factors			Factor Eigenvalue	Explained Variance
	Program	Sustainability	Teacher		
Item17	0,839				
Item20	0,829				
Item29	0,826				
Item19	0,818				
Item28	0,817				
Item26	0,816				
Item18	0,802				
Item30	0,802				
Item22	0,800			18,510	27,486
Item21	0,799				
Item31	0,790				
Item27	0,780				
Item32	0,760				
Item23	0,756				
Item16	0,722				
Item15	0,709				
Item14	0,678				
Item6		0,871			
Item8		0,852			
Item12		0,850			
Item11		0,830			
Item9		0,826			
Item10		0,824			
Item1		0,800		6,778	22,758
Item7		0,790			
Item4		0,789			
Item13		0,777			
Item2		0,759			
Item3		0,711			
Item48		0,687			
Item37			0,942		
Item42			0,940		
Item38			0,939		
Item43			0,928		
Item45			0,928		
Item47			0,926	4,461	22,754
Item46			0,923		
Item33			0,813		
Item34			0,755		
Item39			0,754		
Item35			0,655		

As a result of the Exploratory Factor Analysis, it was determined that the scale consists of 41 items and 3 factors. This three-factor structure explains 72.99% of the total variance of the scale. This indicates that the scale has sufficient representation of the relevant measurement dimensions and possesses construct validity. The fact that the total variance explained by the factors is over 70% is considered an acceptable level in social sciences, indicating that the scale has a valid factor structure. The structure obtained from the analysis also supports that the scale was developed in alignment with its theoretical framework.

The first factor includes 17 items, the second factor contains 13 items, and the third factor comprises 11 items. Upon review, the first factor was named "Program," the second factor "Sustainability," and the third factor "Teacher." The "Program" factor relates to the program, which is one of the fundamental components of the educational process, and includes items related to the content, objectives, and methods of quality education. The "Sustainability" factor focuses on items that support environmental, social, and economic development in education. Items in this factor emphasize the long-term impact of education and societal benefits. The "Teacher" factor encompasses items related to the development of knowledge, skills, and attitudes necessary for both teachers and students for quality education, including the teacher's personal responsibilities, competencies, and role in the educational process. Items in this factor focus on the skills and responsibilities that contribute to the quality of education provided by the teacher.

Convergent Validity

Convergent validity is evaluated within the scope of criterion validity. As a result of the literature review, no similar scale was found, so the correlation values between the sub-dimensions of the scale and the overall total were examined. Both the overall total score of the scale and the total scores of the three sub-dimensions of the scale were obtained and their correlations with each other were analyzed. The results are presented in Table 5.

Table 5. Correlation Values of the Scale's Total and Sub-Dimensions

	Total	Program	Sustainability	Teacher
Total	1			
Program	0,758**	1		
Sustainability	0,793**	0,387**	1	
Teacher	0,822**	0,411**	0,519**	1

N=399, **p<,001

As shown in Table 5, a positive and statistically significant correlation was found between the total score of the scale and the total scores of its three sub-dimensions (p<0.05). The fact that these values are significant at the p<0.01 level and all indicate a moderate to high positive correlation suggests that the structure is coherent within itself.

Findings related to reliability
Internal Consistency

The Cronbach Alpha reliability coefficients for the developed scale and its three sub-dimensions have also been calculated. The Cronbach Alpha reliability coefficients for the entire scale and for each sub-dimension are presented in Table 6.

Table 6. Reliability of the Scale

Factor	Number of Items	Cronbach Alpha Coefficient
Program	17	0,967
Sustainability	13	0,965
Teacher	11	0,982
Total	41	0,969

The Cronbach Alpha reliability coefficient for the entire scale was found to be 0.969. The reliability for the Program factor was 0.967, for the Sustainability factor it was 0.965, and for the Teacher factor, it was 0.982.

Item Analysis

The reliability was also examined through item analysis, which includes item-total correlation and the item discriminant values between the lower (n=95) and upper (n=95) 27% groups. To assess the item discriminability in the three dimensions of the scale, comparisons were made between the items in the lower and upper 27% percentiles. The results are shown in Table 7.

Table 7. Results of t-test for item means of the scale items between lower and upper groups.

