Investigation of the Science Individualized Education Programs’ Learning Outcomes According to the Revised Bloom Taxonomy

The aim of this study is to determine whether the learning outcomes in individualized education programs have any learning outcome value, whether they are included in the science education curriculum, and how the learning outcomes are distributed according to the revised Bloom taxonomy knowledge and cognitive process dimension levels. For this purpose, the IEPs from 49 science teachers working in 7 different regions of Turkey which they prepared at the 5th, 6th, 7th and 8th grade levels were requested and analyzed using the document analysis method. It was concluded as a result of the analyzes that, 6% of the learning outcomes in the IEPs did not have any learning outcome value, and that 55% of the 2883 learning outcomes that had a learning outcome value consisted of those included in the science education curriculum. It was determined that the learning outcomes in the IEPs were at the level of conceptual knowledge at the most and at the level of meta-cognitive knowledge at the least from the knowledge dimension levels of RBT. Additionally, they were at the understanding level at the most and at the creating and evaluating level at the least from cognitive process dimension levels of RBT.

Keywords: Individualized education program, science course, learning outcomes, revised Bloom taxonomy

Introduction

Ministries of National Education of countries set different aims in terms of education. One of the main aims of Turkish National Education is "to prepare individuals for life by ensuring that they have professions which will make them happy and contribute to the welfare of the society through equipping them with the necessary knowledge, skills, attitude and habit of working cooperatively in line with their own interests, talents and abilities." (Ministry of National Education [MoNE], 2017). This aim is closely related to each student involved in education and training. Every student, whether they have any disabilities or not, are being included in the main aims of education. That being said, students with disabilities are mostly included within the scope of special education (Kızılaslan & Sözbilir, 2017).

While special education aims to minimize the inadequacy between students with disabilities and their normal peers, it also aims to maximize the knowledge and talents of gifted students (Yell, 1998). Carrying out the special education in the least restrictive environment, instead of keeping students with special needs apart from those with normal development, enables these students to interact better with their peers and helps to integrate them into society (Demir & Kale, 2019; Stubbs, 2008).
Special education is carried out in special education schools and regular schools in Turkey. Such education carried out in regular schools is included within the scope of inclusive education (Altıntaş & Şengül, 2014; Tomlinson, 2017). Inclusive education, which is one of the special education practices, is being shaped according to the requirements of students with special needs. In order for the students included within the scope of inclusive education to learn more effectively and to participate actively in the education, an individualized education program (IEP) should be prepared by taking into account the insufficiencies or sufficiencies of the students (Avcioğlu, 2011; Christle & Yell, 2010). Because the preparation of IEPs for students with special needs and the implementation of these IEPs appear as one of the basic principles of special education (Tekin Ersan & Ata, 2018). Additionally, IEP provides opportunities for students with disabilities to continue their educational activities (Jung, Gomez, Baird & Keramidas, 2008). Therefore, “the current educational performance of the students, short term instructional objectives, annual measurable goals, student assessment methods and additional services” should be established at first for the students who will be included in the IEP (Strickland & Turnbull, 1990). Among these elements, short term instructional objectives are learning outcomes and education for individuals with special needs are provided by taking these learning outcomes into account (Kargin, 2007).

The learning outcomes in the IEPs are very important in terms of addressing the needs of the students and achieving the targeted goals. The performance level of individuals indicates which of the learning outcomes in the curriculum can be achieved (MEB, 2008; Anderson & Krathwohl, 2001). Therefore, the learning outcomes within the IEP should be prepared considering the individual’s development level and insufficiencies (Bhroin, King & Prunty, 2016; Loreman, Deppeler & Harvey, 2010).

The teaching process for the courses in Turkey is carried out in line with the learning outcomes in the curricula (Zorluoğlu, Kızılaslan & Sözbilir, 2016). Learning outcomes are a series of processes that indicate what students will learn and guide the teaching process (Arslan & Eker, 2018). In order to improve this process in terms of quality, it is necessary to evaluate the learning outcomes and to use taxonomies in the evaluation process (Çerçi, 2018). This is because, when taxonomies are used, it is ensured that students gain knowledge at the targeted level (Anderson & Krathwohl, 2001). The revised Bloom taxonomy (RBT) is frequently used in the implementation of science education curriculum and in the evaluation of the processes and the results (Ari, 2015). RBT is extremely essential in terms of determining the knowledge and cognitive process dimension of the learning outcomes, how they are distributed, and directing the curriculum development studies regarding the results (Zorluoğlu, Sahintürk & Bağrıyanlık, 2017).

