

Research Article

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Author for correspondence:

Serkan Aslan

✉ serkanaslan@sdu.edu.tr

✉ Suleyman Demirel University,
Department of Educational Sciences,
Isparta, Türkiye.



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Development of Critical-Thinking Skills Rubric within the Scope of Multicultural Education

Serkan Aslan^{id}, Birsal Aybek^{id}

Abstract

Background/Purpose. The study aimed to develop a rubric to measure students' critical-thinking skills within a multicultural education scope.

Materials/Methods. The study's participants were faculty members, teachers, and students, determined according to convenience sampling based on predetermined criterion. Initially, a story-based test and critical-thinking rubric were prepared and then validity studies conducted on these products. Subsequently, the prepared test and rubric were applied to fourth-grade elementary school students, with the data scored by their teachers, and reliability studies were then conducted. During the study's analysis, scope, validity index and ratio, agreement percentage, correlation coefficient, Kendall's concordance coefficient, and Cronbach's alpha coefficient were all examined.

Results. The collected data were evaluated according to statistical analysis and the obtained findings showed the developed rubric to be both valid and reliable. The results revealed that the rubric developed to evaluate critical-thinking skills in a multicultural education scope was deemed to be an effective tool to assist teachers in measuring and evaluating students' critical-thinking skills. In addition, use of the rubric can contribute to identifying and implementing strategies to improve students' critical-thinking skills.

Conclusion. The study developed effective tools for practitioners and decision-makers in the field of education to measure and develop students' critical-thinking skills. In particular, use of the developed rubric in the evaluation of students' critical-thinking skills presents a significant step in increasing success in education and supporting students' future academic and professional achievements. In conclusion, this research demonstrated the validity and reliability of a rubric that may be used as an effective tool for the evaluation and development of critical-thinking skills in education.

1. Introduction

In recent years, globalization and cultural diversity have created a need for education systems to adopt a new and varied methodology, with the multicultural education approach having emerged based on this need. Multicultural education encourages students from different cultures and backgrounds to learn and interact together. Today, the importance of multicultural education is increasing, as students need these skills in order to be successful in the global world. This approach helps students develop values such as tolerance, empathy, and respect for differences, while also recognizing and accepting cultural richness. Therefore, it is inevitable that education systems should adopt a multicultural approach in order that students can become global citizens and communicate effectively within today's global environment.

Multicultural education holds a significant place in today's education systems, since through globalization and migration, societies are becoming increasingly diverse and the world a much smaller place. This diversity becomes especially apparent in school environments where students from different cultures come together. Multicultural education is an approach based on accepting, valuing, and seeing cultural differences as a richness rather than as some form of division (Banks, 2019). In this context, multicultural education brings the diversity experienced in society into the school environment, enabling students to better understand each other, to meet cultural differences with respect, and to establish a common social bond.

The importance of multicultural education not only concerns enabling students to study together with peers from different cultures, but also has significant goals such as teaching students intercultural skills in communication, how to develop empathy, and the recognition of different cultures (Banks, 2015; Gorski, 2013). The importance of multicultural education at the elementary school level becomes even more evident, since students' worldviews, values, and attitudes begin to take shape during this early learning period. Therefore, the implementation of multicultural education in elementary schools can contribute significantly to the process of students accepting differences and learning tolerance (Derman-Sparks & Edwards, 2009).

Research has shown that multicultural education can increase students' academic success, as well as having a positive impact on their social adaptation (Gay, 2018). For example, multicultural education can help students gain exposure to different cultural perspectives and therefore to better understand cultural diversity (Bennett, 2013). Implementing multicultural education at the elementary schooling level can help contribute to students having a more comprehensive educational experience and thereby growing up as more worldly, global citizens. As interactions between societies increase through globalization and migration, cultural diversity is also increasing (Banks, 2019). In this context, education systems have also started to focus on diversity and cultural awareness. Multicultural education not only helps students understand their own cultures and respect others, but also reinforces their understanding of social justice (Gorski, 2013), develops their ability to understand, evaluate, and appreciate cultural differences, and also helps equip them with critical-thinking skills.

Critical thinking refers to an individual's ability to question information, analyze it, reach logical conclusions, and evaluate alternative perspectives (Ennis, 1987). Critical-thinking skills can be described as a fundamental proficiency necessary whereby individuals have the requisite skills to solve complex problems, make correct and informed decisions, and approach information with a critical perspective. This skill is considered vital, especially in today's world where access to information is almost constant and the nature of information often changes rapidly. The importance of critical-thinking skills for individuals is significant as a fundamental tool for their personal development, affording individuals the ability to more deeply understand and analyze events and situations (Facione, 2011). Critical thinking is a skill that helps individuals to resolve problems as they encounter them in daily life, to approach information with an inherently critical perspective, and to

make effective, informed decisions (Paul & Elder, 2021). Therefore, it may be said that critical thinking is a fundamental skill necessary for personal and professional success in the 21st century.

Critical thinking can be described as a basic skill set that individuals use to solve complex problems and evaluate information. As such, Facione (1990) identified the following six fundamental components that define critical thinking as a set of skills through a Delphi study:

Explanation: This fundamental element of critical-thinking helps individuals to more fully understand a topic, and involves the process of summarizing information, defining terms, and simplifying the topic.

Interpretation: In critical thinking, interpretation allows individuals to make sense of and evaluate information. It involves the process of comparing different information sources, evaluating the reliability of information, and considering different perspectives.

