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Determining the Effect of Intervention and Intervention Packages on the Reading Fluency and Comprehension of Lower Secondary School Students with Mental Retardation

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Abstract

This study aimed at identifying to what extent skill- and performance-based interventions and intervention packages affect the reading fluency and comprehension of the students with mental retardation and analyzing the results of Brief Experimental Analysis (BEA) with Extended Analysis (EA). Five different interventions and/or intervention packages were used to determine the correct number of words and reading comprehension levels of three students with mental retardation. Findings indicated that the effect of intervention and/or intervention packages differed for students. It was found that intervention packages, which increased students' reading fluency, also increased reading comprehension of two students. Moreover, it was observed that using multiple interventions together on reading fluency and comprehension showed more effective results than using a single intervention. Based on the results, it was discussed and suggested that teachers should include interventions based on intrinsic and extrinsic motivation as well as interventions based on skills in order to improve the reading fluency and comprehension skills of students with mental retardation at lower secondary school level.

Keywords

Mental Retardation
Reading Fluency
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Introduction

Nowadays, having difficulty in reading is one of the most important problems that students encounter. In addition to being successful in other academic fields, reading also forms the basis of adaptation to school tasks. Therefore, reading skills are critical for academic success. Reading skills are important for students' academic and other learning processes and affect their text achievement success (Paige, 2011; Sanır, 2017; Yıldız, 2013). To understand the text, it is necessary to read it with appropriate speed, accuracy and tone (Prosody) (Rasinski, 2010). The theory of automatic information processing in reading (La Berge & Samuels, 1974) and the verbal efficiency theory (Perfetti, 1985) assume that the realization of reading fluency depends on the automatic recognition and quick recognition of words. These two theories connect the link between reading fluency and comprehension to the readers' recognizing words automatically and they emphasize that attention will focus on comprehension as the automation increases. Studies, which examined the relationship between reading fluency and comprehension, show that readers who comprehend the text well can read the words more fluently than those who do not comprehend it (Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003; Sanır, 2017). Comprehension also involves the process of constructing meaning from the text or other materials and it is the ultimate goal of reading instruction (Block & Pressley, 2002). Since successful readers recognize words in the text automatically, they focus on understanding and interpreting text rather than analyzing it (Archer, Gleason, & Vachon, 2003; Begeny & Silber, 2006). On the other hand, students with reading difficulties try to read the words slowly and by making an effort (Mastropieri & Scruggs, 2002). In addition, slow and ardent reading process reduces reading fluency and comprehension (Roberts, Torgesen, Boardman, & Scammacca, 2008). Students with inadequate reading skills are unable to improve their academic skills at the same rate when compared to their peers who are fluent in their academic skills (Meisinger, Bloom, & Hynd, 2010). It is stated that reading skills of students with reading difficulties are below the class level (Lewis-Lancaster & Reisener, 2013). Evidence-based reading interventions should be applied to students with reading difficulties so that they can achieve classroom-level reading standards (Roberts et al., 2008).

Literature presents a large number of studies on reading intervention, which were conducted with primary school students; however, there is a dearth of studies examining reading intervention of lower secondary school student with mental retardation (Güzel Özmen & Çevik, 2005; Lewis-Lancaster & Reisener, 2013; Orçan & Özmen, 2012). These studies focused on reading fluency interventions to improve reading speed and accuracy (Lewis-Lancaster & Reisener, 2013; Orçan & Özmen, 2012). Although the results of and the intervention methods applied in these studies differed from this study, the current paper fills the gap as it addresses an age group that has not been sufficiently studied in the literature. Lower secondary school students with reading difficulties have a number of problems related to reading; for example, adult students with reading difficulties experience these difficulties for many years. Furthermore, students with a long history of reading difficulties tend to have academic difficulties due to the verbal nature of reading-based teaching (Lewis-Lancaster & Reisener, 2013). The verbal and language skills that students have from a young age contribute to their reading accuracy and reading comprehension and inadequate display of these skills leads to difficulty in reading comprehension (Cain, Oakhill, & Bryant, 2004). Based on these skills, as students grow up, their performance on the subjects taught increases based on their ability to read and comprehend a good text and students with reading difficulties are disadvantaged at this point (Lewis-Lancaster & Reisener, 2013; Roberts vd., 2008). As a result of their negative experiences, there are strong evidences that they lost their hope and interest in developing their reading skills (Roberts et al., 2008) and that students' interest in motivation and reading decreased after the first years of primary school; this becomes more important for the students who were forced to learn in the early stages of learning (Eccles, Wigifeld, Harold, & Blumenfeld, 1993; McKenna, Kear, & Elsworth, 1995). Contrary to this, if the reading skills of lower secondary school students with reading difficulties are not developed and tackled effective

methods, it is stated that they will experience a number of situations such as learned helplessness, decrease in the level of motivation and dedication related to reading, exhibiting negative attitude towards reading and school (Blachman et al., 2014). Literature abounds in studies which examined the interventions that improve reading fluency skills of students with reading difficulties. These intervention techniques have been addressed in two categories: skill-based and performance-based (Eckert, Ardoin, Daly, & Martens, 2002). Skills-based techniques include repeated reading, listening passage preview and error correction whereas performance-based techniques are performance feedback, choice making, verbal encouragement (motivation) and goal-related reward (Carson & Eckert, 2003; Chafouleas, Martens, Dobson, Weinstein, & Gardner, 2002; Coolong-Chaffin & Wagner, 2015; Eckert et al., 2002; Wilber & Cushman, 2006). Skill-based techniques are usually offered alone or in combination to improve fluent reading (Güzel Özmen, 2011). Being one of the skill-based techniques, repeated reading is an evidence-based reading technique that aims to improve students' reading fluency skills (Therrien, 2004). An increase was observed in students' reading fluency and comprehension scores as a result of the instructions done with repeated reading technique (Chard, Vaughn, & Tyler, 2002). In addition, meta-analysis studies conducted to determine the effectiveness of repeated reading indicate that repeated reading technique has a positive effect on reading fluency and comprehension of students with and without learning difficulties (Burns & Wagner, 2008; Chard et al., 2002; Therrien, 2004). Another skill-based technique is to listen to the text in advance (listening passage preview). This technique requires the student to listen to the text from a fluent reader (before s/he reads the text) and to follow the listening from a copy of the text. Thus, the student is provided to take reading fluency as a model (Begeny, Krouse, Ross, & Mitchell, 2009; Burns & Wagner, 2008; McComas et al., 2009). Research shows that listening passage preview technique increases reading fluency (Daly & Martens, 1994; Lionetti & Cole, 2004; Skinner, Cooper, & Cole, 1997) and reading comprehension (Cates, Thomason, Havey, & McCormick, 2006; Hale et al., 2005; Schmitt, McCallum, Hale, Obeldobel, & Dingus, 2009).

