Educational Research & Implementation

ISSN: 3023-6568 (Print) 3023-6576 (Online) Journal webpage: https://www.edure.net

Check for updates

Title:

Scale of material development literacy perception for teachers

Author(s):

Toygun Türközü, Serkan Dinçer

To cite this article:

Turközü, T., & Dinçer, S. (2024). Scale of material development literacy perception for teachers. *Educational Research & Implementation, 1*(1), 69-80 https://doi.org/10.14527/edure.2024.05

Educational Research & Implementation, 1(1), 2024, 69-80

www.edure.net/

Scale of material development literacy perception for teachers

Toygun Türközü [*a], **Serkan Dinçer** [b]

Article Information

DOI: 10.14527/edure.2024.05

Article History:
Received 18 December 2023
Revised 10 January 2024
Accepted 27 January 2024
Online 02 February 2024

Keywords:
Material development,
Material development literacy,
Perception scale.

Article Type:
Research paper

Abstract

The aim of this study is to develop a measurement tool designed for evaluating teachers' perceptions of their proficiency in material development literacy. This tool aims to provide a structured and effective means of evaluating educators' competencies and understanding in the domain of creating educational materials. The development of such a measurement tool is crucial for obtaining accurate insights into teachers' perceptions, facilitating research on material development literacy, and guiding future interventions or training programs in the educational context. In the research, despite the participation of 1157 teachers, forms with missing data were excluded from the study. The data of 406 teachers were utilized for Explanatory Factor Analysis, and the data of 360 teachers were employed for Confirmatory Factor Analysis. The analyses resulted in a 23-item Likert-type measurement tool comprising four factors: Self-Adequacy, Desire, Material Use, and Process Skill. Additionally, three open-ended questions were included to gather qualitative data, independent of the scale. The measurement tool, explaining 66.18% of the total variance, demonstrates a high level of internal consistency with a Cronbach's Alpha Coefficient of .91. In conclusion, based on the obtained values, it is affirmed that this measurement tool can be effectively utilized to assess the material literacy perception levels of teachers.

Introduction

All kinds of developments bring about change in every field. Today, the continuous increase and development of information and technology influence all spheres of society, and the training services are not exceptional. People have always benefited from educational processes throughout history. Concordantly, it has been attempted to provide individuals with the best education in every period. In doing this, the primary aim is not to upload knowledge, but to raise individuals with character and personality. In learning processes, education has been regarded as a powerful tool in connecting the past with the future rather than the transfer of knowledge. The expectation of the educational systems around the world from individuals is to assimilate the value system of the society in which they live and transfer it to real life (Ulusoy, 2007).

The 21st century has witnessed significant advancements in education and training, akin to various other domains. However, these advancements have led to an increase in corresponding needs. These needs underscore the imperative to not only enhance educational content but also to develop various teaching components, including methods, techniques, and materials. This multifaceted approach aims to enhance the comprehensibility of learning and promote its enduring retention (Koberstein-Schwarz & Meisert, 2022; Zwart, Noroozi, Van Luit, Goei, & Nieuwenhuis, 2020).

Heinich, Molenda, Russell and Smaldino (1993) provided a definition of instructional materials, considering them as diverse means and environments for delivering information to learners. From this perspective, it becomes evident that the integration of materials in lessons can serve to support teachers in certain instances and even substitute for them in others. Consequently, the utilization of instructional materials in teaching has the potential to enhance

* **Corresponding author e-mail:** toygunturkozu@gmail.com
[a] Ministry of National Education, Adana/Türkiye
[b] Faculty of Education, Çukurova University, Adana/Türkiye

students' learning experiences and bolster the interaction between students and teachers. In the realm of education, the pivotal role of teachers' material development is paramount for fostering a successful learning process. Teachers are tasked with crafting suitable materials, particularly those that capture students' attention (Davies, Dean, & Ball, 2013; Dinçer & Doğanay, 2016; 2017; Di Serio, Ibáñez, & Kloos, 2013; Hayden, Lorch, Almasi, & Milich, 2017; Keller, 2010; Kostaris et al., 2017). This not only enhances the effectiveness of learning but also elevates motivation within the classroom (Dinçer, 2020; Dinçer & Doğanay, 2017; Keller, 2010). Therefore, a strategic approach by teachers in selecting, purposefully using, and determining the how and why of teaching materials enables them to more easily attain their instructional objectives (Bozkurt, 2007). The ultimate aim is to simplify complexity and transform learning into an enjoyable phenomenon (Kalaycı, 2003).

Upon reviewing the relevant literature concerning teachers' utilization and development stages of instructional materials, numerous studies emphasize the advantages of employing teaching materials in instructional processes (Dinçer, 2020). These studies consistently highlight that materials enhance students' attention and interest, cater to their individual needs, and facilitate the concretization of abstract information. As an illustration, a course content offered by Marmara University (2014) underscores the significance of teaching materials in the instructional process, stating that such materials increase students' engagement through visual and auditory tools. Şahin (2015) conducted a study on the frequency of teachers' material usage, ranking textbooks and documents as the most utilized, followed by whiteboards, with computers and tablets coming in third, and overhead projectors being ranked least and fifteenth, respectively.

In the literature on the use and development of instructional materials, guide sources often emphasize that visual and auditory tools should engage more than one sensory organ. There is a direct correlation between the involvement of multiple sensory organs in the learning environment and the facilitation of learning (Dursun, 2006; Göksu & Koçak, 2020; Leong, Yeo, & Choy, 2022). This suggests that materials must be designed and developed to appeal to multiple sensory organs. However, considering Cognitive Load Theory—which refers to mental efforts exceeding an individual's information processing capacity—it becomes evident that this approach may not always be suitable. Cognitive Load Theory posits that if learning materials and tasks surpass the learner's cognitive capacity, it can negatively impact learning effectiveness and success. It underscores the need to optimize the design of educational materials and tasks to enhance the efficiency and effectiveness of learning experiences. In this context, it is more appropriate to design materials to engage as many sensory organs as possible when necessary, rather than incorporating these features indiscriminately.