Inference: Forming an important part of critical thinking, inference is a skill whereby individuals possess the ability to draw conclusions based upon existing information and evidence. It involves the process of logical reasoning, making generalizations, and identifying evidence that support logical conclusions.

Analysis: The critical-thinking skill of analysis is the ability to break down information and understand relationships. It involves the process of comparing data, identifying important details, and employing critical-thinking skills.

Self-Regulation: As another component part of critical thinking, self-regulation is the ability to organize one's thinking processes and to set and manage goals.

Evaluation: The final stage of the critical-thinking process is evaluation, which involves the evaluation of results and to question decisions. The process includes choosing between alternatives, predicting results, and evaluating the accuracy of the results.

These six components identified by Facione (1990) form the basic building blocks of critical-thinking skills, helping individuals to more effectively manage their thinking and decision-making processes.

Development of critical-thinking skills at the elementary schooling level is considered extremely important. Children develop basic thinking abilities during this early learning period, and is a time in life where they begin to acquire critical-thinking skills (Ritchhart, 2015). Elementary school students start laying the foundations of critical-thinking skills' acquisition while learning how to generate ideas about a particular topic, what the fundamentals are of cause-effect relationships, and in making inferences. The development of critical-thinking skills during this period not only increases students' academic success, but can also make them more successful and conscious individuals in their future lives.

A relationship can be described between multicultural education and critical thinking (Aybek, 2018; Hjerm et al., 2018; Kaya, 2021; Sivacı & Altaş, 2023) since multicultural education offers students the opportunity to better understand differences between cultures through the evaluation of cultural perspectives. As a result, multicultural education enables students to develop critical-thinking skills, hence the significance placed on critical thinking within multicultural education. In today's world, factors such as globalization and migration mean that societies have becoming increasingly diverse, hence students have a clear need to understand and evaluate different cultural contexts. Multicultural education, therefore, helps students to focus on the development of skills in critical thinking in order to play an active role in 21st century's global society. For example, by providing students with opportunities to understand different cultural perspectives, multicultural education helps to strengthen students' critical-thinking skills (Bennett, 2013), allowing them not only to learn information but also to understand it and evaluate it with a critical perspective. Therefore, developing critical-thinking skills within multicultural education environments can help students

better understand cultural differences and express their thoughts more effectively (King & Kitchener, 2002). Research has shown that the development of critical-thinking skills within the scope of multicultural education can increase students' academic success, as well as help with their social adaptation (Gay, 2018). The development of critical-thinking skills within multicultural education can help students understand cultural differences, establish empathy, and communicate effectively with various perspectives. Therefore, focusing on critical-thinking skills within the scope of multicultural education can contribute to students becoming more conscious global citizens. In this context, the current study aims to make a significant contribution to the literature by furthering the development of complementary measurement and evaluation tools that can be used to determine whether or not critical-thinking skills can be developed within multicultural education and to provide detailed feedback to both students and teachers.

Rubrics are also used in measuring and evaluating critical-thinking skills (Amanvermez İncirkuş & Beyreli, 2019, Reynders et al., 2020; Turgut et al., 2024), and is described as a standard assessment tool used to measure a specific skill or performance (Brookhart, 2013). The rubric is a tool that makes the assessment process transparent by clearly stating the expected standards and performance criteria to students (Stevens & Levi, 2013). As such, rubrics help to improve the process by providing feedback to students and supporting them in more effectively reaching their learning targets. Rubrics are therefore usually designed according to learning targets and the specific characteristics of the skill or performance being evaluated (Moskal, 2000). There are two main types of rubric, analytical and holistic, where analytical rubrics evaluate performance according to different components, with separate scoring for each component (Reddy & Andrade, 2010), whilst holistic rubrics evaluate the overall performance and produce a single score (Arter & McTighe, 2000). Which type of rubric used depends on the purpose of the assessment and associated learning targets.

Rubrics usually have a graded structure, with each performance level clearly defining the skill required to be demonstrated (Andrade et al., 2008). This grading system helps students to understand in which areas they are most strong and in which areas they require improvement. Rubrics also help to guide teachers in identifying their students' strengths and weaknesses, directing the learning process accordingly, and helping them provide learners with personalized feedback (Wilson, 2023). In this way, rubrics are considered an effective tool for evaluating student performance and providing them with feedback (Panadero & Jonsson, 2013). The standardized structure of a rubric makes the assessment process both fair and transparent, and with detailed performance criteria that guides students towards reaching their targets. Rubrics also assist teachers in identifying students' strengths and weaknesses and guiding the learning process (Olson & Krysiak, 2021). A rubric designed to measure critical-thinking skills within the scope of multicultural education can help guide teachers in evaluating students' progress and in providing feedback. These rubrics can also help educators evaluate the effectiveness of multicultural education programs and make improvements where necessary (Gorski, 2013).

Measuring critical-thinking skills is an important element in the evaluation of students' analytical thinking abilities, logical reasoning capabilities, and abilities to critically evaluate information (Facione, 2011). Rubrics are one of the effective tools used to systematically and fairly evaluate this complex skill. Rubrics provide clear feedback to students while evaluating critical-thinking skills based on specific criteria and help to standardize the assessment process. Rubrics make the assessment process transparent and fair, while detailed performance criteria guide students to reach their targets. Rubrics designed especially for the measurement of critical-thinking skills within the scope of multicultural education can help guide teachers in evaluating their students' progress in this area and in provision of targeted feedback. As such, these type of rubrics can also assist educators in evaluating the effectiveness of multicultural education programs and in making improvements when and where necessary (Gorski, 2013).

