Determining the Response Behaviors of Middle School Students for Open-Ended Questions

Neslihan Tuğçe ŞİMŞEK[1] & Ömer KUTLU[2]

ABSTRACT

When the literature for measurement and evaluation in education is reviewed, research related to student achievement are mainly outcome-oriented rather than process-oriented. Researchers pay attention to the responses that a student constructs or chooses, and ignore the cognitive processes that forces students to construct or choose that specific response. Recognizing the cognitive processes a student uses in responding to a question affects the item construction process and psychometric audit on items. Response behavior is a result of a cognitive process used to respond to a question and is accepted as an indicator of student cognitive competence. This study aims to determine the students' response behaviors for open-ended questions. The study group consisted of 70 students from the 5th grade studying during the 2015-2016 education year spring term in the Cankaya and Mamak districts of Ankara province, Turkey. An authentic achievement test which consisted of eight open-ended questions is used as the data collection tool. Students are asked to write in detail how they construct their response in their mind in the blank space set aside after each question. Data is analyzed via grouping students' response behaviors and expert opinions. Research findings revealed that students perform 14 different response behaviors for open-ended questions. These behaviors are themed as responses constructed directly from the text, responses constructed by interpreting the text, and responses constructed by linking real life and the text.

[1] Res. Asst. - Ankara University, Faculty of Educational Sciences, Ankara, Turkey - seval.kula@hotmail.com
[2] Assist. Prof. Dr. - Ankara University, Faculty of Educational Sciences, Ankara, Turkey - omerkutlu@ankara.edu.tr

INTRODUCTION

Behavior is a feature that can be observed in everyone. Erden and Akman (2004) identified behavior as the entire reactions to a stimulant. Yeşilyaprak (2002) considers every action of an organism as behavior, while Morgan (2011) emphasizes that behavior involves inner processes and has various aspects such as physical, perceptual, and sensory. Behavior, in other words, is living beings' cognitive, affective, and psychomotor reactions. In education, the focus is often on the cognitive aspect of behaviors.

Learning is a long-term behavior change due to people' own experiences (Schunk, 2004). Behavior change in a learning context represents the positive changes in a person's cognitive, affective, and psychomotor competences. Individuals either experience new behaviors or changes to old behaviors during this process. Education is often concerned with changes in the cognitive processes in the context of improving student achievement. Cognitive taxonomies are specifically used in order both to improve and measure cognitive processes (Anderson, & Krathwohl, 2001; Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956; Haladyna, 1997; Marzano, & Kendall, 2008; Yüksel, 2007). Education came to use these taxonomies developed for cognitive behaviors particularly after 1950, and aims to measure student achievement based on learning outcomes written based on the taxonomies. Today, studies related to student achievement try to evaluate achievement based on the reactions students give to the learning outcomes written based on the taxonomies; whilst often ignoring how those reactions are constructed. Process-oriented assessments introduced under the Constructivist Approach (OECD, 2008) pay attention to the processes of how students learn and acquire knowledge and skills, as well as how they construct responses. In this sense, students' response behaviors provide information in terms of their cognitive competences. Being aware of students' response behaviors help better item development and promote better assessments regarding student learning (Pehlivan Tunç, & Kutlu, 2014).

Response behavior is an intellectual process that occurs when people answer an item (Tokat, 2006). It can also be defined as the construction process in which a response is formed with the help of cognitive competences. Response behaviors which are results of cognitive competences are constructed with unobservable intellectual processes and accepted as an indicator of the related cognitive process. Namely, which option a student chooses in a multiple-choice test is determined by cognitive processes in play in the background that causes him/her to choose an option. However, response behavior is an intellectual route map that a student follows in order to answer an item. It points out the activities starting when the student encounters an item until he/she answers it. Response behaviors are constructed in the same level that an item is aimed to measure. Constructing an answer to an item measuring the higher-order thinking processes is down to the use of such higher-order thinking skills. A response behavior constructed based on cognitive processes becomes therefore an indicator of success if the answer to the item measuring higher-order thinking is correct.