Although reading comprehension difficulties are often thought to be due to lack of skills, students may need motivation to succeed (Wilber & Cuhsman, 2006). In addition, it is stated that learning difficulties related to any skills may occur not only due to students' cognitive retardation but also their unwillingness to realize the skill (Daly, Witt, Martens, & Dool, 1997; Paige, 2011). From a teacher perspective, although an ideal student needs to have intrinsic motivation, various factors (e.g. many activities carried out in the social context of the class and size of the school environment) naturally motivate students extrinsically rather than intrinsically (Ryan & Deci, 2000; Paige, 2011). While students with extrinsic reading motivation read for being recognized or winning another reward (Guthrie, Wigfield, Metsala, & Cox, 1999), students with intrinsic reading motivation for an object or activity according to their personal interests and curiosities (Schunk, Pintrich, & Meece, 2008). Thus, motivation can be used with a skill-based technique (Wilber & Cushman, 2006). Previous studies have shown that combining skills and performance-based techniques provides maximum benefit for some students (Eckert, Ardoin, Daisey, & Scarola, 2000; Wilber & Cushman, 2006). In this study, the effect of intrinsic motivation was determined by asking students to read the texts that they chose in accordance with their own interests, wishes and curiosity. Choice making, a performance-based technique, can be used both alone and as a component of intervention packages (Daly, Garbacz, Olson, Persampieri, & Ni, 2006b; Carson & Eckert, 2003; Kern et al., 1998). Choice making technique provides students with detailed information about the intervention methods applied and it informs students about the interventions to be applied (Daly et al., 2006b; Carson & Eckert, 2003). The intervention or reward to be applied in this process can be selected by the researcher as well as by the student. Then the effects of the interventions are compared (Daly et al., 2006b; Carson & Eckert, 2003; Kern et al., 1998). Another approach is to evaluate the effects of choice making in direct relation to a particular situation. Opportunities for choice making are also provided in the context of direct interest and curiosity rather than selecting rewards or intervention (Kern et al., 1998). In the context of focus of interest, it is stated that direct choice making significantly increases the commitment towards skills (Kern et al., 1998). In other words, motivation

facilitates commitment, which makes it easier to achieve. The effect of extrinsic motivation in the research process was determined by giving students verbal incentives related to competition, recognition, social and adaptation factors, which formed extrinsic motivation (Wigfield & Guthrie, 1997). For example, such as *when you meet with your friends and tell them what you read, they will see how good a reader you are*. Verbal encouragement is a technique that aims to encourage the development of student's reading and it intends to improve student's motivation by providing verbal praises after reading (Wilber & Cushman, 2006). When used alone or in combination with skill-based techniques, it has been found to increase reading fluency (Wilber & Cushman, 2006).

School-based interventions need to be as efficient as possible in terms of time. Therefore, in recent years, Brief Experimental Analysis (hereafter, BEA) has been used to make academic intervention and to choose intervention components (Güzel Özmen, 2011). If there is lack of time, this method is very useful (Coolong-Chaffin & Wagner, 2015). It allows direct comparison of two or more interventions quickly and efficiently (Jones, Wickstrom, & Daly, 2002; Mc-Comas et al., 2009). BEA is preferred because while it allows the effectiveness of intervention techniques to be tested, on the other hand it prevents the application of ineffective techniques. With BEA research, the treatment techniques that are effective for students are chosen for teaching academic skills. BEA is an evaluation process based on the assumption that instructional variables affect academic achievement (Daly et al., 1997). Treatment techniques in BEA process are systematically applied to determine the technique that creates the desired academic behavior (Daly et al., 1997). The effect of each intervention in BEA process is quickly tested by comparing it to the baseline and to other interventions (Kennedy, 2005). Then, effective response technique is selected by comparing students' responses in the intervention conditions (Coolong-Chaffin & Wagner, 2015; Orçan & Özmen, 2012; Özmen & Atbaşı, 2016; Wilber & Cushman, 2006).

BEA studies have mostly focused on the development of reading fluency (Daly, Martens, Dool, & Hintze, 1998; Daly, Martens, Hamler, Dool, & Eckert, 1999; Eckert et al., 2002; Guzel-Ozmen, 2011; Jones & Wickstrom, 2002; Orçan & Özmen, 2012; Lewis-Lancaster & Reisener, 2013; Wilber & Cushman, 2006; Van Auken, Chafouleas, Bradley, & Martens, 2002). In addition to reading fluency, effective treatment can be selected by using BEA in reading comprehension skills. However, there is a dearth of studies examining both reading fluency and reading comprehension. Cates et al. (2006) tested the effect of six primary school students on reading fluency and reading comprehension by applying skill- and performance-based treatment techniques both separately and together. Repeated reading, pre-listening to the text, reward techniques and three treatment packages were utilized. The treatment packages are repeated reading-reward, reward-pre-listening of the text, and repeated reading-pre-listening of the repeated text. The BEA results showed that the techniques and treatment packages used in both reading fluency and reading comprehension were effective, and that each student differentiated. In another study, Nikanowicz (2009) studied with 13 primary school students whose reading and comprehension levels were below the class level. In that study, to determine the source of the students' comprehension problems, fluency (reading text once) was used as the treatment technique and fluency-strategy package was applied as the treatment package. It was stated that fluency was effective in the process of reading comprehension of two students; in other words, if there was an increase in student's reading fluency, his / her comprehension increased as well.

To the best of the researchers' knowledge, there is only one study in international literature, which discussed BEA process and was conducted with lower secondary school students with mental retardation. In this study, the effects of skill- and performance-based interventions were obtained not only individually but also in combination. Lewis-Lancaster and Reisener (2013) investigated separate and combined effect of skill- and performance-based treatment techniques in a student with mental retardation. In the study, the combination of skills and performance-based techniques was found to be effective.