The measurement of critical-thinking skills is an important element in the assessment of students' abilities in analytical thinking, logical reasoning, and in their critical evaluation of information (Facione, 2011). Rubrics are therefore considered an effective tool in the assessment of these complex skills, both systematically and fairly. Rubrics can be used to provide clear feedback to students during evaluation of their critical-thinking skills which is based on specific criteria, thereby standardizing the evaluation process. The use of rubrics specifies what is expected of students as well as making the assessment process both transparent and fair (Brookhart, 2013); helping students to focus on achieving the set goals as a means to improving their critical-thinking skills. Rubrics can be used in various ways to measure critical-thinking skills; for example, the assessment of how students exhibit a particular analytical thinking skill (such as problem solving or critical reading) (Panadero & Jonsson, 2013). Rubrics can also be used to track students' progress in the critical-thinking process and to evaluate the effectiveness of the curriculum. Overall, it may be stated that the use of rubrics in measuring critical-thinking skills is extremely important.

The current research offers a series of significant contributions to teachers and researchers. First, the study provides teachers with an effective tool to evaluate students' critical-thinking skills within multicultural education environments. Developing critical-thinking skills to increase students' cultural awareness and promote social justice is an important goal of multicultural education, hence it is important for teachers to assess the extent to which students acquire these skills and to intervene where necessary. The current study will enable more effective measurement of students' critical thinking by providing a specific rubric for use in this evaluation. Additionally, the study aims to significantly contribute to researchers in the field of multicultural education, since the existing literature offers no research on the determination of critical-thinking skills in the context of multicultural education. The current research aims to fill this gap, expanding knowledge in the field and laying a foundation for future studies. It also aims to provide researchers with an opportunity to advance the field by offering a model for measurement tools that can be used to evaluate and improve the effectiveness of multicultural education programs. In conclusion, the current study aims to provide an important resource for both teachers and researchers in the measurement and evaluation of critical-thinking skills in multicultural education. This research offers a step towards improving educational practices and in the identification of multicultural education best practices. The primary objective of this research is to develop a rubric for critical-thinking skills in the context of multicultural education.

2. Methodology

2.1. Participants of the Study

In the context of the research, work was conducted with three different participant groups (faculty members, students, and teachers). Erkuş (2022) suggested that purposeful sampling methods should be applied in research conducted for the development of measurement tools. Plano-Clark and Creswell (2014) described how in purposeful sampling, researchers intentionally select participants considering the most suitable individuals for the study. In the current research, the first participant group consisted of faculty members, which was determined according to criterion sampling, one of the purposeful sampling methods. Criterion sampling is a technique where researchers select the sample according to a specific criterion, as in individuals are only selected if they meet a certain predetermined criterion. In this way, researchers can focus the sample to include only those with certain desired qualities within a specific population (Johnson & Christensen, 2019). The criterion for determining the faculty members in the current research was defined as having published studies related to multicultural education, critical thinking, or rubrics. The main reason for selecting these criteria was the development of a valid and more reliable measurement tool through benefiting from the professional experience of the selected faculty members. As such, the views of 10 faculty members from three educational science departments and three classroom education

departments were taken in order to determine the validity and reliability of the text prepared within the scope of the current research and the accompanying open-ended question test that was developed. To determine the validity and reliability of the test, a rubric was developed based on the opinions of five education and teaching faculty members, plus three from classroom education and two from measurement and evaluation. The selected faculty members worked as professors, associate professors, or doctorate lecturers, of which five were female and five males.

The developed rubric was then applied to 54 (34 females, 20 male) fourth-grade elementary school students, and validity and reliability studies were then conducted. The student participants of the research were determined according to convenience sampling, whereby researchers collect data from participants who are locally situated and easily accessible (Fraenkel et al., 2022). In the current study, the researchers employed convenience sampling since data were to be collected from fourth-grade students attending a local elementary school.

The collected data were then scored by the researcher along with two teachers who were studying for a master's degree in the field of classroom education. These teachers were selected according to criterion sampling method, with attention paid to their working on their master's thesis and having adequate knowledge about rubrics. One of the teachers was female and the other was male.

2.2. Data Collection Tools

1. Story Test for Critical-Thinking Skills Based on Multicultural Education

Aydın and Uzun (2020) stated that the text of children's books should consist of various elements. During the writing phase of the story test prepared by the researchers, the content and language-narrative aspects of the story were examined based on certain criteria. In this type of review, Sever (2008) emphasized the need to pay attention to the theme, subject, plan, and style in terms of content. Similarly, Öztoprak (2006) set out criteria that teachers should consider when developing a scale to help them determine the stories they will use, which consisted of examining sentence length, knowledge of the meaning of words used, the syntax of the story, story length, plot, theme, conflict, perspective, location, time, characters, story type (event/situation), author's artistic understanding, period features, and level of interest. In the current study, the researcher paid attention to these features when preparing the story test. Sever (1995, p. 14) also stated that including universal values within a text is considered important in terms of broadening a child reader's worldview. Therefore, universal value of tolerance, equality, and justice, were included in the prepared story text. In another study by Sever (2008, p. 121), it was stated that a story should respond to the individual interests and needs of the reader, that these would change in line with the readers' age, and that they should aim to contribute to the development of basic qualities in the child such as love, friendship, and peace. In this context, the researcher included features in the story text aimed at meeting the individual interests and needs of child readers in order to instill the aforementioned qualities.