When the taxonomy articles carried out on the basis of the science curriculum between 2010-2021 are examined, it is seen that the studies on RBT are in the majority. When the content of the articles in which the concepts of RBT and science are together are examined, it is seen that articles related to the
analysis of the learning outcomes of the science education curriculum
(Cangüven, Öz, Binzet & Avcı, 2017; Doğan & Burak, 2018; Güngör Cabbar, Gültekin, Güneş, Aytac & Daşgın, 2020; Sağlamöz & Soysal, 2021; Yaz & Kurnaz, 2017; Yolcu, 2019; Zorluoğlu, Şahintürk & Bağrıyanık, 2017);
analysis of exam questions in science courses (Ataş & Güneş, 2020; Ayvacı & Türkdoğan, 2010; Gökulu, 2015; Tanık & Saraçoğlu, 2011); analysis of common exam questions (Akyürek, 2019; Kala & Çakır, 2016; Karaer, 2020; Özer Keskin & Aydın, 2011); comparison of the original Bloom taxonomy and the revised Bloom taxonomy (Darwazeh & Branch, 2015; Forehand, 2010; Tutkun, Demirtaş, Erdoğan & Aslan, 2010) were the ones that have been generally carried out. When the articles on IEP are examined, it is seen that there are studies including subjects such as the opinions of teachers about IEP (Ateş, 2017; Çimen Öztürk & Eratay, 2010; Evyapan, 2020; Yılmaz & Batu, 2016); Opinions on the preparation/implementation of IEP (Avcıoğlu, 2011; Ayanoğlu & Erdoğan, 2019; Burunsz & İnce, 2020; Heeden et al. 2013; İlik, 2019; Tekin Ersan & Ata, 2018); Examination and evaluation of IEPs (Goodwin et al. 2020; İlik, 2017; Spiel et al. 2014); Difficulties experienced in the preparation process of IEPs (Çıkılı, Gönen, Aslan Bağcı & Kaynar, 2020; Özan & Sarica, 2021; Söğüt & Deniz 2018; Şahin & Gürler, 2018).

When these articles were examined as a whole, it is seen that the learning outcomes in the curricula were being analyzed with taxonomies. However, no article has not been found in the literature in which the concepts of RBT and IEP are used together. The aim of this study is to determine whether the learning outcomes in IEPs have any learning outcome value, whether they are included in the science education curriculum, and how the learning outcomes are distributed according to the RBT knowledge and cognitive process dimension levels. In accordance with this aim, it is believed that the taxonomic analysis of the learning outcomes in the IEPs prepared for inclusive students will provide a more effective science education to the students with special needs and will reveal the current situation regarding the learning outcomes within the IEP.

Method

In this study, document analysis method was used. Document analysis is a method that is based on an in-depth examination of written documents containing facts, events and information related to the research topic and interpretation of the results (Bowen, 2009; Corbin & Strauss, 2008). IEPs prepared by science teachers who have inclusive students are deemed as documents and the learning outcomes in these documents will be analyzed and evaluated, the study was carried out with the document analysis method. In the study, a total of 2883 learning outcomes in IEPs (5th, 6th, 7th and 8th grades) prepared by 49 science teachers in 7 different regions of Turkey were analyzed. In terms of ensuring the generalizability of the study results (Popper, 2005) teachers working in every region of Turkey were preferred.
The analysis of the learning outcomes in the IEPs according to the RBT and whether they have any learning outcome value or not were determined based on the consensus of the researchers. In cases where there was no consensus or the differences of opinion continued, the knowledge and cognitive process dimension of these learning outcomes was decided according to the majority of opinions. While calculating the reliability coefficient of the study, 10% of the analyzed learning outcomes (288 learning outcomes) were randomly selected by the researchers due to the large number of learning outcomes in IEPs. The selected learning outcomes were submitted to the opinion of and analyzed by an expert experienced in the RBT. Upon comparing the analysis made by the expert with the analysis made by the researchers, similarities and differences were determined. Accordingly, the reliability coefficient of the analysis was calculated as .87 using the formula established by Miles & Huberman (1994). It is determined that the analyzes are reliable since the reliability coefficient is greater than .70 (Hruschka, Schwartz, John, Picone-Decaro, Jenkins & Carey, 2004). In addition, the researchers determined how much of the learning outcomes in the IEPs were included in the Science Education Curriculum (MoNE, 2018) and how many were written originally by the teachers.