Studies on the advantages of utilizing instructional materials in teaching processes emphasize several key points: an increase in the use of tools and equipment aligned with course goals, staying abreast of current educational technologies to enhance the educational environment (Fidan & Duman, 2014); acknowledging the continuous evolution of the information and technology age, urging teachers to incorporate technological advancements into the teaching process for improved learning outcomes (Berna & Arabacıoğlu, 2019; Kelly, 2006; Metin, 2018; Tiritoğlu & Kılıçoğlu, 2019); and the recommendation that teachers engage in designing their own instructional materials (Bouckaert, 2019).

However, limited research has been conducted on the methodology of material design, the effectiveness of teachers in discovering, updating, or creating various instructional materials. For instance, Halis (2002) highlights the importance of technological literacy and material preparation in the educational processes of teacher candidates. Additionally, Dinçer and Çengel-Schoville (2022) note that although teacher training institutions cover instructional technologies, the scarcity of content related to material use and development poses a significant limitation. From another perspective, Dinçer and Doğanay (2016) assert that many teaching evaluations, particularly in material use and development, are not conducted adequately due to the lack of sufficient measurement tools for appropriate samples.

In light of the information provided, there is a perceived importance in assessing teachers' knowledge and self-efficacy in locating materials suitable for their respective fields, updating or recreating materials in alignment with course outcomes—essentially, their literacy levels in using and developing instructional materials. Recognizing the need to measure literacy across dimensions of knowledge, skill, and perception (Dinçer, 2017; Dinçer & Doğanay, 2016), the lack of a measurement tool to evaluate teachers' literacy in using and developing instructional materials poses a challenge.

Motivated by this problem and rationale, the research aimed to develop a scale to gauge teachers' perception levels of teaching material development literacy. The outcome of this study is expected to contribute to the measurement of teachers' perception levels of teaching material usage and development literacy, serving as a reference for the creation of additional measurement tools designed to assess literacy levels in this domain.

Method

The objective of this study was to create a measurement tool to assess material development literacy perception for teachers. To achieve this goal, the steps involved in developing the Scale of Material Development Literacy Perception for Teachers (SMDLPT) are outlined below.

Participants

In the scale development process, a total of 1157 teachers from various schools and fields took part in the research for both the Explanatory Factor Analysis and Confirmatory Factor Analysis. For the Explanatory Factor Analysis, 766 teachers participated initially. However, the data of 223 teachers from the first application and 137 teachers with outliers and missing data in the second application were excluded from the study. Consequently, 406 teachers, with their descriptive statistics provided in Table 1, participated in the Explanatory Factor Analysis of the SMDLPT.

After the Explanatory Factor Analysis, the updated version of the scale was presented to 391 different teachers, the data of 31 teachers with outliers and missing data were excluded from the study, and 360 teachers, whose descriptive statistics are given in Table 1, participated in the Confirmatory Factor Analysis of SMDLPT.

Table 1.

Descriptive statistics of teachers participating in the SMDLPT development process.

	Explanatory Factor Analysis			Confirmatory Factor Analysis			
	Gender			Gender			
	Woman	Man	Total	Woman	Man	Total	Total
Pre-school	12	2	14	10	1	11	25
Primary school	34	24	58	40	23	63	121
Middle school	50	44	94	54	41	95	189
High school	118	122	240	91	100	191	431
Total	214	192	406	195	165	360	766

Data analysis

Validity and reliability studies of the scale, Cronbach Alpha for reliability, expert opinions for content validity, Explanatory and Confirmatory Factor Analysis for construct validity, and consistency analysis for criterion validity were preferred. Additionally, the items underwent a thorough examination, including analysis of arithmetic means, standard deviations, and item-total score correlations. The item discrimination power was determined using the t-test.

Scale Development Process

The research methodology involved several key steps. Initially, a comprehensive literature review was conducted, analyzing similar studies, and identifying 66 items related to teachers' material use and development situations. These items were formatted on a five-point likert scale, ranging from "strongly disagree" to "strongly agree." Expert opinions were sought to assess the suitability of the items. Following the expert opinions, a preliminary scale consisting of 55 items was created by excluding 11 items from the original set.

After receiving expert approval, the items of the scale were presented to a group of 10 teachers. Each teacher was asked to provide their interpretation of the items. Based on the feedback received from the teachers, adjustments were made to some items. The revised version of the scale, incorporating the corrections, was then subjected to another round of expert opinion, and approval was obtained for its content validity. This iterative process involving both expert opinions and teacher feedback aimed to enhance the clarity and relevance of the measurement tool.

In the process of conducting the Explanatory Factor Analysis, the scale was initially administered to 223 teachers. However, it was observed that the data significantly deviated from the normal distribution. Upon further investigation, it was identified that the problematic items causing the deviation were those with negative expressions in reverse items. To address this issue and prevent potential disruptions to the scale structure or inaccurate results, a decision was made to replace the negative expressions with positive expressions in the scale. This decision aligns with similar solutions adopted in scale adaptation studies, as noted by Dinçer (2016). After transforming negative expressions into positive expressions, a decision was made to conduct the Explanatory Factor Analysis again. The data of participants who deviated from normal distribution and exhibited extreme or missing values (n=137) were analyzed, resulting in the removal of 32 items from the scale during the scale development stages. Subsequently, the revised scale, comprising 23 items, was administered to 406 teachers as shown in Table 1, and the obtained data was utilized for the final Exploratory Factor Analysis. The analysis yielded a 23-item measurement tool with four factors, as detailed in the findings section. Additionally, three open-ended questions, independent of the scale, were included to gather qualitative data. The scale, with a midpoint of 98, has a minimum score of 55 and a maximum score of 115. The identified factors are labeled as "Self-Sufficiency", "Desire", "Material Use", and "Process Skill" The Cronbach Alpha Internal Consistency Coefficient for the entire scale was calculated as .91, while the Cronbach Alpha Internal Consistency Coefficients for the individual factors were .82, .69, .83, and .93, respectively.