Another area of importance has also been emphasized in the literature, that of the hero's relativity to the child. Heaven (2007) stated that heroes make a story more meaningful, while Solar (2012, p. 139) emphasized the need to pay attention to the principles of child relativity and the suitability of heroes used within narrative texts in accordance with the child's reality. Therefore, care was taken in the preparation of the story text in the current study in order to ensure that the heroes were compatible with the target children's life reality and that they were of a nature that a child reader would establish similarities and also identify differences with themselves. According to Sever (1995), there should only be a few heroes in children's stories, and the physical and mental state of these heroes should be handled carefully in order to avoid exaggeration. Therefore, only a few heroes were included in the developed story text, and they were specifically created with realistic characters. Sever (2008) also stated that curiosity elements are important to maintain a child's reading interest,

hence care was specifically taken to design a story that would attract students' curiosity and draw the reader into the event. Finally, the literature has also emphasized the importance of ensuring suitability of the environment in which the hero is located. According to Sever (2013), the social and cultural environment in which a hero lives should be deemed suitable for the target readers' close environment. As such, care was taken to ensure that the prepared story text was suitable for the social and cultural environment in which the target students live. During the writing of the narrative story, attention was paid to textuality criteria, text structure, and readability, with particular attention paid to the multicultural elements of the developed story.

Six open-ended questions were then prepared based on the developed story text by considering the critical-thinking skills put forward by Facione (1990). The students' responses to these questions were then scored using the developed rubric in order to measure the readers' critical-thinking skills.

2. Preparation of Critical-Thinking Rubric

Rubrics are a standardized assessment tool that is often employed as a means to evaluate student performance and provide feedback. The rubric creation process usually involves a series of stages and requires careful planning and design. The following sets out five established individual stages for the construction of a rubric (Brookhart, 2013; Goodrich, 2001; Stevens & Levi, 2013):

A. Setting a goal: The first step in the rubric creation process is to determine the purposes of its creation. These purposes may include elements such as which skills or performance criteria will be evaluated, situations in which the rubric will be used, and the overall goals of the assessment process. The goal in terms of the current research was to develop a rubric to measure the critical-thinking skills of fourth-grade elementary school students within the scope of multicultural education.

B. Determination of criteria: The second step in the rubric creation process is determination of the criteria to be used in the evaluation and which establish the characteristics and standards of the skill or performance to be evaluated. Criteria are usually based on learning objectives, the goals of the curriculum or teaching program, or the requirements of a particular task. The current research was aimed at the identification of criteria to determine the critical-thinking skills of students according to a developed rubric. In determining the criteria, the critical-thinking skills expressed in the Delphi Report published by the American Philosophy Association in 1990 were taken into consideration (Facione, 1990). In the report, experts emphasized that critical-thinking skills include cognitive skills such as interpretation, analysis, evaluation, inference, explanation, and self-regulation. Therefore, the critical-thinking skills rubric prepared during the research process of the current study also addressed these skills.

C. Defining performance levels: The third step in the rubric creation process is the definition of performance levels and the differences in these performance levels that students may demonstrate. Usually, ranking within a rubric range from those who show the best performance to those who show the weakest performance. In the current study, the developed rubric determined the performance levels of students, scored from the most competent to the weakest. As much as possible, relative expressions were avoided when determining performance levels. In the rubric development process, while deciding how scoring would be made, the scoring method suggested by Rubba and Harkness (1996) and Griffard et al. (2012) was used. Accordingly, the critical-thinking skills rubric was created based on "Very Good" (3 points), "Acceptable" (2 points), and "Needs Improvement" (1 point). The reason for preferring this scoring method was its suitability to the academic level of the study group. Detailed explanations for each performance level were included in the rubric so as to make the assessment more accurate and clear. For example, the statement "Has fully determined the main problem in the text and the reasons for Arin's problem." in the dimension of interpretation for the critical-thinking skills rubric represents "Very good," as in 3 points, while the statement "Has partially determined the main problem in the text and the reasons for Arin's problem." represents "Acceptable," as in 2 points, and the statement "Has determined very little of the main problem in

the text and the reasons for Arin's problem." represents "Needs improvement," as in it would be awarded 1 point.

D. Deciding on which rubric type to use as a scoring strategy: The next step in the rubric creation process is determination of rubric type, which can be either analytical or holistic, as previously discussed. In the process of determining the rubric type, the primary goal or purpose of the assessment should be taken into account. In the current study, the primary goal was the evaluation of students' critical-thinking skills, hence an analytical rubric was developed. Also, the chosen scoring key was preferred since the analytical rubric provides more objective results compared to that of a holistic model (Kutlu et al., 2023). As an analytical rubric, the developed product would ensure that the evaluation focused on the development of students' critical-thinking skills and would allow for more objective results to be obtained.

E. Design and creation of the rubric: Finally, the most important step in the rubric creation process is its design and creation. In this step, the predetermined criteria and performance levels are arranged in a format suitable for the rubric type and presented in a visually appealing way based on the target audience. In the current research, the rubric was arranged in a format suitable for the determined performance tasks and made interesting for students by adding visuals to the text.