In Turkey, there was no study conducted with BEA, in which both the reading speed and the reading comprehension process of students with mental retardation were tested simultaneously. Students with mental retardation have difficulty in reading and reading comprehension skills fluently and accurately in their classroom level (Güzel Özmen & Çevik, 2005; Orçan & Özmen, 2012). Therefore, there is a need for studies which aim at increasing the reading accuracy and reading comprehension skills of lower secondary school students with mental retardation However, there is one study which tested the reading speed of lower secondary school students with mental retardation. Orçan and Özmen (2012) identified the effects of skill- and performance-based treatment techniques in two lower secondary school students with mental retardation by applying these techniques both separately and together. In the study, while repeated reading was found to be effective in one student, repeated reading-performance feedback was noted to be effective in the other student. When the national and international literature was examined, findings of the studies revealed that treatments which were effective in reading speed and reading comprehension were different among the students. These results indicated the necessity of BEA when time was limited. BEA provides information to identify interventions that are effective in a short time period; however, Extended Analysis (hereafter, EA) studies are conducted to test the effectiveness of any intervention over a long period of time (Coolong-Chaffin & Wagner, 2015; Orçan & Özmen, 2012). EA results showed that the technique or techniques whose effectiveness was determined in the BEA process were long-lasting (Orçan & Özmen, 2012). In addition, an increase was observed in students' reading performance in studies where EA was applied (Daly, Murdoch, Lillenstein Webber, & Lentz, 2002; McComas et al., 2009).

This study aimed to determine to what extent skill and performance based interventions and intervention packages affect the reading fluency and comprehension of the students with mental retardation and to test the results of BEA with EA.

Unlike the BEA studies conducted in Turkey and abroad, this study examined the effect of skill- and performance-based intervention packages on reading comprehension of lower secondary school students with mental retardation as well as their reading fluency, and it aimed to determine the effect of intrinsic and extrinsic reading motivation separately by combining them with skill-based techniques. Combining skills and performance-based interventions that affect reading fluency and reading comprehension of students with poor performance in reading will increase student achievement and provide an effective learning environment for the teacher. In addition, considering that students can perform readings depending on their internal and external reading motivations, it is important to determine which motivation sources students with mental retardation need for reading and comprehension process during puberty period.

Method

Subjects and Environment

This study consisted of three students with mental retardation. They were selected from three special education classes in a lower secondary school in Ankara. Some criteria were considered to recruit the students. These criteria include; a) they should be attending lower secondary school, b) their maximum reading speed should be in the second grade level norm (read 30-80 words per minute) (Erden, Kurdoğlu, & Uslu, 2002; Rasinski, 2010), c) they should read at least 90% of the text correctly and without spelling, d) their reading comprehension level should be 50% or less (Halladay, 2012).

In order to recruit the students, first, special education class teachers were interviewed to determine whether the students met the criteria. The teachers reported five students who could read and whose reading level was at the second grade level. Second, the number of words that the five students read per minute, the error percentages in the text and their comprehension level were determined through a text written at the second grade level (Güzel Özmen, 2001). Finally, it was asked whether the students were regularly attending the school or not, and those who were regularly

attending were recruited. Then, the researcher arranged a session in which necessary preconditions were evaluated. During the interviews, five students were not selected for the study because four of them spelled more than 10% of the text while other student read more than 10% of the text incorrectly. As a result, three students in special education classes of the same school selected for the study. Parents of the participants were informed about the treatment and written permissions were taken for students to participate in the study. Table 1 shows the demofigure features of the participants.

Tablo1. Demofigure Features of the Participants

Participant	Sex	Age	Retardation Type
Participant 1	Male	15 years, 3 months	Mental Retardation
Participant 2	Female	16 years, 4 months	Mental Retardation
Participant 3	Female	15 years, 8 months	Mental Retardation

Participant 1 (15 years, 3 months) was a male student with mild mental retardation. He was attending special education class at a lower secondary school. He could read 90% of the 2nd grade level text correctly and 95% of it without spelling. His correct number of words per minute was 36. He did not attend any rehabilitation center and benefit from special education services. His teacher stated that he had been studying for four years.

Participant 2 (16 years, 4 months) was a female student with mild mental retardation. She was attending special education class at a lower secondary school. She could read 90% of the 2nd grade level text correctly and 90% of it without spelling. Her correct number of words per minute was 31. She did not attend any rehabilitation center and benefit from special education services. Her teacher stated that he had been studying for three years.

Participant 3 (15 years, 8 months) was a female student with mild mental retardation. She was attending special education class at a lower secondary school. She could read 90% of the 2nd grade level text correctly and 90% of it without spelling. Her correct number of words per minute was 75. She did not attend any rehabilitation center and benefit from special education services. Her teacher stated that he had been studying for three years.

The application process of the study was carried out in the support training room of the school. A voice recorder was available in the room to record all sessions and to calculate the observer and application reliability. All sessions were held by the first author on weekdays at 09: 30-11: 30, as one session per day.

Materials

Stories that students had never read before were chosen among the story sets written in accordance with first and second grade level (Güzel Özmen, 2001). Two texts for the starting level and two texts for each treatment technique were randomly selected from this set. Stories were single-event stories written according to Stein and Glenn's story structure. Texts were written in 16 point, Comic Sans MS was used as a font and the stories consisted of 115 words on average.

Twelve stories were used in the BEA process while 16 stories were used in the EA process. Considering the common use of Times New Roman in textbooks and the similarity of the Verdane character to the Turkish language characters, both characters were utilized in the materials to be used in the study. In this context, the stories were presented to the participants in both characters after they were cleared of pictures. The points in the textbooks of the participants were taken into consideration while determining the type size. The texts were prepared in 10 and larger point sizes for the fifth grade. All of the stories were written in 1, 5 line spacing and 14 point size. The stories to be used at the baseline and treatment conditions were selected by random sampling method.

Comprehension questions were developed by Güzel_Özmen (2001). Eight comprehension questions were developed for each of the selected 28 stories (Güzel Özmen, 2001). The reading comprehension questions were developed for story elements such as heroes, place, time, problem, intervention, outcome of the intervention and reaction in the story. Stories and reading comprehension questions are assigned randomly for each experiment condition.

Research Design and Application

In this study, Brief Multi-Element Design was applied in BEA process and Alternating Treatment Design was used to test BEA results in EA process. After the two most effective treatment techniques for each subject were determined by BEA, Alternating Treatment Design was used to test BEA results with EA. While alternating treatment design was applied, effective treatments were applied alternately.

In BEA process, first, the baseline data was taken once. The application order of the treatment techniques was ranked from the easiest applied one to the most difficult applied one. Before starting the application, the treatment techniques were explained to the subjects according to their characteristics.