Following the Exploratory Factor Analysis, the measurement tool obtained was subjected to Confirmatory Factor Analysis with a sample of 391 teachers. The necessary prerequisites were assessed, and data with extreme or missing values that did not adhere to normal distribution were excluded from the analysis. The data of 360 teachers, as presented in Table 1, were included in the Confirmatory Factor Analysis. Subsequently, the required conditions were evaluated, leading to the determination that the scale is usable.

Results

From the data of 406 teachers used for Explanatory Factor Analysis, the total score of the scale, approximating a normal distribution, was calculated for each participant. Subsequently, the scores and total scores of each item were sorted from lowest to highest, creating lower (27.00%, n=109) and upper (27.00%, n=109) groups. The items were analyzed to determine if they differentiated between these two groups. The results indicated that all items and the total score were able to significantly distinguish between the groups ($p < .05$). The arithmetic means of the 23 items ranged from 2.89 to 4.50, with standard deviations falling within the range of .75 to 1.20.

At the beginning of factor analysis, it is necessary to determine whether the data is suitable for factor analysis. To test this suitability, the Kaiser-Meyer-Olkin (KMO) coefficient and BarlettSphericty test results were examined, and these values were found to be statistically significant (KMO = .91; BarlettSphericty test $\chi 2 = 5211.99$, df = 253, p=.00).

From the first results of the factor analysis, it was seen that the scale had five components with an eigenvalue above 1.00. However, it was observed that the load values of the substances included in these five components were close to each other. The most frequently used criteria in the process of deciding the total number of factors are eigenvalue, percentage of contribution to the total variance and screeplot (De Vellis, 2003; Doğanay & Sarı, 2012; Kalaycı, 2009). It is stated that the parallel point of the screeplot to the horizontal axis can be used as a criterion in determining the number of factors. When the screeplot of the eigenvalues of the scale items was examined, it was observed that the most significant break was in the four factors as shown in Figure 1.

In the analyses, the relationships between the items in the examined scale were assessed using various methods. These evaluations included examining the items' relationships with the total scores, mathematical values of the relationships between the items, their common variances, the factor loadings of the items (at least .32), and differences between the factor loadings of the items loaded on more than one factor (at least .15). Following these assessments, 30 items were removed from the scale. Principal component analysis and Varimax rotation, an orthogonal rotation method, were used for these operations. After the elimination of the items, the results of the orthogonally rotated principal components analysis representing the four-factor structure are presented in Table 2. As shown in Table 2, the 23 items in the scale are categorized into four factors: "Self-Adequacy", "Desire", "Material Use", and "Process Skill". The factor loadings of the six items in the "Self-Adequacy" factor range from .47 to .80, and the item-total score correlations range from .63 to .81. and the Cronbach Alpha Internal Consistency Coefficient of the subscale is .82. The factor loadings of the four items in the "Desire" factor, the second subscale of SMDLPT, range from .41 to .85, and the item-total score correlations range from .60 to .81 and the Cronbach Alpha Internal Consistency Coefficient of the subscale is .69. The factor loadings of the three items in the "Material Use" factor, the third subscale

of SMDLPT, range from .63 to .85, and the item-total score correlations range from .82 to .88 and the Cronbach Alpha Internal Consistency Coefficient of the subscale is .83. The factor loadings of the ten items in the "Process Skill" factor, which is the last and fourth subscale of SMDLPT, range from .69 to .91, and item-total score correlations range from .72 to .91 and the Cronbach Alpha Internal Consistency Coefficient of the subscale is .93.

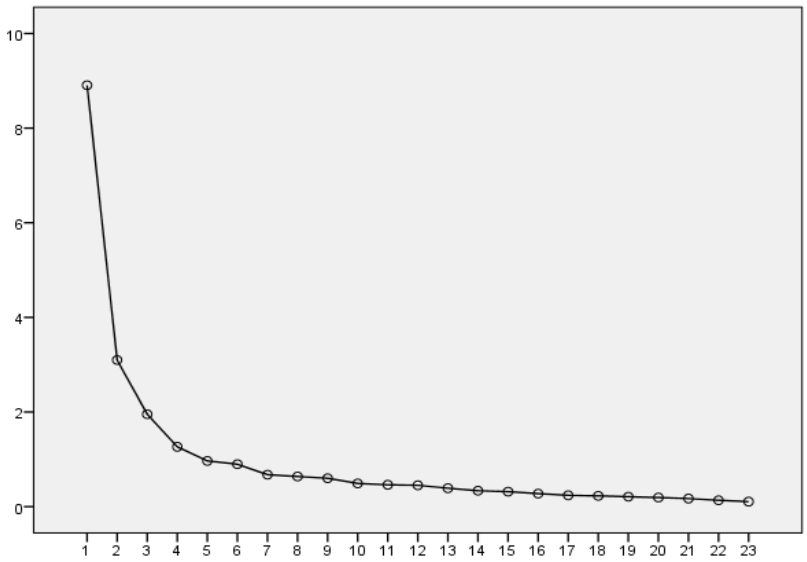


Figure 1. *Screeplot of* SMDLPT.

Table 2.

The results of explanatory factor analysis for SMDLPT.