Higher-order thinking skills as an indicator for progress in success have been lately related to student achievement and are measured in order to determine success level (Haladyna, 1997). Curriculums have been rescheduled to raise students who think, decide autonomously, control their own cognitive processes, know how to use technology, and can effectively apply their own

thinking processes. The reason for the change in curriculums is the alteration of skills necessary in today's society and the need to raise people who possess such skills. Strong economies need people to develop the existing situation, and the only way to achieve this need is via education.

Effort to determine higher-order thinking skills brings about the use of open-ended questions. Open-ended questions are appropriate to measure both ordinary and complex learning outcomes and often require respondents to write one or two paragraphs while giving answers (Popham, 2000). Open-ended questions require students to organize their own response process and provide a degree of freedom to students in constructing their responses. Besides, they minimize the behavior of guessing. Tests that include multiple-choice items are used to measure knowledge and skill; but they are inappropriate to measure higher order thinking skills (Ebel, 1965). Open-ended questions require students firstly to decide which information is to be used in which order and for what purpose, and to combine and arrange them (Gronlund, 1977). People in their daily lives use thinking skills such as deciding on related information and arranging it according to the stimulus. Open-ended questions contribute to the use of these daily life skills and enables more meaningful and improving assessments.

Meneghetti, Carretti, and De Beni (2006) defines reading as a process formation of meaning and constructing information with the help of preliminary information, while Demirel (1999) states that reading makes use of written symbols via the cooperation of cognitive processes and psychomotor skills. Reading comprehension skill is formed as a result of a process and is the very first step to acquiring knowledge. This skill is necessary for so many situations such as education, self-fulfillment, judging social issues, contacting relations, and transforming ideas (Mete, 2012). Mullis, Martin, Kennedy, and Foy (2007) state that reading comprehension skill utilizes daily life success and cultural richness and specifies that people who can read and also understand what they have read contribute to the social and economic growth of their nation. Bloom (1995) remarks that reading and reading comprehension skills are general cognitive behaviors. If a good reading comprehension skill is acquired during the primary school years, this very positively affects future learning.

PIRLS (Progress in International Reading Literacy Study) is a large-scale assessment which focuses solely on the measurement of 4th grade reading comprehension skills. PIRLS aims to gather comparative data regarding worldwide education policies and applications as well as school, home and student factors that might affect student reading comprehension skills. It targets at determining the students' existing situation, makes comparisons on national and international levels, observes the improvement of skill over time, and arranges and evaluates the effects of education policy and applications on reading comprehension skill (Mullis et al., 2007).

Achievement tests used in PIRLS include open-ended questions written on different cognitive levels related to a text. Items are constructed based on four different comprehension levels. The first and the ordinary level is about stating clearly expressed ideas and making direct deductions. This level focuses on recognizing information and ideas related to the answer. Interpretation is not required in order to answer the questions correctly in this process. The interpreting level, however, needs reasoning to be applied with regard to what the text conveys. To measure this level, discerning knowledge and information is required, and then combining what has been noticed. The third process is called use of knowledge and experiences. This process

is more complex and cognitively more challenging. Students need to benefit from the ideas and information stated implicitly in the text and use their own background and experiences in the interpretation process. As the response process is shaped by individuals' experiences, responses may vary from one person to another. The most complex response process is investigating the elements, content, and language of the text. This process requires students to study the text from their own point of view (perspective, beliefs etc.). Students in this process evaluate the quality of the text, the case the text portrays or the writer's point of view (MEB, 2005).

Which route does a student follow to answer an item and which cognitive processes take part in this answering process? These questions can only be answered through the investigation of response behaviors. Considering the personal and social benefits of reading comprehension skill, analyzing the reading comprehension skill processes, how students make meaningful what they read and being aware of according to which cognitive competence and process they construct their answers can provide useful information regarding students' cognitive behaviors and reading comprehension skills. When the process of reading comprehension is analyzed, related processes can be studied and efforts to improve them can be conducted.

