ASSESSING THE EFFECTIVENESS OF DIRECT INSTRUCTION METHOD IN TEACHING STUDENTS WITH LEARNING DISABILITIES ABOUT CONCEPTS OF SCIENCE AND TECHNOLOGY LESSON

Dr. Ş.Şenay İLİK
Necmettin Erbakan University, Ahmet Keleşoğlu Education Faculty
42090, Meram, Konya, Turkey
senayilik@gmail.com

Prof . Dr.Hakan SARI
Necmettin Erbakan University, Ahmet Keleşoğlu Education Faculty
42090, Meram, Konya, Turkey
E-mail: hakansari@gmail.com

ABSTRACT
It is evident that number of researches studying the effect of methods to be used in science lessons of individuals with learning disabilities on the success of students is limited in the literature. Thus the aim of the present study is to reveal whether direct instruction is effective in teaching students with mild learning disabilities about concepts of science lessons. It further aims to shed light on other studies thereof in the field. The present study used 'multiple-probe design with probe sessions' out of single-subject research and explored effectiveness and efficiency of direct instruction in teaching the subject of solar system to children with learning disabilities in science lesson. The present study was carried out with subjects who benefit from special education services and are diagnosed as 'student with learning disability'. Data was collected at the end of sessions applied to three students in accordance with multiple-probe design with probe sessionsand data was shown in graphs compliant with this model and they were interpreted according to the aim of this research. Findings of the research are as follows: 1) Direct instruction is effective for all subjects in teaching the subject of solar system in science lesson.2) Findings are observed to be supported by previous studies which examine the effectiveness of direct instruction in teaching students with mild learning disabilities about academic skills.

Keywords: Mild Learning Disability, Direct Instruction, Science, teaching individuals with special needs about concepts

1.INTRODUCTION

Learning is a chain of comprehensive and complex life-long processes, which occur related to developmental and individual characteristics of a person (Korkmazlar, 1999). Learning is the basis of systems which enable the person to control and limit himself/herself, make sense of his/her surroundings, watch the stimuli and react accordingly. Thus any deficiency in the main constituents poses a threat for the whole life of the person. If learning is basically defined as the act of acquiring knowledge, learning disability may be defined as a problem a person encounters while acquiring knowledge (Share and Silva, 2003).

"Learning Disability", a specific term of special education, has been of great interest to people in recent years (Kırcaali-İftar, 1992). Studies which point out that learning disability does not result from mental deficiency are rather new. The problem commonly known as "learning disabilitiy" was awakened by parents of children with normal intelligence but who failed in education in 1960s and it was introduced to the legislation since it was different from other disabilities (Bintaş, 2007). Complexity of the subject in terms of learning processes and prevalence of its effects in many fields result from difficulties such as the definition and solution of the problem (Özyürek, 2003). Furthermore lack of tests which may reveal the disability, inability to transform the situation in numbers and various characteristics of the students in this category complicate the existing difficulties (Özyürek, 2003; Şenel, 1995).

The term "learning disability" was coined by Kirk (1963). After Kirk (1963) defined the learning disability on educational grounds, further studies and tests emphasized the importance of this problem affecting the life of people. Unlike Kirk (1963), Bateman (1965) featured the difference between ability and achievement and referred to dysfunction of central nervous system as the reason behind (Cited byKorkmazlar, 1993). According to Hallahanand Kauffman (1994) individual with learning disability cannot develop and employ strategies required for solving academic problems, he is not aware of his own abilities and unconfident in featuring his abilities and he cannot pick strategies offered to him for enabling learning (Akyol, 1997: 16). Learning disorder is defined as follows in DSM IV (DiagnosticandStatisticalManual of MentalDisorders): "Individual's