Items	F1	F2	F3	F4	Item-Total Score Correlation	Variance	$\bar{X}$	Sd
1	.78				.81	.61	3.66	1.01
2	.68				.75	.46	4.07	.92
3	.80				.81	.64	3.31	1.04
4	.73				.73	.53	3.01	1.17
5	.47				.63	.22	3.66	.91
6	.65				.69	.42	3.03	1.25
7		.85			.72	.72	4.12	1.08
8		.48			.71	.23	4.43	.76
9		.81			.81	.66	4.23	.90
10		.44			.60	.19	4.49	.68
11			.85		.85	.72	4.34	.82
12			.80		.88	.64	4.32	.80
13			.63		.82	.40	4.19	.86
14				.84	.85	.71	4.37	.91
15				.83	.85	.69	4.22	.99
16				.88	.89	.77	4.41	.89
17				.91	.91	.83	4.47	.86
18				.86	.87	.74	4.40	.88
19				.81	.83	.66	4.22	.97
20				.83	.86	.69	4.35	.93
21				.84	.87	.71	4.32	.88
22				.88	.91	.77	4.38	.89
23				.69	.72	.48	3.99	.89
Eigenvalue	4.10	2.58	2.28	8.37				Total
Variance %	13.48	8.49	5.49	38.72				66.18
Cronbach Alpha	.83	.66	.81	.96				.91

*p<.01; **F1:** Self-Adequacy, **F2:** Desire, **F3**: Material Use, **F4**: Process Skill

The four factors of SMDLPT account for 66.18% of the total variance. Moreover, the Cronbach Alpha Internal Consistency Coefficient for the entire scale is .91. In explanatory factor analysis, it's essential to examine the relationship between factor total scores and between factor total scores and the total score. The analysis revealed a significant and low relationship between the factor total scores, while a significant and high relationship is anticipated between the factor total scores and the total score. A high correlation between two factors is interpreted as these factors measure the same phenomenon. In such cases, it is recommended to combine factors measuring the same phenomenon. To explore this condition, necessary analyses were conducted, and a correlation matrix of four factors was created. This correlation matrix is presented in Table 3.

Table 3.

Correlation matrix, arithmetic means and standard deviation values for SMDLPT total score and subscales.

Factors	F1	F2	F3	F4	$\overline{X}$	Sd
F1	-				20.74	4.63
F2	.17	-			17.27	2.46
F3	.52	.35	-		12.84	2.10
F4	.27	.28	.42	-	43.10	7.76
Total	.70	.52	.66	.87	93.95	16.95

*p<.01; **F1:** Self-Adequacy, **F2:** Desire, **F3**: Material Use, **F4**: Process Skill

As evident from Table 3, there is a substantial and statistically significant correlation among all the factors. While this outcome is less than ideal, it becomes more acceptable in the context of a scale development study, especially when the subscales demonstrate a highly significant relationship with the total score. To assess the validity of the SMDLPT, whose reliability was previously evaluated with a set of 23 items through an exploratory factor analysis, the instrument underwent a subsequent application to a third group. Following this, a Confirmatory Factor Analysis was conducted using the collected data to further examine its psychometric properties.

To ensure the scale's usability, the initial step involved creating lower (27.00%, n=97) and upper (27.00%, n=97) groups from the 360-data set utilized for Confirmatory Factor Analysis. The goal was to assess whether the items had the capacity to effectively distinguish between these two groups. The analysis revealed that all items and total scores exhibited significant distinctions between the groups ($p < .05$). The arithmetic means of the 23 analyzed items were found to range between 3.14 and 4.58, with corresponding standard deviations falling within the range of.59 to 1.08. Following these initial findings, the subsequent steps of Confirmatory Factor Analysis were initiated.