When the literature is studied, it is inferred that researchers often discuss the construction process of open-ended questions, but ignore how these questions are in fact answered. Asking a question is a psychological process as well the answering of it (Tourangeau, Rips, & Rasinski, 2000; Weisberg, 2005). In this process, a person systematically constructs an answer based on the context of the item, the people he/she interacts with and his/her experiences and knowledge. Schwarz and Oyserman (2001) emphasized in their research regarding responding items that to answer a question correctly, the first condition is that the behavior one demonstrates and the trait that is to be measured should match. Analyzing response behaviors both presents the students' cognitive competences for open-ended questions and provides information as to whether or not an item measures the trait it aims to measure.

Response behavior studies are mostly focused on multiple-choice questioning (Kadıoğlu, 2002; Krebs, & Hoffmeyer-Zlotnik, 2010; Pehlivan Tunç, & Kutlu, 2014; Tokat, 2006; Umay, 1997, 1998). There appear to be no studies that focus on investigating the students' response behaviors to open-ended questions. Analysis of response behaviors are considered important as it helps to reveal the intellectual and cognitive processes that a student experiences while constructing a response.

This current study therefore aims to determine the response behaviors and contribute to the literature. The response behaviors form developed in this study is considered to be significant as it enables the revealing of a student's cognitive processes. It is thought that knowing the cognitive process a student experiences in the answering of open-ended questions will help to interpret test scores and improve the judgment of student achievement. It is anticipated that this form will provide an opportunity for researchers who want to study and plan research regarding response behaviors.

The aim of this current study is to determine 5th grade student response behaviors on open-ended items written in different cognitive levels regarding reading comprehension skill.

METHOD

The development process for the response behavior form for open-ended questions is given in this section. In this context, the research design, selection of a study group and its features, and the development of data collection tool and data analysis are outlined.

Research Design

This research study is designed as a survey model. Survey researches aim to specify the features of a group (Büyüköztürk, Kılıç-Çakmak, Akgün, Karadeniz, & Demirel, 2014), and the aim of this survey research study is to determine the intellectual process that students experience while giving their answer to an item.

Study Group

This research is conducted with a study group of 70 students from the 5th grade of two schools in the Cankaya and Mamak districts of the province of Ankara, Turkey, during the 2015-2016 education year spring semester. Purposeful sampling is used as the sampling technique, and is preferred with the aim of obtaining the richest data (Büyüköztürk et al., 2014). Socio-economic variables are thought to affect response behaviors, which are the results of cognitive competences. For this reason, the study group is comprised of students from two districts which are different in terms of their socio-economic levels. Official permission in order to proceed with the study was taken from the Provincial Directorate for National Education in Ankara.

International Standard Classification of Education (ISCED) competence levels determined by UNESCO Statistical Institute are taken into consideration in order to decide on the age range of the study group. Students who receive formal education for four years are grouped in ISCED 1 level. The study group of this research consists of this level of student, as having received four years of formal schooling, they are considered to be learning to read and starting reading to learn (Mullis et al., 2007).

Data Collection Tool

The reading comprehension achievement test was developed by Kutlu and Aslanoğlu (2008, 2009). There are eight open-ended items in the test related to text. Items are constructed for four different cognitive processes based on the PIRLS reading skill taxonomy (MEB, 2003; PIRLS, 2003). There are two items on stating the clearly expressed ideas and making direct deductions, two items on interpreting, two items on the use of knowledge and experiences, and two items on investigating the elements, content, and the language of the text.

In order to assert the aim and stress the importance of the study, three experts from the field of measurement and evaluation in education, four Turkish language teachers, and two Turkish Education academicians were requested to analyze and make suggestions for any necessary modifications regarding the text, items, and the instructions for the form. The expert group were asked to evaluate the documents in terms of expressions and appropriateness of the items for the classroom level and the text. Feedback from the expert group was then studied and the instruction and items reviewed by taking the received feedback into consideration. The final version of the form was then prepared in readiness for applying to the study group. Information obtained from the expert group was considered as proof of validity.

Students were asked to answer the questions based on the text and to write how they construct their responses for each item in detail in the space provided on the form. In order to eliminate potential uncertainties, examples are presented to the students.