At the stage of determining the *baseline*, the researcher told the student: "Read this text aloud and I will follow you from my own text, I also want you to answer the reading comprehension questions prepared for this story, try your best." Then, the student read whole story aloud once, and the researcher pointed out the word that the student reached after one minute in his story. In addition, the researcher noted the words the student read incorrectly in a minute. The researcher then asked the student about the comprehension questions related to the story and asked the student to answer the questions. Based on the student's answers, he recorded the correct and incorrect answers of the student to the answer key. When the student answered each question in the comprehension test, the researcher did not give any feedback on the correctness and inaccuracy of the questions. After the student had read the story and answered the comprehension questions, the researcher reinforced the student's work behaviors (e.g., you worked very well today).

In the *listening passage preview (LPP) intervention technique*, the text that the student and the researcher had was first read by the researcher in a clear and understandable way, and then the student was asked to read the text. At the end of the student's reading, the number of correct and false words was recorded by the researcher. After the story was read by the student, the comprehension process was repeated in the listening passage preview process as in the baseline.

In the *repeated reading (RR) intervention technique*, the text was read by the student three times. At the end of the third reading of the student, the number of true and false words the student read per minute was recorded by the researcher. Immediately after the reading process, the comprehension process was applied as explained at the beginning level.

In the *listening passage preview + repeated reading (LPP + RR) intervention technique*, the text was in front of both the student and the researcher. During the application, the text was first read by the researcher in a clear and understandable way, in accordance with the reading speed of the student, then the student was asked to read the same text three times. After the third reading, the researcher recorded the number of correct and incorrect words read per minute. Immediately after the student completed reading, students' answers were recorded by asking comprehension questions and the study was terminated.

In the *Intrinsic motivation + Listening passage preview + repeated reading (IM + LPP + RR) technique*, before the student started reading the text, the researcher talked on themes of interest and curiosity from studies involving various themes (e.g., I love nature, I want to be a good person, I want to be a good student, I love my family and my friends, I want to be healthy, I love to share, collaborate and

help) and the researcher determined the student's interest and curiosity about subjects by asking them the following questions: *Which texts are interesting for you? Can you tell me more about what's interesting for you? Do you often read about this topic? Which texts are exciting or mysterious for you?* (Guthrie et al., 2007). After the topics which the student liked to read were determined, the students were asked to select the text which they wanted to read. Then, the text chosen by the student was read by the researcher in a clear and understandable way and then the student was asked to read the text three times. At the end of the student's third reading, the number of true and false words the students read per minute was recorded by the researcher. After the reading process was completed, the researcher asked the comprehension questions to the students verbally without wasting any time, recorded the answers of the student after each answer and terminated the study when the questions were finished.

In the *Extrinsic motivation + Listening passage preview + repeated reading (EM + LPP + RR) technique*, before the student started reading the text, the researcher gave verbal incentives to enable the student to be extrinsically motivated. These incentives were given according to the following variables: Competition (you can be the first among your friends in reading by giving more accurate answers to questions related to reading and reading speed), recognition (your friends will know you're a good reader), adaptation (you can do your reading-related homework assignments exactly as the teacher wished), and social (they will see what a good reader you are when you meet with your friends and tell them what you read). After the student was encouraged to read, the text was read by the researcher in a clear and understandable way in accordance with the reading speed of the student, and then the student was asked to read the text three times. At the end of the student's third reading, the number of true and false words the students read per minute was recorded by the researcher. Just like the other interventions, the researcher asked the comprehension questions verbally and terminated the study by recording the student's answers, immediately after the reading process.

BEA process lasted 6 weeks for three participants. EA process of the application lasted 2 weeks for three participants. The pre-evaluation of the research, BEA, and EA stages lasted for 2 months. In BEA process, intervention or intervention packages were applied to the participants from the easy to the difficult respectively. In the application, the baseline was 5-6 minutes, LPP was 6-8 minutes, RR was 12-14 minutes, LPP + RR was 16-18 minutes, IM + LPP + RR was 25 minutes, EM + LPP + RR was 25 minutes. In EA process, two techniques / packages which were effective for the participants were applied alternately. The goal of EA applications was to find the most effective intervention / package for each participant. EA process was applied until the difference between treatments was determined.

Dependent Variables and Data Collection

The correct words read per minute and the correct answers of reading comprehension questions were the dependent variables of the study. For collecting data, the story was read aloud. The timer was started as soon as the student read the first word. The researcher marked the related place where the student was staying after one minute for the student to read and finish the text to the end, and calculated the number of words the student read correctly and incorrectly by recording the reading speed on the recording chart. The correct number of words read by the student in one minute was calculated by subtracting the number of incorrectly read words from the total number of words read in one minute. This calculation was based on the criteria determined by Shinn (1989). According to the criteria, when the student skipped a line while reading, the line was shown to the student, and the student was asked to continue reading. If the student could not read a word within three seconds, the researcher read the word and asked the student to continue reading. The word that student read incorrectly, that the student couldn't read within three seconds, that the student skipped, that the researcher read instead of the student was considered as a misread word. If the student read a word incorrectly at first, but corrected it within three seconds, the word was considered as a correctly read word. The words added by the student were not assessed (Shinn, 1989). After the student read the story, the researcher asked

the comprehension questions developed for the story to the student verbally and recorded the student's verbal responses. He did not intervene to extend the student's response. Each comprehension test consists of open-ended questions about specific events in the story (place, time, etc.). Comprehension questions required remembering the details or events that are clearly mentioned in the story (e.g., *what did Uncle Solomon see when he walked towards the direction where the sound was coming? Say*). The student's answers were matched with those in the answer key; the unanswered and incorrectly answered questions were scored as incorrect.

Data Analysis

In this research, the data in the brief multi-element and alternating treatment designs were interpreted visually. The slope and level of the data in the graphs were examined (Tawney & Gast, 1984). The intervention technique and the intervention package, in which the targeted behavior data generated a higher curve, were interpreted more effectively. In this research, the results of BEA and EA were discussed separately. While the level of data points in sessions were compared in the BEA results, the slope and the level in the sessions were compared in the EA results. In determining that the treatment technique applied in the BEA process was more effective than other treatment techniques, the levels of data obtained in one treatment condition were compared with the height of data obtained in other treatment conditions. All conditions were reapplied to ensure the most effective treatment condition in the BEA process. In the BA results, in addition to the data level, the data slope obtained in one treatment session was compared based on the verticality of the data obtained in the other treatment session. Thus, it was decided that the higher level and steeper slope were more effective (Gast, 2010).