The noun expression of the learning outcomes were identified by the researchers in order to determine the knowledge dimension of the learning outcomes in IEPs, and verb expressions were identified to determine the cognitive process dimensions thereof and then the RBT level of the learning outcomes was determined (Anderson & Krathwohl, 2001). Examples of how the learning outcomes in the IEPs examined in the study are analyzed according to the RBT and how their place in the taxonomy is determined are presented below. Additionally, an example of a learning outcome that is included in the IEPs but does not have the characteristics of an outcome, an example of an original learning outcome, and an example of an outcome taken from the science education curriculum are presented below.

Since the name expression of the learning outcome of "Explain the effect of friction force on kinetic energy with examples" which is "the effect of frictional force on kinetic energy" is a knowledge that is explained by mutual relations between basic concepts, it is at the conceptual knowledge level among the knowledge dimension levels, and the verb phrase "explain with examples" is at the understanding level among the cognitive process dimension levels, since the concepts are asked to be explained with examples. Since the verb expression of the sentence "The concepts of gene, phenotype, genotype, pure progeny and hybrid progeny are mentioned" does not indicate the knowledge, skills and attitudes that the student will acquire, it does not have any learning outcome value. This outcome is not within cognitive process dimension levels and therefore was not included in the study. While the learning outcome "F.8.1.1.1. Make predictions about the formation of the seasons" is included in the science education curriculum "Tell that there are four seasons in a year" learning outcome is not included in the science curriculum and was originally written by the teacher.
Findings

It is presented with figures whether the learning outcomes in IEPs have any learning outcome value, whether they are included in the science education curriculum, and how the learning outcomes in Turkey and within the regions are distributed according to the RBT knowledge and cognitive process dimension levels and the grade levels across Turkey.

*Figure 1. Whether the Learning Outcomes have any Learning Outcome Value*

Across Turkey

![Chart showing the distribution of learning outcomes across Turkey.](chart.png)

Figure 1 shows whether the learning outcomes in the IEPs have any learning outcome value or not. After examining a total of 3061 learning outcomes, it was determined that 94% of the learning outcomes (2883 learning outcomes) had a learning outcome value, while 6% (178 learning outcomes) did not have any learning outcome value. 24 learning outcomes in the Mediterranean Region; 28 learning outcomes in the Southeastern Anatolia Region; 22 learning outcomes in the Central Anatolia Region; 48 learning outcomes in the Black Sea Region; 19 learning outcomes in the Marmara Region; 29 learning outcomes in the Eastern Anatolia Region and 8 learning outcomes in the Aegean Region have not been included in the analysis as they do not have any learning outcome value.
Upon examining whether or not 2883 learning outcomes with learning outcome value are included in the science education curriculum (MoNe, 2018), it was determined that 45% of the learning outcomes (1283 outcomes) were not included in the curriculum, and 55% (1600 outcomes) were included in the curriculum. When the learning outcomes are analyzed in terms of regions, it is seen that 91 learning outcomes are not included in the science education curriculum in the Mediterranean Region; 220 in the Southeastern Anatolia Region; 155 in the Central Anatolia Region; 318 in the Black Sea Region; 236 in the Marmara Region; 150 in the Eastern Anatolia Region; and 113 in the Aegean Region.
Figure 2. Distribution of Learning Outcomes in Turkey and the Regions by Knowledge Dimension

16% of the learning outcomes across Turkey are the factual knowledge, 61% are the conceptual knowledge, 17% are the procedural knowledge and 6% are the meta-cognitive knowledge level. When the learning outcomes are analyzed regionally; it is seen that: 11% of the learning outcomes in the Mediterranean Region are the factual knowledge level, 59% of them are the conceptual, 23% of them are the procedural and 7% of them are the meta-cognitive knowledge level; 20% of the learning outcomes in the Southeastern Anatolia Region are the factual knowledge level, 59% are the conceptual knowledge level, 14% of them are the procedural and 7% of them are the meta-cognitive knowledge level; 17% of the learning outcomes in the Central Anatolia Region are the factual knowledge level, 60% of them are the conceptual, 18% of them are the procedural and 5% of them are the meta-cognitive knowledge level; 21% of the learning outcomes in the Black Sea Region are the factual knowledge level,
64% of them are the conceptual, 9% of them are the procedural and 6% of them are the meta-cognitive knowledge level; 15% of the learning outcomes in the Marmara Region are the factual knowledge level, 63% of them are the conceptual knowledge level, 17% of them are the procedural knowledge level and 5% of them are the meta-cognitive knowledge level; 14% of the learning outcomes in the Eastern Anatolia Region are the factual knowledge level, 59% of them are the conceptual level, 19% of them are the procedural and 8% of them are the meta-cognitive knowledge level; 13% of the learning outcomes in the Aegean Region were the factual knowledge level, 58% of them are the conceptual, 22% of them are the procedural and 7% of them are meta-cognitive knowledge level.