Interrater reliability was checked as proof for the reliability of the achievement test. The applied forms were sent to three experts who received undergraduate education on language teaching and now continue their higher education in the field of educational sciences. Experts each scored the forms independently. Congruity between experts' scores were analyzed by calculating Kendall's W, a statistic used to determine congruent status when data is at least in ordinal scale and there is more than one scorer. Kendall's W values range between 0 and 1, with zero meaning there is no concordance, while one indicates perfect concordance between scorers (Howell, 2013). Concordance values for this study were statistically significant (p<0.01), with a medium level concordance between the three scorers.

Data Analysis

In the data analysis process, students' process of response behavior for open-ended questions was studied separately for each item and for each cognitive process of PIRLS taxonomy. First, response behaviors were grouped. These grouped responses were reviewed in terms of grammar and expression, and any detected mistakes corrected. Then, similar expressions were excluded from the form. After these processes, 20 response behaviors for four cognitive processes remained in the draft from. Instruction, achievement test and its item, cognitive process on which items are based and the explanations of cognitive processes are attached to the form and sent to three experts on the field of measurement and evaluation in education. The experts were asked to pay attention to the similarity and clarity of expressions and appropriateness to cognitive levels. The expert feedback was studied and 14 response behaviors determined.

FINDINGS

In the study, it was determined that 5th grade students showed 14 response behaviors which were grouped under three themes on the items constructed based on four different cognitive processes. Themes and related behavior responses are presented in Table 1.

Table 1. *Response behaviors for open-ended questions and related themes*

Themes	Response Behaviors
1- Responses constructed directly from the text	I first read the text, and then the question. The answer came to my mind, but I again reread the text to be sure and then wrote my answer.
	I first read the text, and then the question. Then, I again reread the part related with the question and then wrote my answer.
	I did not understand neither the text nor the question. For this reason, I used a statement directly from the text as an answer.
	I first read the question and then the text. I then wrote my answer.
2- Responses constructed by interpreting the text	I read the text and the question. I then wrote my answer based on my opinions.
	I first read the text, and then the question. The answer came to my mind, but I again reread the text. I combined the sentences from the text with my own opinions and then wrote my answer.
	I first read the text, and then the question. Then, I combined what I have read in the text and what I had in my mind and wrote my answer.
	I first read the question and then the text. I summarized the text in my mind and wrote my answer as a summary.
3- Responses constructed by linking real life to the text	I first read the question and then the text. I put myself in his shoes and thought about what I would like to be told. I then wrote my answer in this sense.
	I first read the question and then the text. I thought about a similar problem from my own life and then wrote my answer.
	I first read the question. I then combined what my parents told me with the opinion of the text and then wrote my answer.
	I first read the question. I used my imagination to write my answer.
	I first read the question. I then recalled the text and thought how it could continue and wrote my answer.
	I first read the question. I put myself in the writer's shoes and then wrote my answer.

Table 1 shows that students showed 14 response behaviors on open-ended questions. These behaviors are grouped under three themes from ordinary through to complex. These are themed as 'responses constructed directly from the text', 'responses constructed by interpreting the text' and 'responses constructed by linking real life to the text'.

Responses constructed directly from the text are behaviors that are mainly observed on stating the clearly expressed ideas and making direct deductions items according to PIRLS taxonomy. These behaviors are formed when students use only the text to answer the question and find the related information from the text. The most ordinal response behaviors are gathered in this theme.

Responses constructed by interpreting the text are behaviors observed on interpreting items. A more complex process is required to construct responses for these behaviors than responses constructed directly from the text behaviors. These behaviors are formed when students find the related information from the text and relate it to the existing information they have. The more complex cognitive process takes part in this level of response behavior.

Responses constructed by linking real life and the text are the most complex response behaviors and are mainly observed on items regarding the use of knowledge and experiences and investigating the elements, content and the language of the text. These behaviors are formed when students empathize with others and use their imagination.

When the response behaviors for open-ended questions are studied in general, it can be concluded that students tend to read the text first, and then read the item. The more complex the trait which is being measured by the item, the less effort students show in finding the answer from the text. Rather, they prefer to use their own experiences and knowledge, combine them with the related pat of the text, use their imagination and reasoning skills. Therefore, they try to picture themselves in the positions they may never be and activate their higher-order thinking processes.