Inter-Rater Reliability and Application Reliability

Inter-rater reliability was calculated for 18 (60%) of 60 treatment conditions in order to determine the number of correct and incorrect words read per minute. Random sampling method was used for selecting the treatment conditions. Rater (observer) is a PhD student in special education. He was not given any training since he had previously done research on reading fluency and reading comprehension. The stories and reading records of the 18 sessions were given the rater and he was asked to listen to the student's reading and to mark both the place where the student read in one minute and the incorrectly read words. In each story, the words which were reported as incorrect by the researcher and the rater were calculated via "Consensus / [consensus + dissensus] X 100" (House, House, & Campbell, 1981). Inter-rater reliability, which was performed for determining the number of correct and incorrect words read by each participant in one minute, was found to be 99%, 97% and 100% for Participant 1, Participant 2, and Participant 3 respectively. In addition, inter-rater reliability was calculated for 18 (30%) of 60 treatment conditions in order to identify correct and incorrectly answered reading comprehension questions. The observer marked the answer of each student independently of the researcher and concurrently according to previously prepared reading comprehension answer key. Inter-rater reliability was calculated based on answers marked as correct and incorrect by the researcher and the observer. In each comprehension test, the correct and incorrect answers of the researcher and the observer was calculated via "Consensus / [consensus + dissensus] X 100" (House et al., 1981). Inter-rater reliability was found to be 100% for all three participants.

Application reliability was calculated for 18 (30%) of 60 treatment sessions. To determine whether the researcher applied the interventions appropriately to the subjects in these sessions, the rater was provided a checklist that was prepared to contain every stage of the intervention conditions and the rater was asked to mark each phase of intervention applied by the researcher. Application reliability was calculated by using "observed practitioner behavior / planned practitioner behavior x 100 (Billingsley, White, & Munson, 1980). Application reliability was found 100% for each intervention technique / package.

Results

Figure 1 presents the baseline of Participant 1 in the BEA and EA processes and the number of correct words he read in one minute in treatment conditions and his correct answers to reading comprehension questions.

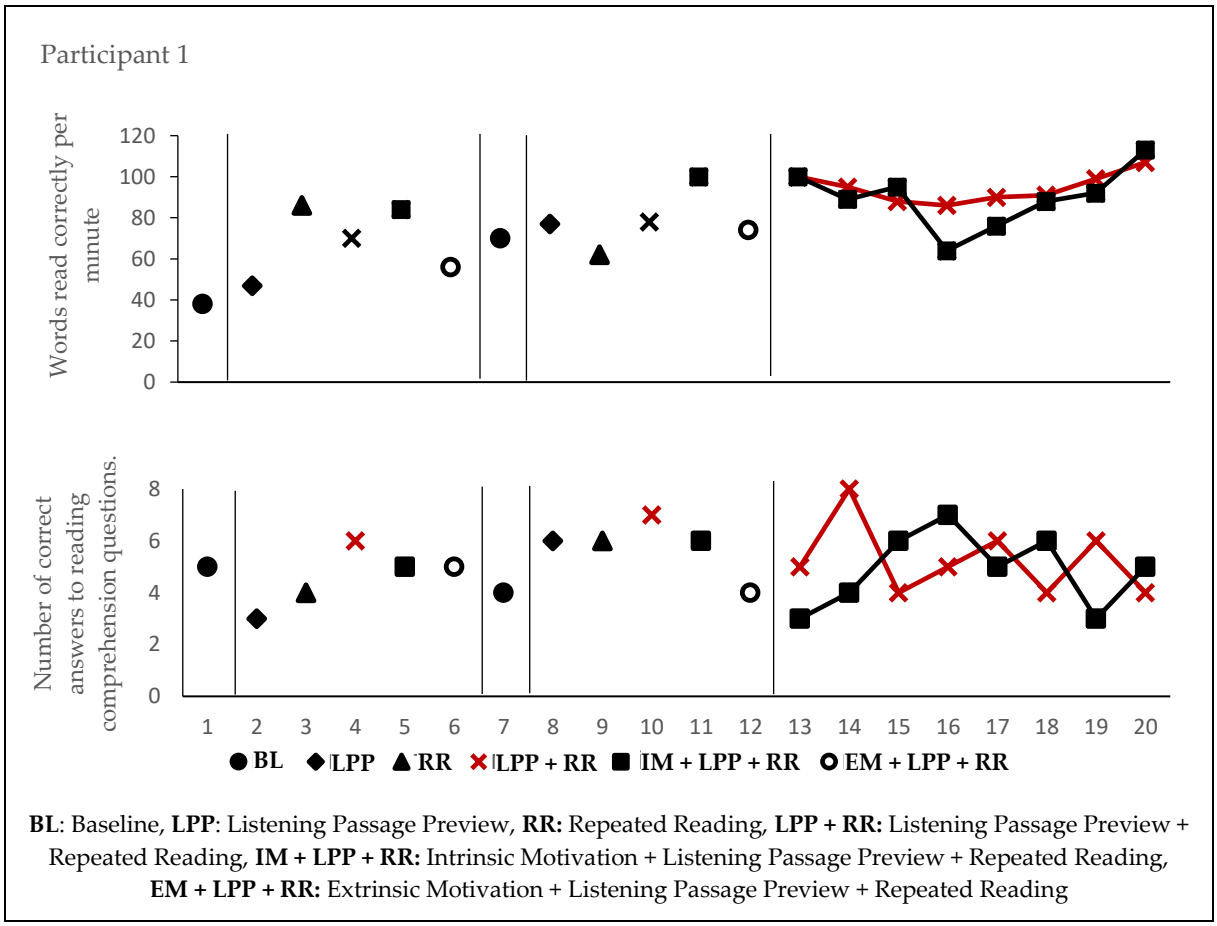


Figure 1. The baseline of Participant 1 in the BEA and EA processes and the number of correct words he read in one minute in treatment conditions and his correct answers to reading comprehension questions.

Considering the baseline of Participant 1 in BEA process, he read 38 and 70 words per minute respectively, and answered 5 and 4 reading comprehension questions respectively. When the data points were compared in Figure 1, the data points at the highest level were under the condition of IM + LPP + RR and the second highest data points were under the condition of LPP + RR. Among combined treatment packages, IM + LPP + RR. was found to be the most effective treatment condition in increasing the reading speed in Participant 1.