Factor	Item		N	$\bar{x}$	s	t	sd	p
	Item17	Lower %27	99	3,424	0,784	-11,802	196	0,000
		Upper %27	99	4,576	0,573			
	Item 20	Lower %27	99	3,354	0,787	-13,379	196	0,000
		Upper %27	99	4,626	0,527			
	Item 29	Lower %27	99	3,354	0,787	-13,107	196	0,000
		Upper %27	99	4,616	0,548			
	Item 19	Lower %27	99	3,485	0,837	-10,699	196	0,000
		Upper %27	99	4,586	0,589			
	Item 28	Lower %27	99	3,475	0,849	-10,491	196	0,000
		Upper %27	99	4,576	0,608			
	Item 26	Lower %27	99	3,414	0,796	-11,008	196	0,000
		Upper %27	99	4,535	0,628			
	Item 18	Lower %27	99	3,414	0,756	-11,405	196	0,000
		Upper %27	99	4,505	0,578			
	Item 30	Lower %27	99	3,303	0,814	-12,834	196	0,000
		Upper %27	99	4,586	0,572			
	Item 22	Lower %27	99	3,152	0,825	-13,887	196	0,000
		Upper %27	99	4,556	0,575			
	Item 21	Lower %27	99	3,323	0,806	-12,274	196	0,000
		Upper %27	99	4,545	0,576			
	Item 31	Lower %27	99	3,152	0,825	-14,833	196	0,000
		Upper %27	99	4,626	0,546			
	Item 27	Lower %27	99	3,394	0,753	-11,857	196	0,000
		Upper %27	99	4,525	0,578			
	Item 32	Lower %27	99	3,202	0,808	-12,186	196	0,000
		Upper %27	99	4,455	0,627			
	Item 23	Lower %27	99	3,222	0,802	-11,882	196	0,000
		Upper %27	99	4,424	0,608			
PROGRAM FACTOR	Item 16	Lower %27	99	3,253	0,896	-12,057	196	0,000
		Upper %27	99	4,616	0,681			
	Item 15	Lower %27	99	3,374	0,708	-12,483	196	0,000
		Upper %27	99	4,596	0,669			
	Item 14	Lower %27	99	3,727	0,740	-11,353	196	0,000
		Upper %27	99	4,737	0,486			
SUSTAINABILITY FACTOR	Item 6	Lower %27	99	2,586	0,915	-11,985	196	0,000
		Upper %27	99	4,010	0,749			
	Item 8	Lower %27	99	2,535	0,873	-13,852	196	0,000
		Upper %27	99	4,121	0,732			

	Item 12	Lower %27	99	2,576	0,797	-15,333	196	0,000
		Upper %27	99	4,283	0,770			
	Item 11	Lower %27	99	2,404	0,794	-15,699	196	0,000
		Upper %27	99	4,091	0,716			
	Item9	Lower %27	99	2,455	0,872	-13,435	196	0,000
		Upper %27	99	4,030	0,775			
	Item10	Lower %27	99	2,636	0,886	-15,064	196	0,000
		Upper %27	99	4,313	0,665			
	Item1	Lower %27	99	2,576	0,882	-14,377	196	0,000
		Upper %27	99	4,202	0,700			
	Item7	Lower %27	99	2,929	1,118	-9,900	196	0,000
		Upper %27	99	4,242	0,701			
	Item4	Lower %27	99	2,323	0,867	-14,939	196	0,000
		Upper %27	99	4,091	0,797			
	Item 13	Lower %27	99	2,505	0,838	-13,025	196	0,000
		Upper %27	99	4,061	0,843			
	Item2	Lower %27	99	2,182	0,787	-13,938	196	0,000
		Upper %27	99	3,808	0,853			
	Item3	Lower %27	99	2,152	0,825	-12,860	196	0,000
		Upper %27	99	3,747	0,919			
	Item 48	Lower %27	99	2,566	0,883	-10,710	196	0,000
		Upper %27	99	3,869	0,829			
	Item 37	Lower %27	99	1,808	0,804	-17,350	196	0,000
		Upper %27	99	3,960	0,936			
	Item 42	Lower %27	99	1,828	0,796	-17,346	196	0,000
		Upper %27	99	3,939	0,913			
	Item 38	Lower %27	99	1,838	0,804	-16,980	196	0,000
		Upper %27	99	3,869	0,877			
	Item 43	Lower %27	99	1,859	0,796	-17,694	196	0,000
		Upper %27	99	3,899	0,827			
	Item 45	Lower %27	99	1,808	0,804	-19,576	196	0,000
		Upper %27	99	4,131	0,865			
	Item 47	Lower %27	99	1,828	0,796	-19,642	196	0,000
		Upper %27	99	4,131	0,853			
	Item 46	Lower %27	99	1,838	0,804	-19,169	196	0,000
		Upper %27	99	4,081	0,841			
	Item 33	Lower %27	99	1,909	0,834	-20,445	196	0,000
		Upper %27	99	4,242	0,771			
TEACHER FACTOR	Item 34	Lower %27	99	1,919	0,804	-20,626	196	0,000
		Upper %27	99	4,212	0,760			
	Item 39	Lower %27	99	1,929	0,799	-20,456	196	0,000
		Upper %27	99	4,172	0,743			
	Item 35	Lower %27	99	2,364	1,064	-15,552	196	0,000
		Upper %27	99	4,374	0,723			