2.3. Data Collection Process

The process of data collection involved a three-step procedure. First, a test consisting of a narrative text and an accompanying set of open-ended questions based on the focus of multicultural education was prepared. Validity studies related to this text were then conducted. Second, a rubric was prepared to assess students' critical-thinking skills, and validity studies of the rubric then conducted. The developed critical-thinking rubric was then sent to a group of expert faculty members, along with the written narrative text and set of open-ended questions. Once finalized, the developed and validated test was applied to 54 students and reliability studies were then conducted. Then, training was given to participant teachers in order that they could evaluate the performances of the students according to the rubric. The teachers then reviewed the students' test results, with scored each according to their critical-thinking skills demonstrated using the developed rubric. After the scoring process had been completed, reliability studies were then conducted.

2.4. Data Analysis

The collected data were evaluated according to statistical analysis techniques using a statistical package program was used in the analyses of the research.

3. Results

In the research, validity and reliability studies were conducted for the developed rubric, and these are presented under two separate subheadings.

3.1. Validity Studies

The developed test, which consisted of a narrative text and a set of open-ended questions prepared to determine students' critical-thinking skills within the context of multicultural education, was presented to faculty members to determine its content validity. Necessary corrections were then applied in accordance with feedback from several of the faculty members before a final version was agreed upon. In this way, the conducted validity study resulted in the incorporation of experts' opinions into the development of the rubric.

In more detail, following creation of the initial version of the analytical rubric, it was presented to 10 faculty members working at Yıldız Technical, Hacettepe, Çukurova, Anadolu, and Firat universities. First, the content validity of the created rubric was evaluated, with the experts lending their opinion on the criteria and performance levels used within the rubric. The experts graded the

rubric's suitability of the criteria and performance levels used as "not suitable" (1 point), "partially suitable" (2 points), or "suitable" (3 points). The content validity of the graded scoring key prepared based on expert opinions was determined by calculating the content validity ratio (CVR) and content validity index (CVI). The CVR value is a statistical value related to the content validity of whether an item forms part of the scale or graded scoring key (Lawshe, 1975). CVI represents "the dimensions of the observed overlap between the functional capacity of a defined job performance area and the performance observed in the test under review" (Yeşilyurt & Çapraz, 2018, p. 256). Lawshe (1975) suggested that the following formulae be used to calculate the content validity ratio.

$$\text{CVR} = \frac{N_u - N/2}{N/2} \quad \text{or} \quad \text{CVR} = \frac{N_u - 1}{N/2}$$

In these formulae, "Nu" represents the number of experts who marked the appropriate option in the rubric, while "N" represents the total number of experts. The Content Validity Index is calculated by taking the arithmetic mean of the content validity ratios (Lawshe, 1975). There are certain critical values for the content validity ratio. For instance, the critical value for an item evaluated by 10 experts is considered to be .62 (Ayre & Scally, 2014). In CVI, the critical value for a scale or rubric evaluated by 10 experts is determined as .80 (Yeşilyurt & Çapraz, 2018). Table 1 presents the results related to the content validity ratio and content validity index of the developed rubric.

Table 1. Results Related to Rubric Content Validity Ratio and Index

Rubric Dimension	Expert										Total	CV	
	1	2	3	4	5	6	7	8	9	10		CVR	CVI
Explanation	3	3	3	3	3	3	3	3	3	3	30	1.00	.91
Interpretation	3	3	3	3	3	3	3	3	2	3	29	.80	
Analysis	3	3	3	3	3	3	3	3	3	3	30	1.00	
Inference	3	3	3	3	3	3	3	2	3	3	29	.80	
Evaluation	3	3	3	3	3	3	3	3	3	3	30	1.00	
Self-Regulation	3	3	3	3	3	3	3	3	3	3	30	1.00	

1 point = not suitable, 2 points = partly suitable, 3 points = suitable

As can be seen from Table 1, the CVR values of the prepared graded scoring key varied between .80 and 1.00 and the CVI value was revealed as .91. These results indicate that the scope validity of the developed graded scoring key was satisfactorily achieved (Ayre & Scally, 2014; Yeşilyurt & Çapraz, 2018).

3.2. Reliability Studies

To reveal the reliability of the test, which consisted of a narrative text prepared to measure critical-thinking skills within the scope of multicultural education and a set of open-ended questions, the opinions of faculty members working in educational sciences and classroom education were

consulted. The faculty members were asked to review the prepared text in terms of its theme, readability, textual criteria, text structure, and the level of agreement in their responses was then assessed according to the reliability formula suggested by Miles and Huberman (1994, p. 64).

$$\text{Reliability} = \frac{\text{Consensus}}{\text{Consensus} + \text{Disagreement}}$$

When the consistency of the faculty members' opinions was analyzed, the reliability coefficient of the test was revealed to be .91 ($41 / 41 + 4 = .91$). Miles and Huberman (1994, p. 64) stated that the reliability should be close to 90%. Based on this, it may be said that the narrative text assessed by the faculty members was found to be quite reliable.

The opinions of the 10 faculty members (five from education and instruction, three from classroom education, and two from measurement and evaluation) were sought in order to assess the reliability of the prepared rubric. The faculty members were tasked with reviewing the rubric in terms of its suitability to assess critical-thinking skills as defined by Facione (1990). The reliability of the rubric was also assessed according to the aforementioned reliability formula recommended by Miles and Huberman (1994).