Compering the first participant's level of the data paths concerning reading fluency in BEA process, except for the first, third and last sessions, the data obtained in the LPP + RR condition was higher than the IM + LPP + RR condition. Considering the slope, the slope of the data path varied. While an increase was found in slope in LPP + RR condition after the fourth session, there was a decrease in slope in the second and fourth sessions under the condition of IM + LPP + RR. When the level of data paths related to the correct answers given reading comprehension questions was compared, an increase in slope was noted in the first and second sessions in LPP + RR condition; this slope decreased in the third session, and an upward slope was observed until the fifth session, and then the slope varied. In the IM + LPP + RR condition, there was an increase in the slope until the fourth session, but a decline in

the fifth and seventh sessions, then an increase in slope was noted in the sixth and eighth sessions. The techniques that were effective in increasing the reading speed and reading comprehension of Participant 1 during the BEA process were also effective in the EA process. According to these results, the EA results confirmed the BEA results.

Figure 2 presents the baseline of Participant 2 in the BEA and EA processes and the number of correct words he read in one minute in treatment conditions and his correct answers to reading comprehension questions.

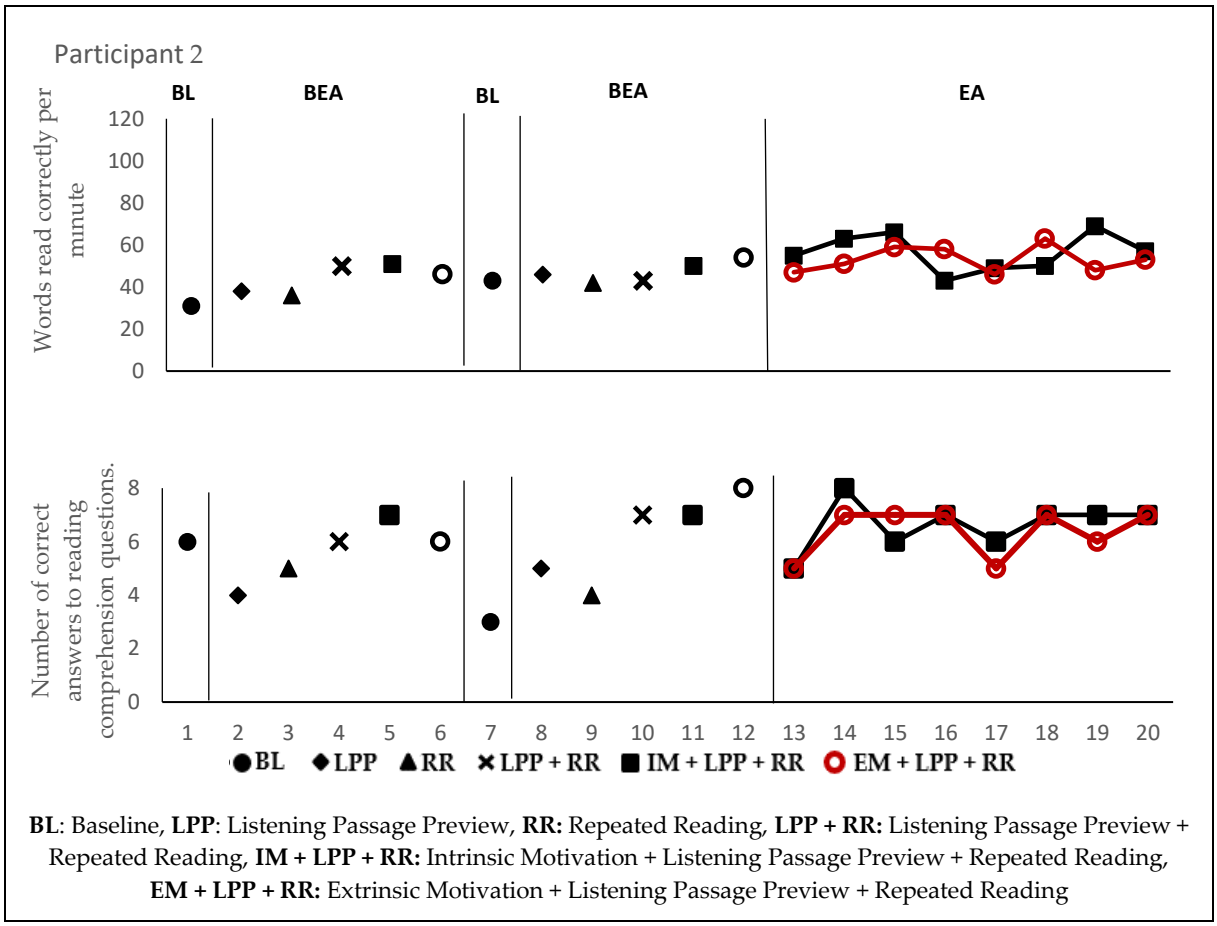


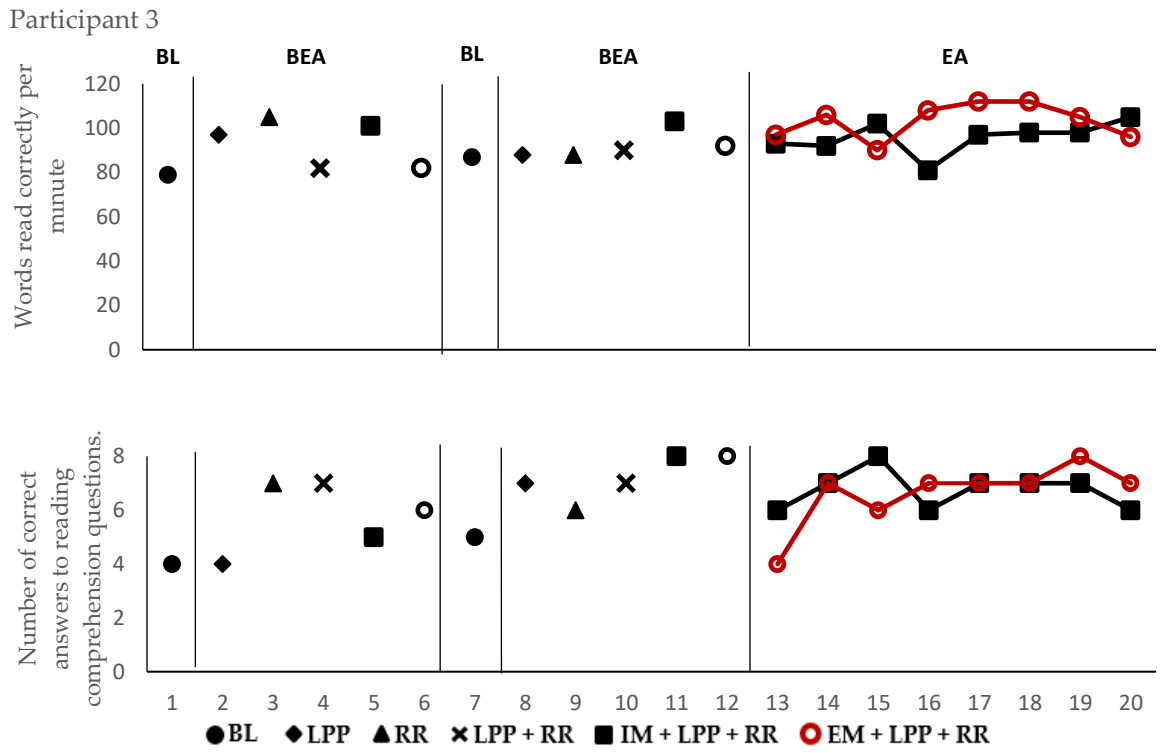
Figure 2. The baseline of Participant 2 in the BEA and EA processes and the number of correct words he read in one minute in treatment conditions and his correct answers to reading comprehension questions.