Table 7 provides the results of the item discrimination analysis, which compares the item means between the lower and upper 27% groups for specific factors. Item discrimination tests how effectively each item distinguishes the feature it intends to measure and how well each item contributes to the overall structure of the scale. This analysis helps determine the clarity and relevance of each item in assessing the desired characteristics. High item discrimination values indicate that the item is effective in differentiating between individuals with varying levels of the characteristic being measured.

The comparisons between the lower and upper 27% groups for the items in the Program factor show significant results, with t-values ranging from -10.699 to -14.833, and a p-value of 0.000 for all items. These results indicate that each item creates a distinct difference between the low and high scoring groups, demonstrating that these items make a strong contribution to the overall structure of the scale. Particularly, items like M17, M20, M29, and M19 show large differences, suggesting that these items are effectively distinguishing the characteristics they aim to measure.

Significant differences were also found between the lower and upper 27% groups for the items in the Sustainability factor, with t-values ranging from -9.900 to -15.699, and a p-value of 0.000 for all items. This indicates that the items related to the sustainability factor have a high discriminative power within the scale. Items such as M6, M8, and M12 show large differences between the lower and upper groups, effectively contributing to the differentiation of the characteristics measured in relation to sustainability.

The analysis of the Teacher factor items also yielded significant results, with t-values ranging from -16.980 to -20.626, and a p-value of 0.000 for all items. The items in this factor show a high level of success in differentiating teacher-related characteristics. Particularly, items such as M37, M42, M38, and M43 exhibit large differences, further enhancing the validity of the items used to measure teacher-related attitudes and evaluations. As observed in the table, all items related to the Program, Sustainability, and Teacher factors exhibit high discriminative power. The item analyses show that the items in each factor are strong enough to create significant differences between the lower and upper 27% groups. This suggests a positive indication of the scale's validity and reliability. Additionally, considering that the p-values for all items are 0.000, it can be concluded that these items are appropriately placed and capable of effectively measuring the targeted characteristics.

As a result, these analyses validate the internal consistency and measurement power of each factor in the scale. These findings indicate that the items used to assess factors such as teachers and sustainability have been successfully designed and implemented. It is evident that such analyses are crucial for evaluating the reliability and validity of measurement tools in educational research. Following the completion of these processes, the scale's validity and reliability analyses were meticulously conducted, and both content and construct validity were confirmed. Necessary revisions were made based on the findings, and the final version of the scale is presented in Appendix-1.

RESULTS, DISCUSSION, and SUGGESTIONS

This study encompasses the development process of a scale designed to measure teachers' quality education literacy for sustainable development. The research began with a thorough literature review and establishment of a theoretical framework concerning sustainable development and quality education literacy. Based on the educational literacy components recommended by UNESCO and the United Nations, three primary factors of the scale were identified: "Curriculum," "Sustainability," and "Teacher." These factors formed the theoretical foundation of the scale, and an item pool was subsequently developed to define the elements of each factor.

The validity of the scale was assessed through exploratory factor analysis (EFA). The results of the EFA revealed a three-factor structure that accounted for 72.99% of the total variance. This finding indicates that the scale has a valid construct and effectively represents the intemded dimensions. Regarding construct validity, the results show that the scale was developed based on theory and that its factor structure aligns with the expected measurement dimensions. Additionally, convergent validity was confirmed through positive and significant correlations between the sub-dimensions and the overall total score. These findings indicate that the internal structure of the scale is consistent and that each factor is accurately reflected.