When the opinion compatibilities of the faculty members were analyzed, the reliability coefficient for the analytical rubric prepared to measure critical-thinking skills within the scope of multicultural education was revealed to be .90 ($54 / 54 + 6 = .90$). Based on this finding, it may be stated that the prepared rubric was also deemed to be quite reliable.

To evaluate the reliability of the scores, the literature suggests that analytical measures such as Pearson correlation coefficient, Kendall compatibility coefficient, and Cronbach alpha coefficient are conducted, and to examine the revealed values (Kutlu et al., 2023). In the current study, first, the storytelling text and accompanying set of open-ended questions were applied to 54 fourth-grade elementary school students. Then, the data obtained were scored separately by three different researchers, one of whom is an author of the current study. These scores were entered into a statistical package program and Pearson correlation analysis and Cronbach alpha coefficient used to determine reliability, while the Kendall compatibility coefficient determined compatibility between the scorers. The obtained results are presented in Table 2.

Table 2. Correlation Between Scorers, Kendall's Concordance Test, and Reliability Results

Rubric Dimension	Correlations between applications (N = 54)						Cronbach alpha	Kendall's (w)	
	E1-E2		E1-E3		E2-E3				
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>			
Explanation	.60	.00*	.43	.00*	.51	.00*	.76		
Interpretation	.59	.00*	.60	.00*	.41	.00*	.78	.80	.00*
Analysis	.62	.00*	.40	.00*	.49	.00*	.75		

Rubric Dimension	Correlations between applications (N = 54)						Cronbach alpha	Kendall's (w)
	E1-E2		E1-E3		E2-E3			
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>		
Inference	.27	.00*	.68	.00*	.31	.02*	.69	
Evaluation	1.00	.00*	.86	.00*	.86	.00*	.98	
Self-Regulation	.83	.00*	.84	.00*	.64	.00*	.95	

* $p < .05$, E1: Evaluator 1, E2: Evaluator 2, E3: Evaluator 3

When the data presented in Table 2 is examined, it can be seen that a significant correlation exists at a medium level between E1 and E2 ($r = .60$; $p < .05$), a weak level between E1 and E3 ($r = .43$; $p < .05$), and a medium-level significant correlation between E2 and E3 ($r = .51$; $p < .05$) in the interpretation dimension of the developed rubric. In the analysis dimension, a medium-level significant correlation exists between E1 and E2 ($r = .59$; $p < .05$), a medium level between E1 and E3 ($r = .60$; $p < .05$), and a weak level between E2 and E3 ($r = .41$; $p < .05$). In the evaluation dimension, a medium-level significant correlation exists between E1 and E2 ($r = .62$; $p < .05$), a weak level between E1 and E3 ($r = .40$; $p < .05$), and a weak level between E2 and E3 ($r = .49$; $p < .05$). In the explanation dimension, a weak-level significant correlation exists between E1 and E2 ($r = .27$; $p < .05$), a medium level between E1 and E3 ($r = .68$; $p < .05$), and a weak level between E2 and E3 ($r = .31$; $p < .05$). In the inference dimension, a very high-level significant correlation exists between E1 and E2 ($r = 1.00$; $p < .05$), a high level between E1 and E3 ($r = .86$; $p < .05$), and a high level between E2 and E3 ($r = .86$; $p < .05$). In the self-regulation dimension, a high-level significant correlation exists between E1 and E2 ($r = .83$; $p < .05$), a high level between E1 and E3 ($r = .84$; $p < .05$), and a medium-level significant correlation exists between E2 and E3 ($r = .64$; $p < .05$) (Sungur, 2014, p. 116).

The existence of weak, medium, and high-level relationships between the scorers indicates that the dimensions are appropriately related to each other. In Table 2, the Cronbach alpha coefficient for the interpretation dimension of the rubric is shown as .76, whilst for the analysis dimension it is .78, for the evaluation dimension it is .75, for the explanation dimension it is .68, for the inference dimension it is .98, and for the self-evaluation dimension it is .95. According to Özdamar (2017), a Cronbach alpha coefficient of .60 or above indicates that research is deemed reliable. Based on this reference, it can be stated that the graded scoring key of the developed critical-thinking skills rubric was found to be sufficiently reliable. In Table 2, the Kendall's Concordance Test ($w = .80$, $p < .05$) among the three scorers was found to be quite high. In research by Can (2023), it was stated that the closer the result of Kendall's Concordance Test is to 1, the better the consistency is between the scorers. Based on this, it may be said that a quite good level of consistency was revealed between the scorers.

4. Discussion

The evaluation of critical-thinking skills holds an important place in education. Tools are therefore developed to measure this skill, helping to assess and improve students' critical-thinking skills (Alsaleh, 2020; Darwin et al., 2024; Ku, 2009). In this context, the current study conducted a

validity and reliability study of a rubric developed to measure critical-thinking skills within the scope of multicultural education.

Validity studies are conducted to determine whether a measurement tool accurately measures the skill for which it was designed (Frey, 2014; Garson, 2013). In the current study, expert opinions were consulted in order to determine the validity of the content and criteria of the developed rubric. As a result of the experts' evaluations, it was revealed that coverage validity of the rubric was sufficient. Following determination of the rubric's validity, a reliability study was also conducted. Reliability is considered important in order to assess whether or not a measurement tool will provide stable and consistent results (Kirk & Miller, 1985). In the current study, the repeatability and consistency of the rubric were determined based on evaluations by experienced faculty members, with high-reliability coefficients obtained from this process.