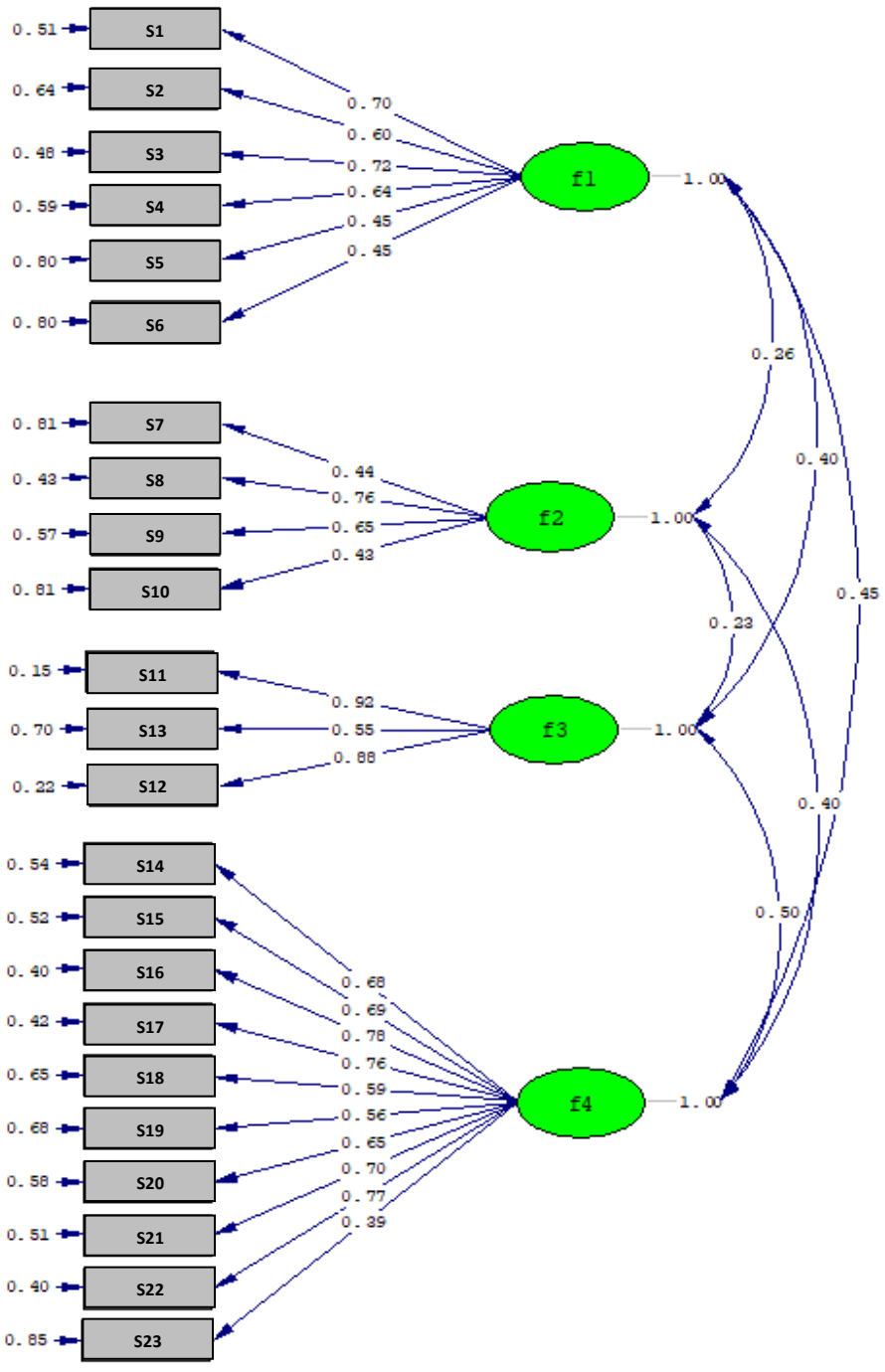
In Confirmatory Factor Analysis, it is essential to examine the standardized values of the proposed model and the significance of each item. To meet this requirement, the standardized values of the items in the scale were scrutinized, and both these values and their graphical representation are depicted in Figure 2. In confirmatory factor analysis, it is imperative that the standardized value of each item does not reach 1.00 or exceed it. In assessing this criterion for the model in question, it was observed that the standardized values fell within the range of .22 to .85, ensuring that none exceeded 1.00. This led to the conclusion that the correlation between the observed variables was at an appropriate level. Subsequently, the examination shifted to the t-values of the items, ensuring a significant difference at the .05 level. This condition was thoroughly assessed, and the t-values of the items, along with their graphical representation, are illustrated in Figure 3. Finally, the limit and acceptance values of the indices, incorporating widely acknowledged thresholds and the values specific to SMDLPT, were determined and presented in Table 4.

Table 4.

Fit indices, limit values and SMDLPT Confirmatory Factor Analysis fit values. (Schermelleh-Engel, et al., 2003).

Fit Indices	Limit Values	Acceptable Fit Value	Compliance Values of SMDLPT
χ2/df	*χ2/df*<2.00	*χ2/df*<5.00	3.96
RMSEA	RMSEA<.05	RMSEA<.08	.09*
SRMR	SRMR<.05	SRMR<.08	.08
RMR	RMR<.05	RMR<.08	.04
GFI	GFI>.95	GFI>.90	.83*
AGFI	AGFI>.90	AGFI>.85	.78*
CFI	CFI>.95	CFI>.90	.91
NFI	NFI>.95	NFI>.90	.88*

* Fit values that are outside acceptable values.