achievement on individually administered, standardized tests in reading, mathematics, or written expression is substantially below that expected for age, schooling, and level of intelligence". These different definitions incorporate both different fields such as reading, writing, listening and speaking but also extensive academic and social development fields (Korkmaz 2000). Commonly recognized special learning disorder is defined as the following: individuals with special learning disorder have deficiency in one or more academic and psychological processes in listening, thinking, speaking, reading, writing or solving mathematical problems, comprehension or employing written or verbal language (Sarı, 2005). DSM IV (1994) classified the learning disorder under four categories according to academic features of the learning disorder. 1) Reading Disorder (Dyslexia): This category of disorder is characterized by omissions, distortions, substitutions, slowness and spelling, errors in comprehension while reading. There are two subcategories of dyslexia: a) Developmental Dyslexia: If an individual without any mental problem can never obtain reading ability or he obtains very lately or slowly and there is not any brain-related disorder, it is called "Developmental Dyslexia". b) Acquired Dyslexia: Reading disorder which occurs due to brain damage of individuals already knowing how to read is called 'Acquired Dyslexia'. 2) Mathematics Disorder (Dyscalculia): It is a scientific term used for calculation difficulty or poor sense of calculation. World Health Organization defines dyscalculia as the unexplained limitation of calculation skills due to general mental deficiency or insufficient education. 3) Disorder of Written Expression (Dysgraphia): Writing skills fall substantially below those expected given the individual's age, measured intelligence and education. 4) Learning Disorder Not Otherwise Specified: This category is for academic achievement disorders that do not meet criteria for mental deficiency, insufficient education or emotional deficiencies (Butterworth, 2005; DSM IV, 1994).

Although some of these students do not have problems in terms of visual, audial, mental, emotional and social aspects, they may encounter problems in one or more fields of reading, writing, speaking and arithmetic Korkmaz, (2000). While these problems hinder the educational success of students, both children and family are blamed for educational failure since the main reason of the failure is not known Korkmaz, (2000). Individuals that have difficulty in formal education, that feel different from his peers and that do not have sufficient relations with his parents and teachers also have deficiencies in the development of his own personality. Secondary psychological problems such as depression and anxiety disorders, low self-confidence and disturbed self-esteem complicate the existing problems (Trott, 2003).Thus they need a learning environment equipped with different teaching methods and tools.Learning environments designed according to features and performance of the students, are thought to overcome this problem.

One of the methods widely used for children with learning disability and bearing successful results is direct instruction. The term of "Direct Instruction" has been used by researchers since 1968 as a term summarizing methods used for teaching metacognitive subjects. "Explicit instruction", "systematic instruction" and "systematic education" are used interchangeably. All these terms refer an instruction method in which the teacher is involved, teacher corrects the errors and then instruction is carried out again and teacher acts as a guide (Kim andAxelord, 2005; Roseinshine, 2008). Model is not the end of instruction process but a course which equips the students in order to cope with complex learning activities (Rupley, 2009; Rymarz, 2013). The aim is to enable learning and generalization and frequent use of skills and thus activate the student regarding ordered tasks and enable them to speed up (Marchand-Martella, MartellaandAusdemore, 2005).Direct instruction differs from other methods since it organizes the content of a program which is aimed to be instructed under a discipline. Conventional methods for instance expository instruction organizes the subjects and content of a discipline by time frame. However, direct instruction has a spiral pattern regarding the organization of content. Thanks to the spiral pattern, more than one skill may be thought in one lesson; students have opportunity to use various concepts and skills on a wider basis since another skill is not initiated upon the completion of a skill (TuncerandAltunay, 2004).Instructional grouping, instructional time, written instruction processes, continuing evaluation factors should be met while organizing the instruction in order to enhance the instructional effectiveness. Direct instruction method has six instructional functions as follows (Rosenshine, 2008: 4; Hollingsworth and Ybarra, 2009:.13; Rupley, Blair and Nichols, 2009: 126)

1-Revision and analysis of previous work,
2- Presentation of a new subject,
3- Students' studying new texts under the guidance of teacher,
4- Provision of feedback with correctives,
5- Provision of independent practice,
6- Weekly or monthly revisions include detailed explanations, exemplification and guided practice in Direct Instruction Method.

Direct Instruction Method adopts the participation of all students (Watkins and Slocum, 2003). Students should be grouped according to their skills in order to enable the active participation of all students. It should be

possible to re-organize already established groups in order to enable the participation of different students according to the subject or transfer of some students from a group to another. It should be possible for students to transfer between groups according to their progress in a specific subject or skill. Thus teacher may provide instruction in line with the knowledge and skills of all students in the class, effective communication is ensured among the group and the communication of the teacher with the group is productive (Watkins and Slocum, 2003).