Considering the baseline of Participant 2 in BEA process, she read 31 and 43 words per minute respectively, and answered 6 and 3 reading comprehension questions respectively. When the data points were compared in Figure 2, the data points at the highest level were under the condition of IM + LPP + RR and the second highest data points were under the condition of EM + LPP + RR. Among combined treatment packages, IM + LPP + RR was found to be the most effective treatment condition in increasing the reading speed in Participant 2.

Compering the second participant's level of the data paths concerning reading fluency in EA process, except for the fourth and sixth sessions, the level of data path of IM + LPP + RR, one of the most effective condition, was observed to be higher than the second treatment condition (EM + LPP + RR). Considering the slope, the slope of the data path varied. A decrease was observed in IM + LPP + RR condition in the fourth session, but there was an increase in other sessions; in the EM + LPP + RR condition, a decrease in slope was observed in the fifth and seventh sessions. When the level of data

paths related to the correct answers given reading comprehension questions was compared, except for the second, third, fifth and seventh sessions, both cases shared similar findings; it demonstrated a constant slope when the slope was compared. In the EM + LPP + RR condition, there was an increase in the slope in the first session but a fixed slope was observed in subsequent sessions. The techniques that were effective in increasing the reading speed and reading comprehension of Participant 2 during the BEA process were also effective in EA process According to these results, EA results confirmed BEA results.

Figure 3 presents the baseline of Participant 3 in the BEA and EA processes and the number of correct words he read in one minute in treatment conditions and his correct answers to reading comprehension questions.



BL: Baseline, **LPP**: Listening Passage Preview, **RR:** Repeated Reading, **LPP + RR:** Listening Passage Preview + Repeated Reading, **LPP + RR + IM:** Listening Passage Preview + Repeated Reading + Intrinsic Motivation, **LPP + RR +EM:** Listening Passage Preview + Repeated Reading + Extrinsic Motivation

Figure 3. The baseline of Participant 3 in the BEA and EA processes and the number of correct words he read in one minute in treatment conditions and his correct answers to reading comprehension questions.

Considering the baseline of Participant 3 in BEA process, she read 79 and 87 words per minute respectively, and answered 4 and 5 reading comprehension questions respectively. When the data points were compared in Figure 3, the data points at the highest level were under the condition of IM + LPP + RR and the second highest data points were under the condition of EM + LPP + RR. Among combined treatment packages, IM + LPP + RR was found to be the most effective treatment condition in increasing the reading speed in Participant 3.

When the third participant's level of the data paths concerning reading fluency in EA process was compared, except for the third and eighth sessions, the level of data path of EM + LPP + RR, one of the most effective condition, was observed to be higher than the second treatment condition

(IM + LPP + RR). Considering the slope, the slope of the data path varied. There was an increase in the slope in IM + LPP + RR condition until the fourth session, but a decline was observed in the fourth session, then an increasing slope was observed until the last session. In the EM + LPP + RR condition, an increase in slope was observed up to the third session, but there was a decrease in the slope in third session; then an upward slope was observed until the last two sessions. When the level of data paths related to the correct answers given reading comprehension questions was compared, except for the first and third sessions, the level of data path obtained in the EM + LPP + RR condition was higher. In addition, in the second, fifth and sixth sessions, it was observed that the students responded to the same number of reading comprehension questions in both the most effective conditions. Considering the slope, an upward slope was observed in IM + LPP + RR condition until the fourth session; this slope decreased in the fourth and eighth sessions and a stable slope was observed in other sessions. In the EM + LPP + RR condition, there was a decrease in slope in the third session, but an increasing slope was observed in all subsequent sessions. The techniques that were effective in increasing the reading speed and reading comprehension of Participant 3 during BEA process were also effective in the EA process According to these results, EA results confirmed BEA results.

Discussion

This study aimed to determine to what extent skill and performance based interventions and intervention packages affect the reading fluency and comprehension of the students with mental retardation and to test the results of BEA with EA.

In the study, IM-LPP-RR treatment package, which is one of the combined packages of skill- and performance-based techniques, was found to be effective in increasing the reading fluency levels of Participant 1 and Participant 3, whereas EM-LPP-RR was effective in Participant 2. This result confirms literature which reports that most students with reading difficulties at lower secondary level benefit most from interventions involving more than one component (Lewis-Lancaster & Reisener, 2013; Roberts et al., 2008; Wilber & Cushman, 2006). Another finding was the differentiation of the interventions that increase the students' fluency. This result supports the results of national and international studies (Cates et al., 2006; Güzel Özmen, 2011; Orçan & Özmen, 2012). The results obtained in BEA process may be due to individual differences and / or requirements of the students. Therefore, it is important to arrange teaching methods and interventions according to the individual needs of students (Eckert et al., 2000).