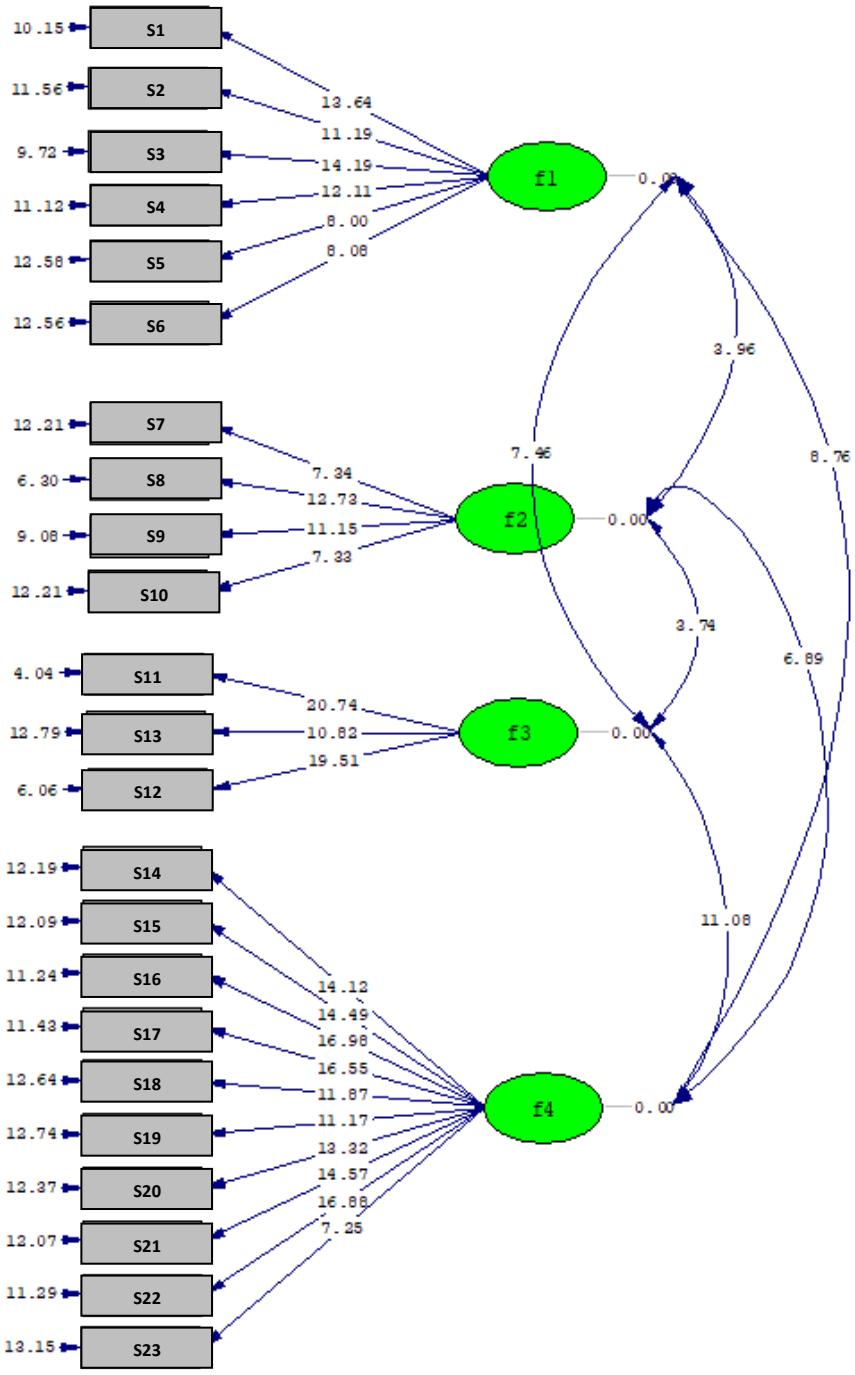


F1: Self-Adequacy, **F2:** Desire, **F3**: Material Use, **F4**: Process Skill

Figure 2. Standardized values of SMDLPT items obtained as a result of Confirmatory Factor Analysis.

Upon reviewing Table 4, it is evident that the values derived from the SMDLPT Confirmatory Factor Analysis mostly fall within acceptable limits. The root mean square error of estimation (RMSEA), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), and normed fit index (NFI) are all within these acceptable limits. Although they are very close to the threshold values, and the χ2/df value is calculated as 3.96, it was determined that this scale demonstrates a good fit.

Finally, the Cronbach Alpha Internal Consistency Coefficient was examined for the data included in the confirmatory factor analysis. The values were found to be .75 for the "Self-Adequate" subscale, .66 for the "Desire" subscale, .79 for the "Material Use" subscale, .94 for the "Process Skill" subscale, and .90 for the total SMDLPT. These values suggest a high level of internal consistency for the scale.



F1: Self-Adequacy, **F2:** Desire, **F3**: Material Use, **F4**: Process Skill

Figure 2. t-values of SMDLPT items obtained as a result of Confirmatory Factor Analysis.

Based on the above data, it was concluded that SMDLPT could be applied both validly and reliably for all teachers. The scale's scores have a range from a minimum of 23.00 to a maximum of 115.00, with the midpoint at 69.00. The scoring of the scale was computed following normal distribution principles, and the results are detailed in Table 5. It is recommended that score interpretations for the SMDLPT and its subscales be conducted within these specified upper and lower limits.

Table 5.

Lower and upper score values for SMDLPT and subscale levels.

	Very Low	Low	Medium	High	Very High
F1	7.00-7.75	7.76-11.00	11.01-25.99	26.00-29.24	29.25-30.00
F2	4.00-4.50	4.51-6.00	6.01-17.99	18.00-19.49	19.50-20.00
F3	3.00-3.25	3.26-4.00	4.01-13.99	14.00-14.74	14.75-15.00
F4	10.00-11.50	11.51-16.51	16.51-43.49	43.50-48.49	48.50-50.00
SMDLPT	23.00-26.00	26.01-41.00	41.01-96.99	97.00-111.99	112.00-115.00

F1: Self-Adequacy, **F2:** Desire, **F3**: Material Use, **F4**: Process Skill

Discussion, Conclusion, and Recommendations

In this study, a scale was developed to assess teachers' levels of material development literacy perception in educational processes. Following necessary analyses, a five-point Likert-type scale with four factors and 23 items was derived.

To assess the reliability of the scale, internal consistency coefficients were examined. The Cronbach Alpha Internal Consistency Coefficient was calculated as .91 through Explanatory Factor Analysis and .90 through Confirmatory Factor Analysis. Additionally, it was determined that the scale accounted for 66.18% of the total variance. While some researchers (Sheskin, 2004) argue that the total variance explained should be at least 70.00%, others (Tavşancıl, 2002) suggest a threshold of 40.00%, and further perspectives (Büyüköztürk, 2005) propose a threshold of 30.00% and above. In light of the high reliability coefficient and these considerations, it was deemed acceptable that the results of the explanatory factor analysis for the measurement tool were within appropriate values.

When the fit indices of the scale structure were examined as a result of Confirmatory Factor Analysis, it was revealed that it had fit indices of $\chi 2/df= 3.96$, SRMR = .08, RMR= .04, NFI=.88, and CFI=.91. According to Byrne (1998), these fit indices indicate acceptable fit. From these values, it was determined that the scale structure had an acceptable fit.

It was noted that although the values obtained from the scale were at the border level, they were significantly lower than the expected values. When the reason for this was examined, it was first associated with the removal of many items from the scale. It was understood that the main reason for removing these items was that they could not detect/correctly code the reverse items. This is an issue also stated in the study of Dinçer and Doğanay (2016); However, while the participants in this study were secondary school students, it is thought that the fact that the participants in this study were teachers is a situation that should be examined.

The observed lower-than-expected scale values can be attributed to the participants' limited knowledge about material use and/or development. This underscores the significance of assessing teachers' knowledge and skills in material development. A study by Dinçer and Çengel-Schoville (2022) highlighted serious limitations in teacher candidates' use of technology in teaching, attributing these limitations to inadequacies in the curriculum contents of teacher training institutions. The current research further emphasizes the importance of examining teachers' situations in material use/development, aligning with this statement.