Scientific activities are important as they assist the students in understanding the relations between objects and events (Demiriz, 2001). Children' participation in scientific and natural activities helps the development of affective and psychomotor skills as well as cognitive skills, it will enable their learning and introduce them the skill to approach the events from scientific perspective (Gürdal, Çağlar, Şahin, ÖkçünandMacaroğlu, 1993). It is expected that children are enabled to actively participate in activities, make observations, take nature tours and acquire the main skills such as making comparison and classification, establishing cause and effect relation, paying attention to details, making observations and experimentation, hypothesizing. The sooner we stimulate the curiosity and pleasure through scientific instruction the better it will be for the individual. The individual then acquires the skill to catch the examples in the universe and infer main laws from observed systems. According to Soylu(1996), 'science' is the set of activities which question, explore and discover and explain the implicit systems of the universe. 'Science' may be considered as the act of modeling the truths (Çilenti, 1985; Temizyürek, 2003). Science is discipline based on observations, experiments and quantitative measurements for the comprehension of natural phenomena in the universe. Students get acquainted with the science lesson in the second stage of primary education namely 4^{th} and 5^{th} grades and they are involved in educational activities thereof uninterruptedly for five years until the end of 8^{th} grade. The basis of social and environmental development is firstly laid in Science lesson in primary schools. During these lessons, children get the opportunity to deal with the scientific and natural world they live in from a scientific perspective and to research it. Their adaptation to life depends on their extensive knowledge about scientific and natural world and learning the methods to benefit from it sufficiently. Accordingly students examine their surroundings through scientific methods in primary schools and they acquire the skill to think objectively and make accurate judgments about events and situations. This habit enables them to be helpful towards themselves, their families and the environment (Akgün, 2004).

The present study aims to reveal the effectiveness of direct instruction method in teaching students with learning disability about solar system in the science lesson. The research is considered to be important since knowledge is taught systematically in the science lesson. There is hardly any study on the effectiveness of direct instruction method in science lesson according to literature review specific to this field. However many students with learning disability continue their educational life without any systematic education regarding science during their primary education. This results in new knowledge problems for the students in the upper stage of the education. Scientific instruction is one of the most vital windows opening into physical world of the individual. Scientific instruction has an important function in raising individuals who do not just pay attention to objects and articles but perceive, analyze, question and deduce through synthesizing. This requirement is even more important for individuals with learning disabilities. As long as students with learning disabilities construe objects surrounding them, science lesson will turn out to be more pleasurable to learn.
Thus the aim of the present study is 1) to reveal whether direct instruction is effective in teaching concepts of science lessons to students with mild learning disabilities and 2) to shed light on other studies thereof in the field.

2. METHOD

Detailed information is given under this section about the research method.

2.1. Research Model

The present study used multiple-probe design with probe sessionsout of single-subject research. Primarily starting data is collected simultaneously in all sessions in multiple-probe model with probe sessions. Upon the stability of starting data, it is started to be implemented for first subject. After the criterion is met for the first subject, probe session is employed in all cases and data is collected successively in all three sessions. It is expected that probe data meet criterion in first subject and they are expected to be similar with starting level in other cases. Following the probe session, implementation is started for second case. When the criterion is met in the second implementation, probe sessions are again employed in all cases. It is expected that probe data meet the criterion in the first and the second case and they are expected to be similar with starting level in other cases. These steps are repeated for all cases (Tekin and Kırcaali-İftar, 2001). As Tekin and Kırcaali-İftar (2001) mentioned, the reason for selecting this method for this research is that the method allows the generalization of

findings for different subjects since an instructional or behavior-alternating practice is studied in terms of its effectiveness and the method has all advantages of multiple-probe method (Tekin and Kırcaali-İftar, 2001).

2.2. Study Group

The study group of the present study was composed of three students with learning disabilities from a Special Education Center in Konya. Three students who are 14-15-14 years old with learning disabilities participated in the study. These students attend different primary schools. None of the subjects have received systematic instruction through direct instruction method.

Subjects were required to perform following tasks as criterion;

1. Following the verbal instructions,
2. Concentrating on an activity for minimum 5 minutes,
3. Keeping the knowledge in mind
4. Using hands and fingers,
5. Reading one-digit and two-digit numbers,
6. Attending the school regularly.