The study findings indicated that IM-LPP-RR intervention package was effective in increasing the reading fluency levels of Participant 1 and Participant 3. That participants chose the texts they would read in accordance with their interests and curiosities might increase their desire to read and their commitment to skill (Kern et al., 1998). The choice making of materials or interventions by the student has normally been more effective in increasing the performance (Atbaşı & Sanır, 2018; Daly et al., 2006b; Carson & Eckert, 2003; Kern et al., 1998). This result is consistent with the literature suggesting that motivation could play an important role in the reading skills of lower secondary school students and that motivation could be used with skill-based techniques (Lewis-Lancaster & Reisener, 2013; Wilber & Cushman, 2006). In Participant 2, EM-LPP-RR treatment technique was found to be effective technique. The effectiveness of this intervention package in Participant 2 may be indicated that the participant needed a source of extrinsic motivation. Pre-application verbal incentives which were provided to increase the participant's extrinsic motivation became effective, such as *you can be the first among your friends in reading by giving more accurate answers to questions related to reading and reading speed* (competition), *your friends will know you're a good reader* (recognition), *they will see what a good reader you are when you meet with your friends and tell them what you read* (social), and *you can do your reading-related homework assignments exactly as the teacher wished* (adaptation). Extrinsically motivated students read to be recognized, encouraged or to win another award (Guthrie et al., 1999). In their BEA study, Wilber

and Cushman (2006) reported that extrinsic motivation-repeated reading- pre-listening of the text intervention package was the most effective intervention in increasing student's reading fluency. The results of this study support the findings of Wilber and Cushman (2006).

Another point to be emphasized in the study is the degree to which the participants reflect their reading fluency and their reading comprehension skills. Examining the answers of the participants to the reading comprehension questions with the number of words they read in the intervention conditions, it was seen that the interventions which were effective in increasing the number of words that Participant 2 and Participant 3 read and the number of correct answers to reading comprehension questions were found to be the same. In this case, it can be stated that if reading fluency increased, reading comprehension increased as well. Moreover, it can be said that the outcomes obtained for reading fluency were related to those in reading comprehension. This result confirms some research findings of BEA (Cates et al., 2006; Nikanowicz, 2009). However, this situation was different in Participant 1. IM-LPP-RR, which was the most effective intervention in increasing the number of words that Participant 1 read in one minute, did not show the same effect in reading comprehension process. The biggest increase in the reading comprehension level of Participant 1 occurred in the RR-LPP condition. This supports the findings reported by Cates et al. (2006) and Nikanowicz (2009). The effectiveness of RR-LPP during the first participant's reading comprehension process shows that the participant needed more practice to understand the information units in the text. The biggest increase in the reading comprehension level of Participant 2 happened in the EM-LPP-RR condition. This result shows that the second participant needed encouragement, application and modeling in the reading comprehension process. The biggest increase in reading comprehension level of Participant 3 was realized in the EM-LPP-RR and IM-RR-LPP conditions. This result indicates that Participant 3 needed to be encouraged as well as to read the texts he selected in line with his / her interest and curiosity. Researchers suggest that both intrinsic and extrinsic motivation can coexist, in other words, they can support each other (Covington & Mueller, 2001). Based on these findings, it should not be recommended that interventions that improve reading fluency are the best intervention to increase reading comprehension and that would have the same effect at the next intervention stage. As mentioned above, the interventions that were effective in increasing the participants' reading fluency differentiated and it was the same case for reading comprehension. This finding shows consistency with other studies in the literature (Cates et al., 2006; Nikanowicz, 2009), indicating that BEA can be used for reading comprehension skills.

Another aim of the study was to test the accuracy of the data obtained in BEA process with EA. The results of the study showed that the two most effective interventions determined by BEA were also found to be effective in EA process. This supports other research results (Daly et al., 2002; Daly, Bonfiglio, Mattson, Persampieri, & Foreman-Yates, 2006a; Orçan & Özmen, 2012). The results indicate that the reading fluency of the students in EA process increased when compare to BEA process. Daly et al. (2002) stated that students' reading performance increased during EA process. When EA data about the participants' reading comprehension skills were examined, there was a decreasing slope in the reading comprehension level of the first participant in the RR-LPP condition. This result is consistent with the study findings showing that the fluency interventions based on repeated reading did not affect reading comprehension skills (Scammacca et al., 2007). When the second and third participants' answers to the reading comprehension questions in the EA process were examined, an increase was observed in participants' comprehension level; the data of most effective two intervention condition selected for Participant 2 was observed to overlap in the fourth, sixth and eighth sessions while the data of the most effective two intervention condition selected for Participant 3 was observed to overlap in the second, fifth and sixth sessions. This may be due to the limited number of comprehension questions and their similar structures. Allowing the effect of the most effective two intervention conditions chosen for the student happen in EA process may be another reason this situation.

Based on the study results, it can be said that students with reading difficulties at lower secondary level need both intrinsic and extrinsic reading motivation as well as skill-based interventions to increase their reading fluency and reading comprehension skills. Unlike BEA studies conducted on reading fluency and reading comprehension, in the current study, the effect of both intrinsic and extrinsic reading motivation was tested separately with skill-based techniques and it was seen that the reading fluency and reading comprehension of the lower secondary school students were affected by both types of motivation. In this respect, the study has expanded the literature on reading studies with BEA. However, this study has some limitations. The first is that students' reading comprehension was not tested with standardized reading comprehension tests appropriate to the class level and the limited number of comprehension questions used to measure reading comprehension skills. Second, the study sample consisted of three 8th grade students with mild mental retardation in the special education class. Further research can be performed with students in different disability groups (learning disability, attention deficit and hyperactivity disorder, behavior disorder and normal development). Third, the impact of interventions can be tested at different grade levels and with more student groups. Finally, rather than simply giving place to interventions that increase reading fluency, the impact of interventions that include processes (for example, strategy use) to enable the reader to interact with the text in the process of reading comprehension can be tested in BEA research.

Despite some limitations, this study provides a basis for researchers and practitioners interested in the assessment of reading fluency and reading comprehension. It is very vital to determine the interventions that are effective for lower secondary school students in the risk group in a short time period and to prepare the curriculum according to their individual needs. BEA, which is a scientific-oriented assessment method, is thought to be a guide for researchers and teachers in terms of selecting a specific intervention or intervention package and planning the teaching accordingly. In addition, it is thought that the study will help teachers to support not only students' cognitive processes but also their motivational components in the general environment of the school, in the classroom or in the teaching process. BEA is an alternative method that facilitates the choice making of intervention for students who do not make enough progress and who could not reach the same reading level of their peers. Therefore, it is recommended that researchers and teachers should include the BEA process to increase their students' reading fluency and comprehension level.

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