While the research revealed that teachers' skill levels in using teaching materials, particularly in the development process, were low, this aspect was not measured, as it did not align with the research's primary purpose. Skill measurement should encompass dimensions of perception, knowledge, and skill (Dinçer, 2017; 2018). This study is confined to determining the level of perception, prompting a recommendation to develop knowledge and skill assessments for material development levels. Furthermore, despite the usability of the scale, it requires refinement in terms of reliability and validity. Thus, it is suggested that the scale undergo reconsideration and updates in future studies.

References

Berna, S. & Arabacıoğlu, T. (2019). Sınıf öğretmenlerinin eğitim teknolojileri kullanım düzeylerinin bireysel yenilikçilik özellikleri açısından incelenmesi. *Ondokuz Mayis University Journal of Education Faculty*, *40*(1), 369-386.

Bouckaert, M. (2019). Current perspectives on teachers as materials developers: Why, what, and how? *RELC Journal*, *50*(3), 439-456.

Bozkurt A., A. S. (2007). Matematik öğretiminde materyal geliştirmenin ve kullaniminin yeri, önemi ve bu konuda öğretmenin rolü. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi, 27*.

Büyüköztürk, Ş. (2005). *Sosyal bilimler için veri analizi el kitabı* (2nd ed.). Ankara: PegemA Yayıncılık.

Byrne, B. M. (1998). *Structural equation modeling with LISREL, PRELIS and SIMPLIS: Basic concepts, applications, and programming's.* London: Lawrence Erlbaum Associates, Publishers.

Davies, R. S., Dean, D. L., & Ball, N. (2013). Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course. *Educational Technology Research and Development, 61*(4), 563-580

De Vellis, R. F. (2003). *Scale development: Theory and applications* (2nd ed.). Thous and Oaks: Sage Publications.

Di Serio, Á., Ibáñez, M. B., & Kloos, C. D. (2013). Impact of an augmented reality system on students' motivation for a visual art course. *Computers & Education, 68,* 586–596.

Dinçer, S. & Çengel-Schoville, M. (2022). Curriculum content proposal for ıntegration of technology in education. *Uluslararası Eğitim Programları ve Öğretim Çalışmaları Dergisi*, *12*(2), 399-412.

Dinçer, S. (2017). Ortaokul öğrencilerinin bilgisayar okuryazarlık düzeylerinin belirlenmesi ve ölçme–değerlendirme araçlarının yapısı. *İlköğretim Online*, *16*(3), 1329-1342.

Dinçer, S. (2018). Are preservice teachers really literate enough to integrate technology in their classroom practice? Determining the technology literacy level of preservice teachers. *Education and Information Technologies*, *23*, 2699-2718.

Dinçer, S. (2020). The effects of materials based on ARCS Model on motivation: A meta-analysis. *Ilkogretim Online*, *19*(2), 1016-1042.

Dinçer, S., & Doğanay, A. (2016). Öğretim Materyali'ne İlişkin Motivasyon Ölçeği (ÖMMÖ) Türkçe Uyarlama Çalışması. *İlköğretim Online*, 15(4), 1131-1148.

Dinçer, S., & Doğanay, A. (2017). The effects of multiple-pedagogical agents on learners' academic success, motivation, and cognitive load. *Computers & Education*, *111*, 74-100.

Doğanay, A. & Sarı, M. (2012). Düşünme Dostu Sınıf Ölçeği (DDSÖ) geliştirme çalışması. *İlköğretim Online*, *11*(1), 214-229.

Dursun, F. (2006). Öğretim sürecinde araç kullanımı. *İlk öğretmen Dergisi, 1*(1), 8-9.

Fidan, N. K., & Duman, T. (2014). Sınıf öğretmenlerinin yapılandırmacı yaklaşımın gerektirdiği niteliklere sahip olma düzeyleri. *Eğitim ve Bilim*, *39*(174), 143-159. http://dx.doi.org/10.15390/EB.2014.2027

Göksu, İ. & Koçak, Ö. (2020). Öğretmen adaylarının öğretim teknolojilerine yönelik metaforik algıları. *Journal of Instructional Technologies and Teacher Education*, *9*(2), 125-143.

Halis, İ. (2002)*, Öğretim teknolojileri ve materyal geliştirme,* Ankara: Nobel Yayın Dağıtım.

Hayden, A., Lorch, E. P., Almasi, J., & Milich, R. (2017). Lessons learned from the development of a narrative comprehension intervention for third-graders at risk for ADHD. *The ADHD Report, 25*(6), 1-6.

Heinich, R., Molenda, M., Russell, J., & Smaldino, S. (1996). *Instructional media and technologies for learning*. New York, NY: Macmillan.

Kalaycı, N. (2003). *Öğretim teknolojileri ve materyal geliştirme*. Ankara: Nobel Yayınları.

Kalaycı, Ş. (2009). *SPSS uygulamalı çok değişkenli istatistik teknikleri* (4th ed). Ankara: Asil Yayıncılık.

Keller, J. M. (2010). *Motivational design for learning and performance: The ARCS Model approach*. New York, NY: Springer.

Kelly, C. A. (2006). Using manipulatives in mathematical problem solving: A performance-based analysis. *The Mathematics Enthusiast*, *3*(2), 184-193.

Koberstein-Schwarz, M., & Meisert, A. (2022). Pedagogical content knowledge in material-based lesson planning of preservice biology teachers. *Teaching and Teacher Education*, *116*, 103745.