Subjects were primarily observed in the classroom in order to detect whether they meet pre-requisite skills. Afterwards a session was held and prerequisite skills were evaluated by the implementing person through instructions and activities. Furthermore the teachers of the subjects were contacted and their regular attendance was investigated and students attending the school regularly participated in the study. Prior to study, families of the subjects were contacted, they were informed about the study and their written approval was obtained for the participation of the students. Detailed information is given about the subjects in the following sections.

Subject 1 (15 years old) is a male student with learning disability. The student had been diagnosed as 'requiring special educational services on a limited scale due to mild deficiency in mental functions and conceptual, social and practical harmonization skills'. Student is in the 7th grade in second stage of primary education. The student is able to perform self-care skills, fine-gross motor skills and whole communicative skills independently. He is able to distinguish objects of complex color and form and accurately explain the color and forms thereof. He is able to distinguish the group of objects by quantity and size. The student is able to perform some social skills independently such as using money, shopping, using social spaces, independent transportation.

Subject 2 (15 years old) is a female student with learning disability. The student had been diagnosed as 'requiring special educational services on a limited scale due to mild deficiency in mental functions and conceptual, social and practical harmonization skills'. The student is in the 8th grade in second stage of primary education. The student is able to perform self-care skills, fine-gross motor skills and whole communicative skills independently. Student has reading-writing and basic mathematical skills. The student is aware of colors and opposite concepts. The student is able to perform social skills.

Subject 3 (14 years old)is a male student with learning disability. The student had been diagnosed as 'requiring special educational services on a limited scale due to mild deficiency in mental functions and conceptual, social and practical harmonization skills'. In the medical report of the student, special educational program where the student may attend is specified as 'supportive educational unit'. Student is in the 7th grade in second stage of primary education. The student is able to perform self-care skills, fine-gross motor skills and whole communicative skills independently. Student has reading-writing and basic mathematical skills. He is adapted to social relationships but does not have many friends. He is able to perform skills such as using the money.

2.3. Data Collection Tools

An open-ended questionnaire composed of equivalent twelve questions was prepared in order to collect data in the present study. Questions were prepared according to the curriculum of Ministry of National Education and educational level of students with learning disabilities and equivalence of questions was determined by a group including an academician from the department of special education, an academician from the department of science teaching and a teacher of special education. A total of twelve questions were prepared and they were divided into three groups considering the similar features of the questions (questions are provided in Annex I).

2.4. Implementation Process

Teaching students with learning disabilities about science was the dependent variable of the research. Independent variable was instructional practices introduced to students with learning disabilities based on direct instruction method. In the present study, three students with learning disabilities were thought about science through direct instruction method. Experimental process of the research was composed of starting level,

instructional sessions, monitoring and generalization sessions. The implementation was carried out respectively as follows.

2.5. Data Collection
In this section, information is provided about the data collection within experimental process.

2.5.1. Probe Sessions
After prerequisite skills and scientific performance level were determined for each subject prior to instruction, simultaneous collective probe sessions were held. Probe data were collected at starting level by asking 1 group of questions out of 3 groups each composed of four questions out of equivalent twelve questions to all subjects for three days consecutively. Completely right answers of the students were marked (+) and wrong or approximate answers were marked (-). Instruction was sustained until right answers reached the stability level.

2.5.2. Instructional Sessions
The content of the research was derived from textbooks and periodicals compatible with the curriculum of Science Lesson in Primary Education and it was submitted for the opinion of experts. It was used for three students of study group considering the performance of them. Following steps are generally taken in science lessons taught according to Direct Instruction Method:

1) Motivating the students and stimulating the knowledge by reminding previous studies,
2) Presentation of new knowledge, teacher's performing an exemplary activity,
3) Students' performing new activities under the guidance of teacher
4) Teacher's correcting erroneous knowledge and concepts,
5) Students' studying independently,
6) Revision of outcomes,
7) Re-presenting/teaching of some practices when necessary,
8) Evaluation of the process.