Reliability analyses were conducted to assess the internal consistency of the scale using Cronbach's Alpha coefficients. The results indicate that both the overall scale and its three factors demonstrate high reliability. The Cronbach's Alpha value for the overall scale was calculated as 0.969, while the reliability coefficients for the sub-factors were 0.967 for "Curriculum," 0.965 for "Sustainability," and 0.982 for "Teacher,"

respectively. These values confirm that each factor of the scale serves as a reliable measurement instrument and substantiate the reliability of the scale's overall structure. Item analyses were conducted to test the discriminative power of each item by comparing the upper and lower 27% groups. The results indicate that the items within each factor possess high discriminative capability. Specifically, items related to the "Curriculum," "Sustainability," and "Teacher" factors produced significant differences between the low- and high-scoring groups, demonstrating that these items contribute strongly to the overall structure of the scale. Item discriminability confirms how effectively each item distinguishes the construct it intends to measure and thereby supports the validity of the scale's items. During the implementation phase, the draft scale was administered to 355 participants after obtaining ethical approvals. Participants were informed about the purpose and use of the scale, and the data collection process was conducted meticulously. The collected data were properly organized for statistical analyses, and validity and reliability tests were performed. This process ensured that all necessary procedures were fulfilled for the scale to be used as a valid and reliable measurement instrument.

A review of existing scale development studies related to quality education for sustainable development reveals that the majority primarily focus on education for sustainable development in general context, with many targeting awareness and attitude measurement rather than comprehensive evaluation. For instance, the study conducted by Nolet (2009) aims to assess teachers' levels of awareness regarding sustainable development but does not directly address instructional planning or implementation skills. Similarly, Olsson et al. (2016) propose a scale intended to measure sustainable development awareness among students, excluding aspects related to teachers' planning, implementation, or professional development. Biasutti and Surian (2012), in their study on developing sustainability competencies in teacher education, seek to evaluate teachers' competencies concerning sustainability topics but focus more on general trends rather than a structured scale.

Quality education literacy scale for sustainable development developed in this study distinguishes itself by offering a more comprehensive assessment framework compared to previous instruments. The scale focuses explicitly on the quality education goal within sustainable development and encompasses the content, objectives, and methods of quality education. It incorporates a holistic perspective that supports environmental, social, and economic sustainability in education, considers the long-term impacts and societal benefits of education, and aims to develop the knowledge, skills, and attitudes that teachers need to achieve quality education. The Quality Education Literacy Scale for Sustainable Development is a tool with high validity and reliability. Exploratory factor analysis and item analyses have confirmed the structural integrity of the scale as well as the functional value of each item. Cronbach's Alpha reliability coefficients indicate high internal consistency, and item discriminability analysis demonstrates that the items within each factor possess strong discriminative power. These findings suggest that the developed scale can be effectively used as an instrument to monitor sustainable development goals in education and to assess teachers' literacy in quality education.

This study will enable teacher training programs, program development processes, and education policies to be structured in a more conscious and holistic manner, thereby enhancing the quality and effectiveness of educational practices aimed at sustainable development. By providing significant contributions both theoretically and practically in the field of quality education for sustainable development, it will support education systems in becoming more inclusive, effective, and sustainable.

In future research, the long-term effects of teacher training programs and the sustainability dimensions in the field of quality education for sustainable development can be examined. Furthermore, this scale can serve as a reference for the development of education policies and teacher training programs. Testing the scale in different cultural and educational contexts in the future may enhance its generalizability and enable broader application at the international level. The development of such scales will contribute to more effective integration of the sustainable development perspective within education.

Declarations

Conflict of Interest

No potential conflicts of interest were disclosed by the author(s) with respect to the research, authorship, or publication of this article.

Ethics Approval

The ethics committee approval for this research was obtained from the Gazi University Ethics Committee during the meeting numbered 19 dated 26.11.2024.

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Research and Publication Ethics Statement

Hereby, we as the authors consciously assure that for the manuscript "An Examination of Women Thinkers who have Contributed Sociologically, Psychologically or Philosophically to Educational Programs from a Feminist Perspective" the following is fulfilled:

- This material is the authors' own original work, which has not been previously published elsewhere.
- The paper reflects the authors' own research and analysis in a truthful and complete manner.
- The results are appropriately placed in the context of prior and existing research.
- All sources used are properly disclosed.

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