Figure 3. Distribution of Learning Outcomes in Turkey and the Regions by Cognitive Process Dimension

The distribution of the analysis of the learning outcomes according to the cognitive process dimension of RBT within Turkey and regions is shown in Figure 4. 26% of the learning outcomes across Turkey are the remembering level, 38% of them are the understanding level, 12% are the applying level, 15% are the analyzing level, 5% are the evaluating level and 4% of them are the creating level. When the learning outcomes are analyzed regionally; it is seen that: 19% of the learning outcomes in the Mediterranean Region are the remembering level, 41% of them are the understanding level, 11% of them are the applying level, 16% of them are the analyzing level, 7% of them are the evaluating level and 6% of them are the creating level; 30 of the learning outcomes in the Southeastern Anatolia Region are at the remembering level, 35% of them are the understanding level, 12% of them are the applying level,
14% of them are the analyzing level, 6% of them are the evaluating level and 3% of them are the creating level; 27% of the learning outcomes in the Central Anatolia Region are the remembering level, 35% of them are the understanding level, 14% of them are the applying level, 15% of them are the analyzing level, 5% of them are the evaluating level and 4% of them are the creating level; 31% of the learning outcomes in the Black Sea Region are the remembering level, 41% of them are the understanding level, 9% of them are the applying level, 12% of them are the analyzing level, 3% of them are the evaluating level and 4% of them are the creating level; 28% of the learning outcomes in the Marmara Region are the remembering level, 39% of them are the understanding level, 11% are the applying level, 13% are the analyzing level, 5% of them are the evaluating level and 4% of them are the creating level; 22% of the learning outcomes in the Aegean Region are the remembering level, 37% of them are the understanding level, 14% are the applying level, 18% are the analyzing level, 4% are the evaluating level and 5% of them are the creating level.

Figure 4. Knowledge Dimension Distribution of Learning Outcomes by Grade Levels in Turkey

The distribution of the learning outcomes according to the grade levels across Turkey and the knowledge dimension of the RBT is shown in Figure 5. When we look at the distribution of learning outcomes at Grade 5 level across Turkey according to knowledge dimension, it is seen that: 74 learning outcomes are the factual knowledge level, 231 learning outcomes are the conceptual knowledge level, 126 learning outcomes are the procedural knowledge level, and 40 learning outcomes are the meta-cognitive knowledge level. When we look at the distribution of learning outcomes at Grade 6 level in Turkey according to knowledge dimension, it is seen that: 112 learning
outcomes are the factual knowledge level, 527 learning outcomes are the conceptual knowledge level, 185 learning outcomes are the procedural knowledge level, and 51 learning outcomes are the meta-cognitive knowledge level; When we look at the distribution of learning outcomes at Grade 7 level in Turkey according to knowledge dimension, it is seen that: 80 learning outcomes are the factual knowledge level, 468 learning outcomes are the conceptual knowledge level, 114 learning outcomes are the procedural knowledge level, and 25 learning outcomes are the meta-cognitive knowledge level; When we look at the distribution of learning outcomes at Grade 8 level in Turkey according to knowledge dimension, it is seen that: 186 learning outcomes are the factual knowledge level, 519 learning outcomes are the conceptual knowledge level, 74 learning outcomes are the procedural knowledge level, and 71 learning outcomes are the meta-cognitive knowledge level.