Instruction followed the above-mentioned order and it was sustained until right answer reached the stability level. After stability was reached, implementation process was completed and collective probe sessions were held for all subjects. At the end of each day 1 group of questions out of 3 groups each composed of four questions out of twelve questions was asked again to all subjects and the number of right answers was recorded. Completely right answers of the students were marked (+) and wrong or approximate answers were marked (-).

2.5.3. Monitoring and Generalization Sessions
Monitoring sessions were held in order to analyze how subjects maintained learnt items upon the completion of instruction. Monitoring sessions were held as collective probe sessions by implementing person after 2, 4 and 5 weeks following the completion of instruction.

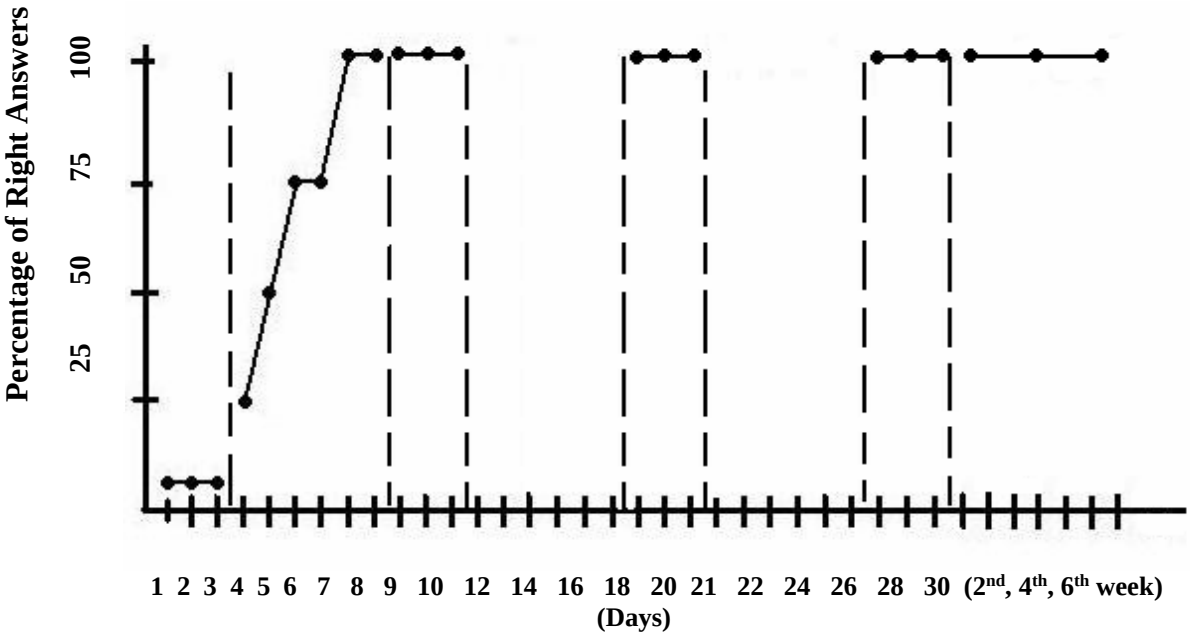
3. FINDINGS
Students with learning disabilities were asked to answer twelve questions summarizing the subject of solar system in science lesson and findings about the effectiveness and efficiency of direct instruction method are provided under this section.

3.1.Findings about Direct Instruction Method
In this research, data on the effect of direct instruction method were collected by means of multi-probe design with probe sessions and the data were shown in graphs compatible with this method. Starting level, implementation phase and monitoring phase of multi-probe design with probe sessions were shown in graphs. Three subjects of the study were asked to answer twelve questions summarizing the subject of solar system in science lesson both in first and second starting phase. Furthermore, three subjects were taught about the subject of solar system in science lesson through direct instruction method both in first and second implementation phase and they were asked to answer twelve questions summarizing the subject of solar system at the end of each implementation phase. Given the graphs, it was evident that all three subjects did not have performance level whose starting data meet the criterion. During the implementation phases, students were asked to answer twelve questions upon the teaching of solar system. Data were observed to have increased at a level to meet criterion. Thus direct instruction method was observed to be effective for all three subjects.