RESULT, DISCUSSION AND SUGGESTION

There were 14 different response behaviors exhibited by 5th grade students for open-ended questions, grouped under three themes. Themes are hierarchic from ordinary to complex levels. Thus, response behaviors share the same case with the themes they are grouped. It can be stated that students do not use their cognitive processes effectively when they are asked to answer an item which measures their knowledge. However, they use their cognitive processes much more effectively when they are faced with items that measure reasoning or interpreting. They even use their higher-order thinking skills when they are required to combine their own knowledge with the new information.

The following suggestions can be made based on the research findings of this current study for educators and researchers:

Educators; (i) it is important to design measurement and evaluation applications with items that can promote students' complex thinking processes. Thus, students can use their higher-order thinking skills. Measurement and evaluation applications should focus on these skills. (ii) Classroom activities and measurement applications should be arranged so as to focus on different levels of intellectual thinking processes. (iii) Teachers may be asked to pay attention to open-ended questions and the construction of open-ended questions in terms of their usefulness in measuring higher-order thinking skills. School management should value the importance in service training and related workshops.

Researchers; (i) This current study determined the response behaviors for open-ended questions written based on PIRLS taxonomy. Future research could determine response behaviors related to other taxonomies and reveal any differences and/or similarities. Students' features that cause these similarities and differences might also be investigated. (ii) Student, teacher, and school features that shapes the response behaviors could be researched. (iii) In this current study, response behaviors are determined based on reading comprehension skill. Future research on response behaviors in different learning domains can also be an area of study. (iv) This current study determined 5th grade students' response behaviors. Students from other classroom levels can be the focus of future research in order to determine their response behaviors. In addition, the relation between classroom level and response behavior change may also be interesting. (v) This current research was conducted with two public schools in Ankara, Turkey. The study group could be enlarged by including private schools, and then a study to determine the differences in response behaviors between the schools could be designed. (vi) The current research's study group was specified by taking socioeconomic variables into consideration. Various other variables known in the literature to be effective on response behaviors could also be considered in the formation of another study group, and then comparative research could be conducted.

REFERENCES

Anderson, L. W., & Krathwohl, D. R. (Eds.) (2001). *A taxonomy for learning, teaching, and assessing: A revision of bloom's taxonomy of educational objectives* (Complete edition). New York: Longman.

Bloom, B. S. (1995). *İnsan nitelikleri ve okulda öğrenme* (D. A. Özçelik, Trans.). Ankara: Pegem Akademi Yayıncılık.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives. Book I: Cognitive domain*. U.S.: Longman.

Büyüköztürk, Ş., Kılıç-Çakmak, K. E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2014). *Bilimsel araştırma yöntemleri*. Ankara: Pegem Akademi Yayıncılık.

Demirel, Ö. (1999). *Türkçe öğretimi*. Ankara: Pegem Yayıncılık.

Ebel, R. L. (1965). M*easuring educational achievement*. New Jersey: Prentice- Hall Press.

Erden, M., & Akman, Y. (2004). *Gelişim ve öğrenme.* Ankara: Arkadaş Yayınevi.

Gronlund, N. E. (1977). *Constructing achievement test* (2nd ed.). Englewood Cliffs, .J.: Prentice-Hall.

Haladyna, T. M. (1997). *Writing test items in order to evaluate higher order thinking*. USA: Allyn & Bacon.

Howell, D. C. (2013). *Statistical methods for psychology* (8th ed.). USA: Wadsworth.

Kadıoğlu, B. (2002). *Çoktan seçmeli testlerde test maddelerini cevaplama davranışlarının madde ve öğrenci özelliklerine göre nasıl bir değişim gösterdiğinin incelenmesi* (Unpublished Master's thesis). Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

Krebs, D., & Hoffmeyer-Zlotnik, J. H. P. (2010). Positive first or negative first? Effects of the order of answering categories on response behavior. *Methodology, 6*(3), 118-127.