Figure 5. Cognitive Process Dimension Distribution of Learning Outcomes by Grade Levels in Turkey

The distribution of learning outcomes across Turkey by grade levels and cognitive process dimension of RBT is shown in Figure 6. When we look at the distribution of learning outcomes at Grade 5 level across Turkey according to cognitive process dimension, it is seen that: 95 learning outcomes are the remembering level, 110 learning outcomes are the understanding level, 96 learning outcomes are the applying level, 83 learning outcomes are the analyzing level, 48 learning outcomes are the evaluating level, and 39 learning outcomes are the creating level; When we look at the distribution of learning outcomes at Grade 6 level across Turkey according to cognitive process
dimension, it is seen that: 179 learning outcomes are the remembering level, 390 learning outcomes are the understanding level, 97 learning outcomes are the applying level, 123 learning outcomes are the analyzing level, 44 learning outcomes are the evaluating level, and 42 learning outcomes are the creating level; When we look at the distribution of learning outcomes at Grade 7 level across Turkey according to cognitive process dimension, it is seen that: 129 learning outcomes are the remembering level, 297 learning outcomes are the understanding level, 78 learning outcomes are the applying level, 126 learning outcomes are the analyzing level, 40 learning outcomes are the evaluating level, and 17 learning outcomes are the creating level; When we look at the distribution of learning outcomes at Grade 8 level across Turkey according to cognitive process dimension, it is seen that: 350 learning outcomes are the remembering level, 293 learning outcomes are the understanding level, 68 learning outcomes are the applying level, 91 learning outcomes are the analyzing level, 16 learning outcomes are the evaluating level, and 32 learning outcomes are the creating level.

**Conclusion, Discussion and Recommendations**

In this study, examinations are carried out to identify whether the learning outcomes in IEPs have any learning outcome value, whether they are included in the science education curriculum, the knowledge and cognitive process dimension levels of RBT in which the learning outcomes across Turkey and the regions are included, and the distribution of knowledge and cognitive process dimensions according to grade levels throughout Turkey.

When it is examined whether learning outcomes in the IEPs have any learning outcome value or not (Figure 1), it was determined that 6% of them did not have any learning outcome value. Certain criteria have been taken into account while determining whether the learning outcomes have any learning outcome value or not. In his study, Saracaloğlu (2015) stated how the learning outcomes should be prepared and the characteristics that these learning outcomes should have in order for them to be expressed as learning outcomes. Considering the characteristics that must be present in the learning outcomes, the ones in the IEPs that do not have any learning outcome value were not included in the analysis. Since it is known that teachers have a lack of knowledge about preparing IEPs (Burunszuz & İnce, 2020; Christle & Yell, 2010; Gök & Erbaş, 2011; Güzel, 2014; İdin, 2016; Johns, Crowley & Guetzloe, 2002; Kosko & Wilkins, 2009; Lee Tarver, 2006; Lytle & Bordin, 2001; Pektaş, 2008; Şahin, 2017; Tekin Ersan & Ata, 2018; Tike, 2007; Yell & Drasgow, 2005); it is believed that 6% of them are caused by teachers’ lack of knowledge about writing learning outcomes.

Whether the learning outcomes are included in the curriculum or not are shown in Figure 2. In this study, it was determined that the learning outcomes in IEPs mostly consisted of the learning outcomes included within the science education curriculum, and the teachers gave less place to the learning outcomes.
that they prepare themselves. Similarly, Burunsuz and İnce (2020) concluded that teachers tend to use ready-made learning outcomes without taking into account students’ needs. However, the learning outcomes included in the science curriculum are prepared by taking into account the characteristics of students with normal development (Mete, Cross & Yıldırım, 2017). For students with special needs, IEPs should be prepared taking into account their developmental characteristics, educational needs and performance in line with the curriculum (MoNE, 2000). Therefore, since science education cannot be carried out for students with special needs by adhering to the curriculum, it is necessary to revise and edit the learning outcomes in the science education curriculum or to write new learning outcomes in line with the curriculum (Cawley, Hayden, Cade & Kroczynski, 2002). The fact that 55% of the learning outcomes in the examined IEPs consist of the learning outcomes included within the science education curriculum indicates that the learning outcomes are used as they are in the curriculum without any revision or change. Considering the inadequacies of the students, the learning outcomes should not be exactly the same as those within the science education curriculum and the teachers should create original learning outcomes themselves. Therefore, it leads to the conclusion that the learning outcomes in the examined IEPs are prepared without considering the levels of the students.