3.1.1Effectiveness of Direct Instruction for the First Subject
Data which were collected for teaching about solar system in science lesson through direct instruction method are shown in Figure 1. Information was provided about collected data, probe sessions, implementation sessions and monitoring sessions. Three sessions were held for the first subject at the preliminary starting level and three groups of questions each composed of four questions out of twelve questions summarizing solar system in

science lesson were asked during starting level. The first subject answered the questions with accuracy by 0% during collective probe sessions at the starting level. During the teaching session following the starting level, six consecutive sessions were held for the first subject by using direct instruction method and a rapid increase was observed in target learning level. Percentage of right answers reached the stability with the following percentages of accuracy: 25% in the first session, 50% in the second session, 75% in third session, 75% in the fourth session, 100% in the fifth session, 100% in the sixth session within the implementation phase. Then teaching session was ended. Collective probe phase was implemented for all students. During the collective probe phase, three groups of questions each composed of four questions out of twelve questions were asked respectively. The first subject answered the questions with the following percentages of accuracy: 100% in the first session, 100% in the second session and 100% in the third session during the collective probe phase. Following the completion of first implementation for the second subject, collective probe phase was applied for all subjects. The first subject answered the questions with the following percentages of accuracy: 100% in the first session, 100% in the second session and 100% in the third session during the collective probe phase. Following the completion of first implementation for the third subject, collective probe phase was applied for all subjects. The first subject answered the questions with the following percentages of accuracy: 100% in the first session, 100% in the second session and 100% in the third session during the collective probe phase. Monitoring sessions were held in order to observe that learnt items were maintained during the 2nd, 4th and 6th weeks and the first subject answered the questions with the following percentages of accuracy: 100% in the first session, 100% :ond session and 100% in the third session during the monitoring phase.