Kutlu, Ö., & Aslanoğlu, A. E. (2008, May). *Dinlediğini anlama becerisinin ölçülmesi*. Paper presented at the VII. Ulusal Sınıf Öğretmenliği Eğitim Sempozyumu, Çanakkale Onsekiz Mart Üniversitesi, Eğitim Fakültesi, İlköğretim Bölümü Sınıf Öğretmenliği Anabilim Dalı, Çanakkale.

Kutlu, Ö., & Aslanoğlu, A. E. (2009). Factors affecting the listening skill. *Procedia Social and Behavioral Sciences, 1*(1), 2013-2022.

Marzano, R. J., & Kendall, J. S. (2008). *Designing and assessing educational objectives: Applying the new taxonomy.* Thousand Oaks: Corwin Press.

MEB (2003). *PIRLS 2001 uluslararası okuma becerilerinde gelişim projesi, ulusal rapor*. PIRLS 2001, Türkiye Raporu. Ankara: Eğitimi Araştırma ve Geliştirme Dairesi Yayınları.

MEB (2005). *PISA 2003 Projesi Ulusal Nihai Rapor.* Ankara: Eğitimi Araştırma ve Geliştirme Dairesi Yayınları.

Meneghetti, C., Carretti, B., & De Beni, R. (2006). Components of reading comprehension and scholastic achievement. *Learning and Individual Differences, 16*, 291-301.

Mete, G. (2012). İlköğretim 8. sınıf öğrencilerinin okuma alışkanlığı üzerine bir araştırma (Malatya İl Örneği). *Dil ve Edebiyat Eğitimi Dergisi*, *1*(1), 43-66.

Morgan, C. T. (2011). *Psikolojiye giriş* (19th ed.) (S. Karakaş & R. Eski, Trans.). Konya: Eğitim Akademi Yayınları.

Mullis, I. V. S., Martin, M. O., Kennedy, A. M., & Foy, P. (2007). *PIRLS 2006 International Report*. Boston: International Study Center.

OECD (2008). *Assessment for learning formative assessment*. Retrieved from: http://www.oecd.org/site/educeri21st/4060053.pdf

Pehlivan Tunç, E. B., & Kutlu, Ö. (2014). Türkçe test maddelerinde yanıtlama davranışlarının incelenmesi. *Eğitimde ve Psikolojide Ölçme ve Değerlendirme Dergisi, 5*(1), 61-71.

PIRLS (2003). *PIRLS international report*. US: International Association for the Evaluation of Educational Achievement (IEA).

Popham, W. J. (2000). *Modern educational measurement: Practical guide for educational leaders* (3rd ed.). USA: Allyn & Bacon.

Schunk, D. H. (2004). *Learning theories: An educational perspective* (4th ed.). Columbus, OH: Prentice-Hall.

Schwarz, N., & Oyserman, D. (2001). Asking questions about behavior: Cognition, communication and questionnaire construction. *American Journal of Evaluation, 22*(2), 127-160.

Tokat, Y. N. (2006). *Çoktan seçmeli testlerde yanıtlama davranışlarının belirlenmesi* (Unpublished Master's thesis). Ankara Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.

Tourangeau, R., Rips, J., & Rasinski, K. (2000). *The psychology of survey response.* Cambridge: Cambridge University Press.

Umay, A. (1997). Yanıtlayıcı davranışlarının analizi yolu ile matematikte problem çözümleri için bir güvenirlik ve geçerlik araştırması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 13*, 47-56.

Umay, A. (1998). Seçmeli testlerde yanıtlayıcı davranışları ve şans başarısının elimine edilmesi işlemlerine ilişkin bazı öneriler. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 14*, 54-61.

Weisberg, H. F. (2005). *The total survey error approach: A guide to the new science of survey research.* Chicago: The University of Chicago Press.

Yeşilyaprak, B. (2002). *Gelişim ve öğrenme psikolojisi.* Ankara: Pegem Akademi Yayıncılık.

Yüksel, S. (2007). Bilişsel alanın sınıflamasında (taksonomi) yeni gelişmeler ve sınıflamalar. *Türk Eğitim Bilimleri Dergisi, 5*(3), 479-509.