Upon examining the RBT analysis results of the learning outcomes in the IEPs which are studied focusing across Turkey and on regions, it is observed that the learning outcomes were at the conceptual knowledge level at the most and at the meta-cognitive knowledge level at the least from knowledge dimension levels of RBT. The general distribution of the study according to knowledge dimension levels is similar to the studies in the literature (Ayyıldız, Aydınlı & Nakiboğlu, 2019; Yaşar & Sadi Yılmaz, 2020; Yaz & Kurnaz, 2017; Yolcu, 2019; Zorluoğlu, Kızılaslan & Sözbilir, 2016; Zorluoğlu, Şahintürk & Bağrıyanık, 2017; Zorluoğlu, Güven & Korkmaz, 2017). Furthermore, it is observed that the learning outcomes were at the understanding level at the most and at the creating and evaluating level at the least from cognitive process dimension levels of RBT. The general distribution of the study according to cognitive process dimension levels is similar to the studies in the literature (Sağlamöz & Soysal, 2021; Yaşar & Sadi Yılmaz, 2020; Zorluoğlu, Kızılaslan & Sözbilir, 2016; Zorluoğlu, Şahintürk & Bağrıyanık, 2017; Zorluoğlu, Güven & Korkmaz, 2017). Sağlamöz and Soysal (2021) found that 22.27% of the total number of learning outcomes was for high-level cognitive skills in the 2018 Science Education Curriculum, which were analyzing (8.49%), evaluating (7.87%), and creating (5.91%). In this study, on the other hand, it was determined that 24% of the total number of learning outcomes were for high-level cognitive skills which are analyzing (15%), evaluating (5%), and creating (4%) levels. When the results of the study are compared, it is seen that the rate of learning outcomes that require high-level cognitive skills in IEPs is higher. Considering the inadequacies of students with special needs, it is believed that the cognitive level of the learning outcomes in the science education curriculum should be at lower levels, unlike their peers.
When the distribution of learning outcomes across Turkey by grade level knowledge dimension (Figure 5) is examined, it is observed that: learning outcomes at the factual knowledge level are most seen in Grade 8 and least in Grade 5, learning outcomes at the conceptual knowledge level are most seen in Grade 6 and least in Grade 5, learning outcomes at the procedural knowledge level are most seen in Grade 6 and least in Grade 8, and learning outcomes at the meta-cognitive knowledge level are most seen in Grade 8 and least in Grade 7. When the cognitive process dimension distributions (Figure 6) are examined, it is observed that: learning outcomes at the remembering level are most seen in Grade 8 and least in Grade 5; learning outcomes at the understanding level are most seen in Grade 6 and least in Grade 5; learning outcomes at the applying level are most seen in Grade 6 and least in Grade 5; learning outcomes at the analyzing level are most seen in Grade 7 and least in Grade 5; learning outcomes at the evaluating level are most seen in Grade 5 and least in Grade 8; learning outcomes at the creating level are most seen in Grade 6 and least in Grade 7. While the number of learning outcomes at the factual, conceptual and meta-cognitive knowledge levels among knowledge dimension levels tends to increase towards Grade 8, the number of learning outcomes at the procedural knowledge level tends to decrease. As for the cognitive process dimension, the number of learning outcomes at the remembering, understanding and analyzing levels tends to increase, and the number of learning outcomes at the applying, evaluating, and creating levels tends to decrease. According to Anderson & Krathwohl (2001), in terms of an effective curriculum, the level of knowledge and cognitive process dimension of the learning outcomes is expected to increase as the grade level increases. It was determined that the distribution of the learning outcomes across Turkey according to grade levels was not in line with Anderson & Krathwohl's (2001) opinion, and the knowledge and cognitive process dimension levels of the learning outcomes did not increase as the grade level increases. In addition to the foregoing, the learning outcomes should be prepared by taking into consideration the development and grade levels of students with special needs (Pektas, 2008). Preparing learning outcomes that the students can achieve in accordance with their development and grade level will both make IEPs effective and enable these students to acquire low-level and high-level learning outcomes according to RBT levels.

The learning outcomes in IEPs that do not have any learning outcome value indicate that teachers have deficiencies in creating learning outcomes. Pre-service and in-service trainings can be provided to teachers to overcome this deficiency. In addition to the foregoing, the special education course given to teacher candidates during the undergraduate process can be expanded in terms of content or courses for preparing IEP can be added. Consequently, when the knowledge deficiencies of teacher candidates and teachers are eliminated, students will be able to learn more effectively. While preparing IEPs, teacher should try to create the learning outcomes according to the inadequacy of the students and not to use the learning outcomes included in the science education curriculum directly. By paying attention to the knowledge
and cognitive process dimensions of the learning outcomes, the learning
outcomes that the student can accomplish should be included. In addition to the
foregoing, as the grade level increases, students can accomplish learning
outcomes that require high-level thinking skills as well. Therefore, it is
suggested that as the grade level increases, the RBT knowledge and cognitive
process dimensions of the learning outcomes should be prepared from higher
levels.

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