Kostaris, C., Sergis, S., Sampson, D. G., Michail, N., Pelliccione, L., Kostaris, C., …& Pelliccione, L. (2017). Investigating the potential of the flipped classroom model in k-12 ict teaching and learning: An action research study. *Educational Technology & Society, 20*(1), 261–273.

Leong, Y. H., Yeo, B. W. J. & Choy, B. H. (2022). Instructional materials as a site to study teachers' planning and learning. *Mathematics Education Research Journal*, *34*(3), 575-598.

Marmara Üniversitesi (2014, Ağustos 24) Marmara üniversitesi eğitim-öğretim bilgi sistemi https://meobs.marmara.edu.tr/Ders/sosyal-bilgiler-ogretim-teknolojileri-ve-materyal-tasarimi/egt3035-54742-3085

Metin, E. (2018). Eğitimde teknoloji kullanımında öğretmen eğitimi: bir durum çalışması. *Journal of STEAM Education*, *1*(1), 79-103.

Sheskin, D. J. (2004). *Handbook of parametric and nonparametric statistical procedures* (3rd ed.). Boca Raton: Chapman & Hall/CRC

Şahin, M. (2015). Öğretim materyallerinin öğrenme-öğretm sürecindeki işlevine ilişkin öğretmen görüşlerini analizi. *Kastamonu Eğitim Dergisi*, *23*(3), 995–1012.

Tavşancıl, E. (2002). *Tutumların ölçülmesi ve SPSS ile veri analizi.* Ankara: Nobel Yayıncılık.

Tiritoğlu, E. ve Kılıçoğlu, D. (2019). Eğitim teknolojilerinin okullarda kullanımına ilişkin okul yöneticilerinin görüşleri: fenomenolojik bir araştırma. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, *19*(4), 1409-1422.

Zwart, D. P., Noroozi, O., Van Luit, J. E., Goei, S. L., & Nieuwenhuis, A. (2020). Effects of digital learning materials on nursing students' mathematics learning, self-efficacy, and task value in vocational education. *Nurse Education in Practice*, *44*, 102755.

Appendix

Appendix 1. Scale of Material Development Literacy Perception for Teachers.

Dear colleague,
As part of our work on the utilization and creation of teaching materials, we are conducting a study to assess your perception levels in this regard. To achieve the study's objectives, we request that you provide answers to the following questions based on your own lessons. Your responses are crucial for the success of this study, and we assure you that any data collected will only be used for academic publications, with no sharing of personal information with third parties. Your accurate and thoughtful responses are greatly appreciated. Thank you for your cooperation.

5. Strongly Agree	**4. Strongly Agree**	**3. hesitant**	**2. Disagree**	**1. Strongly Disagree**
1) I consider myself competent in developing teaching materials.	**5**	**4**	**3**	**2**	**1**
2) I strive to learn about the instructional material development process.	**5**	**4**	**3**	**2**	**1**
3) I have sufficient knowledge about developing teaching materials.	**5**	**4**	**3**	**2**	**1**
4) I have received adequate training on the teaching material development process.	**5**	**4**	**3**	**2**	**1**
5) I can solve the problems I experience when using teaching materials developed by other people or organizations.	**5**	**4**	**3**	**2**	**1**
6) Throughout my professional life, I have developed teaching material for my course. (Score according to your frequency of development. 1= Not at all, 5= Very often) ::: If you scored 1 (NEVER), do not answer questions 14-23 (inclusive) :::	**5**	**4**	**3**	**2**	**1**
7) I wish I had received better training on the instructional material development process.	**5**	**4**	**3**	**2**	**1**
8) The education given on teaching material development in undergraduate education needs to be constantly revised as a result of technological changes.	**5**	**4**	**3**	**2**	**1**
9) I would like teachers to receive in-service training regarding the teaching material development process.	**5**	**4**	**3**	**2**	**1**
10) The institution must allocate a budget to develop teaching materials.	**5**	**4**	**3**	**2**	**1**
11) I make the lesson more fun with the help of teaching materials.	**5**	**4**	**3**	**2**	**1**
12) I ensure active participation of students in the educational environment with the help of teaching materials.	**5**	**4**	**3**	**2**	**1**
13) I use different materials related to my lesson.	**5**	**4**	**3**	**2**	**1**
::: If you scored 1 (NEVER) for 6th question, do not answer questions 14-23 (inclusive) :::					
14) I take students' ages into consideration when developing teaching materials.	**5**	**4**	**3**	**2**	**1**
15) I take into account the socio-economic status of students in the process of developing teaching materials.	**5**	**4**	**3**	**2**	**1**
16) I take students' readiness levels into consideration in the process of developing teaching materials.	**5**	**4**	**3**	**2**	**1**
17) In the process of developing teaching materials, I pay attention to the characteristics of the target audience (students).	**5**	**4**	**3**	**2**	**1**
18) I pay attention to students' interests during the process of developing teaching materials.	**5**	**4**	**3**	**2**	**1**
19) I collaborate with my colleagues/stakeholders/experts in the process of developing teaching materials.	**5**	**4**	**3**	**2**	**1**
20) I pay attention to the learning environment during the process of developing teaching materials.	**5**	**4**	**3**	**2**	**1**
21) In the process of developing teaching materials, I correctly determine the type of material (visual, physical, etc. according to the subject) in accordance with the content.	**5**	**4**	**3**	**2**	**1**
22) In the process of developing teaching materials, I take into account the teaching approach I will use (the way the course is presented; through presentation, collaborative, etc.).	**5**	**4**	**3**	**2**	**1**
23) I can solve the problems I encounter in the process of developing teaching materials.	**5**	**4**	**3**	**2**	**1**

24) What do you understand from the concept of teaching material? Please explain briefly.

……..

25) Could you briefly state an example of a teaching material you developed yourself, if any?

……..

26) Can you give examples of teaching materials you frequently use in your professional life?

……..