The findings obtained show that the rubric developed to measure critical-thinking skills within the scope of multicultural education to be both valid and reliable. These results provide the opportunity to effectively measure and evaluate critical-thinking skills within the field of education. However, the current study also presents certain limitations. For example, teachers' opinions regarding the rubric were not evaluated. Examining these issues in more detail could help researchers to better understand the effectiveness of the developed rubric. In addition, it is important that the rubric is applied with different student groups in future studies and also to monitor the impact of the rubric use over a longer term. Such additional studies could provide opportunities to evaluate the effectiveness of the rubric more comprehensively.

In conclusion, the validity and reliability studies presented in the current study affirmed that the rubric developed to measure critical-thinking skills provides an effective measurement for the evaluation of critical-thinking skills in multicultural education. The validity and reliability of the developed rubric may help decision-makers in education to provide reliable data, leading to better decision making.

5. Conclusion

The current research demonstrated that the rubric developed to measure critical-thinking skills in a multicultural education context was both valid and reliable. A validity study revealed that the content and criteria of the developed rubric, as evaluated by experts, ensured its scope validity. A reliability study then focused on the repeatability and consistency features of the developed rubric, which resulted in high-reliability coefficients being revealed. These results indicate that the rubric developed for evaluating critical-thinking skills in multicultural education can be used in the field as an effective measurement tool. The findings of this research therefore provide a significant resource for both practitioners and decision-makers in the field of education. Measuring critical-thinking skills is important in order to help students develop these skills and thereby to promote more in-depth learning (Vincent-Lancrin, 2023). Therefore, the developed rubric can be used as an effective tool in education for the evaluation and development of students' critical-thinking skills.

Elementary school teachers may use the developed rubric to measure and evaluate their students' critical-thinking skills. Using this measurement tool will also provide feedback to teachers about the effectiveness of their curriculum and the inculcation of critical-thinking skills within multicultural classroom environments. Evaluating students' critical-thinking skills is considered important in order to promote success in education and to support students' future academic and professional achievement. The results of the current research contribute to educational practice by offering an effective strategy and measurement tool through which to develop students' critical-thinking skills. The evaluation of these skills through application of the developed rubric can help provide teachers with the opportunity to identify their students' strengths and weaknesses and then to adjust their instruction accordingly. In addition, the current study provides information about effective tools that can be used to measure critical-thinking skills for both educational researchers

and policymakers. The continuation of such research may contribute to the effective evaluation and development of education programs. In conclusion, the rubric developed in the current study can be used as an effective tool for the assessment and development of critical-thinking skills in multicultural education.

6. Suggestions

The following suggestions are put forward based on the scope of the current research:

1. The use of rubrics should be popularized and applied to different courses and educational programs, as well as for the acquisition of various skills across all levels of education.
2. The development of other rubrics for the measurement of critical-thinking skills that may be applied at different educational levels will help contribute to the literature in this area.

Declarations

Author Contributions. S.A.: Literature review, conceptualization, methodology, data analysis. B.A.: Review-editing and writing, original manuscript preparation. Both authors have read and approved for publication the final version of the article.

Conflicts of Interest. The authors declared no conflict of interest.

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Ethical Approval. No ethical approval was sought for this study since it was based on the voluntary participation of the research subjects. Necessary permissions were obtained from the parents of the students.

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Appendices

Appendix I. Story Test Prepared to Measure Critical Thinking Skills

KÜÇÜK ARIN



Küçük bir köyde, Arin adında bir çocuk yaşıyordu. Arin'in yaşadığı köy çok güzeldi. Her yer yeşildi ve köyde kiraz, elma, armut gibi ağaçlar bolca bulunuyordu. Arin'in evi de köydeki diğer evler gibi tek katlı ve kerpiçten yapılmıştı. İki odadan ve bir mutfaktan oluşan bu evin yanında, *ahuér* adını verdikleri küçük hayvanların yaşadığı bir yer vardı. Arin'in köyü, komşu köylerden farklı kültürel özelliklere sahipti. İnanışları da diğer köylerden farklıydı. Her şey kutsal sayılır ve insanlar her perşembe bir araya gelir, ibadetlerini yapar ve lokma adı verdikleri yiyecekleri dağıtırlardı. Konuştukları dil de diğer köylerdeki insanlardan farklıydı. Yemekleri ve giysileri de diğer köylerdekilere ayrılıyordu. Arin ise en çok annesinin yaptığı, *bıcıké* adını verdikleri yemeği severdi. Bu güzel köyde yaşamasına rağmen Arin üzgündü. Nedeni, bir bacağına diğer bacağından daha kısa olmasıydı. Bu yüzden iyi koşamıyordu. Arin dördüncü sınıfa geçtiğinde köylerindeki okul kapanmıştı. Başka bir köydeki okula gitmek zorunda kaldı. Ancak bu durum Arin'i tedirgin etti. Çünkü ilk defa kendi köyünden ayrılacaktı. Okullar açıldığında Arin annesine okula gitmek istemediğini söyledi. Ama annesi ve babası onun okula gitmesi gerektiğini söyledi. Okulun ilk günü babasıyla birlikte okula gittiler. Bahçede diğer öğrenciler oyun oynuyordu. Babası Arin'i bahçe kapısında bırakıp köye döneceğini söyledi. Arin bahçeye girdi ve yürümeye başladı. Bu sırada etrafındaki çocuklar onu fark ettiler ve hemen yanına koşup geldiler. Birisi Arin'e nereli olduğunu sordu. Arin sessizce cevap verdi, ama farklı bir dil konuştuğu için tam anlayamadı. Diğer çocuklar Arin'e güldüler. Bir diğeri, "Sizin köydeki insanlar farklı bir inanca sahipmiş" diyerek alay etti. Şişman olan bir çocuk ise Arin'in yamalı önlüğüne ve kısa bacağına alaycı bir şekilde baktı. Tüm çocuklar gülmeye başladı. Arin gözleri dolmuş, sessizce etrafındaki çocuklara baktı.



Aşağıdaki soruları yukarıdaki metne göre cevaplar mısınız?

1. Sizce okuduğunuz metindeki temel problem nedir?

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2. Sizce Arin'in yaşamış olduğu sorunun nedenleri nelerdir?

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3. Okuduğunuz metnin ana fikri nedir?

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4. Ari'nin yaşamış olduğu sorunu siz nasıl değerlendiriyorsunuz?

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5. Arin yaşamış olduğu sorun karşısında sizce neler yapılmalıdır? Önerileriniz nelerdir?

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.....

6. Arin'in karşılaştığı soruna benzer sorunla karşılaşırsanız siz ne hissederdiniz, nasıl davranırdınız?

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.....
.....

Critical Thinking Skill Rubric in the Scope of Multicultural Education

Ölçütler	Başarı Düzeyi			Alınan Puan
	Çok İyi (3)	Kabul Edilebilir (2)	Geliştirilmeli (1)	
Yorumlama	Metindeki temel problemi ve Arin'in yaşadığı sorunun nedenlerini tam olarak belirlemiştir.	Metindeki temel problemi ve Arin'in yaşadığı sorunun nedenlerini kısmen belirlemiştir.	Metindeki temel problemi ve Arin'in yaşadığı sorunun nedenlerini çok az belirlemiştir.	
Analiz Etme	Arin'in yaşadığı sorunun kültürel, fiziksel ve duygusal boyutlarını tam olarak irdeleyebilmiştir.	Arin'in yaşadığı sorunun kültürel, fiziksel ve duygusal boyutlarını kısmen irdeleyebilmiştir.	Arin'in yaşadığı sorunun kültürel, fiziksel ve duygusal boyutlarını çok az irdeleyebilmiştir.	
Değerlendirme	Metindeki sorunu ve Arin'in yaşadığı zorlukları ve Arin'in yaşadığı sorunun nasıl ele alınabileceğini tam olarak değerlendirmiştir.	Metindeki sorunu ve Arin'in yaşadığı zorlukları ve Arin'in yaşadığı sorunun nasıl ele alınabileceğini kısmen değerlendirmiştir.	Metindeki sorunu ve Arin'in yaşadığı zorlukları ve Arin'in yaşadığı sorunun nasıl ele alınabileceğini çok az değerlendirmiştir.	
Açıklama	Metindeki sorunun ne olduğunu, Arin'in yaşadığı zorluğun nedenlerini tam olarak açıklamıştır.	Metindeki sorunun ne olduğunu, Arin'in yaşadığı zorluğun nedenlerini kısmen açıklamıştır.	Metindeki sorunun ne olduğunu, Arin'in yaşadığı zorluğun nedenlerini çok az açıklamıştır.	
Çıkarımda Bulunma	Metnin ana fikrini, metinden çıkarılan dersleri ve Arin'in yaşadığı soruna yönelik önerileri tam olarak belirlemiştir.	Metnin ana fikrini, metinden çıkarılan dersleri ve Arin'in yaşadığı soruna yönelik önerileri kısmen belirlemiştir.	Metnin ana fikrini, metinden çıkarılan dersleri ve Arin'in yaşadığı soruna yönelik önerileri çok az belirlemiştir.	
Kendini Düzenleme	Kişisel duyguların ve düşüncelerin, metnin analizinde nasıl kullanılabileceğini; Arin'in yaşadığı sorun karşısında kendisinin ne hissedeceğini ve nasıl davranacağını tam olarak değerlendirmiştir.	Kişisel duyguların ve düşüncelerin, metnin analizinde nasıl kullanılabileceğini; Arin'in yaşadığı sorun karşısında kendisinin ne hissedeceğini ve nasıl davranacağını kısmen değerlendirmiştir.	Kişisel duyguların ve düşüncelerin, metnin analizinde nasıl kullanılabileceğini; Arin'in yaşadığı sorun karşısında kendisinin ne hissedeceğini ve nasıl davranacağını çok az değerlendirmiştir.	

About the Contributor(s)

Serkan Aslan, Ph.D., is an associate professor of curriculum and instruction at Suleyman Demirel University, Isparta, Turkey. His main research interests include curriculum development, critical thinking, multicultural education, and instructional technology. He has published extensively in leading international journals and has also authored books and chapters on multicultural education, curriculum, and instruction.

Email: serkanaslan@sdu.edu.tr

ORCID ID: <http://orcid.org/0000-0001-8515-4233>

Birsel Aybek, Ph.D., is an associate professor of curriculum and instruction at Çukurova University, Adana, Turkey. Her main research interests include curriculum development, critical thinking, multicultural education, and ethics. She has published extensively in leading international journals and has authored written books and chapters on multicultural education, curriculum, and instruction.

Email: baybek@cu.edu.tr

ORCID ID: <http://orcid.org/0000-0001-5846-9838>

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