Figure 1.1: Percentage of Right Answers by Subject 1 during Sessions

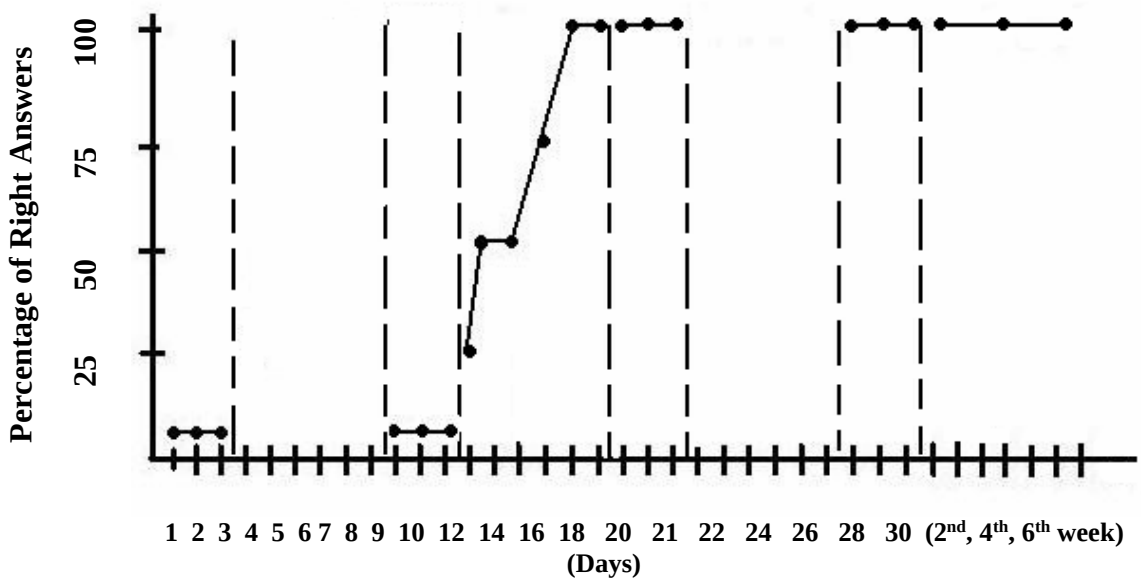


3.1.2. Effectiveness of Direct Instruction for the Second Subject

Three sessions were held for the second subject at the preliminary starting level and three groups of questions each composed of four questions out of twelve questions summarizing solar system in science lesson were asked during starting level. The second subject answered the questions with the following percentages of accuracy: 0% in the first session, 0% in the second session and 0% in the third session at the preliminary starting level. Following the completion of implementation phase for the first subject, collective probe phase was applied for all students. Three groups of questions each composed of four questions out of twelve questions were asked respectively during the collective probe phase. The second subject answered the questions with the following percentages of accuracy: 0% in the first session, 0% in the second session and 0% in the third session during the collective probe phase. During the teaching session following collective probe phase,six consecutive sessions were held for the second subject by using direct instruction method and a rapid increase was observed in target learning level. Percentage of right answers reached the stability with the following percentages of accuracy: 25% in the first session, 50% in the second session, 50% in third session, 75% in the fourth session, 100% in the fifth session, 100% in the sixth session within the first session during implementation phase. Then teaching session was ended. Collective probe phase was implemented for all students. During the collective probe phase, three groups of questions each composed of four questions out of twelve questions were asked respectively. The second subject answered the questions with the following percentages of accuracy: 100% in the first session,

100% in the second session and 100% in the third session during the collective probe phase. Following the completion of first implementation for the third subject, collective probe phase was applied for all subjects. The second subject answered the questions with the following percentages of accuracy: 100% in the first session, 100% in the second session and 100% in the third session during the collective probe phase. Monitoring sessions were held in order to observe that learnt items were maintained during the 2nd, 4th and 6th weeks and the second subject answered the questions with the following percentages of accuracy: 100% in the first session, 100% in the second session and 100% in the third session during the monitoring phase.

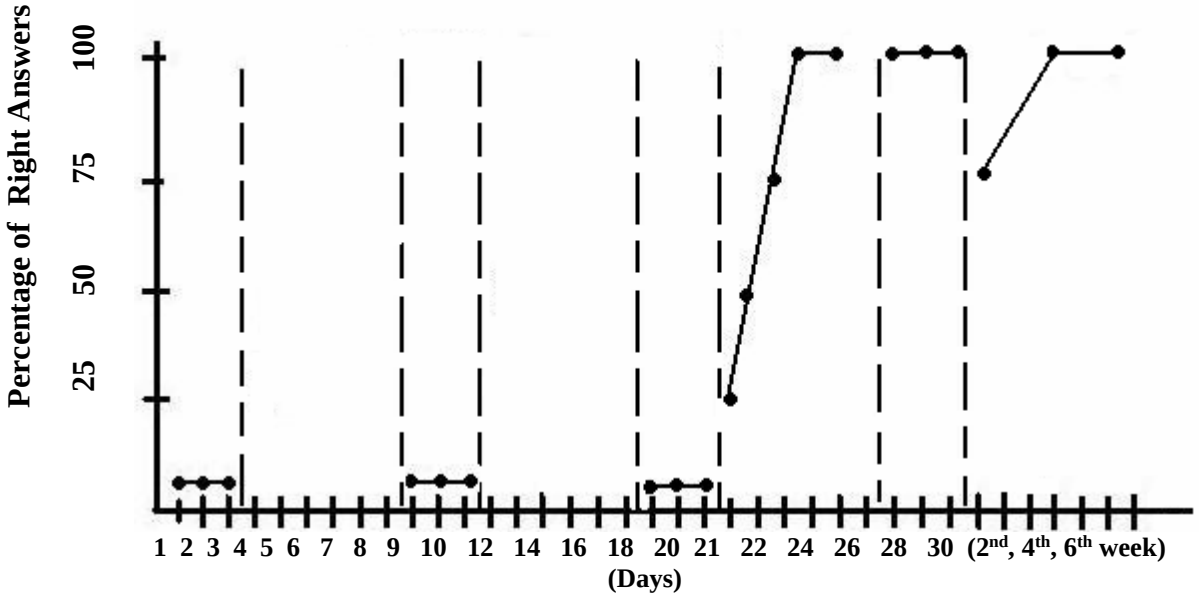
Figure 1.2: Percentage of Right Answers by Subject 2 during Sessions



3.1.3. Effectiveness of Direct Instruction for the Third Subject

Three sessions were held for the third subject at the preliminary starting level and three groups of questions each composed of four questions out of twelve questions summarizing solar system in science lesson were asked during starting level. The third subject answered the questions with the following percentages of accuracy: 0% in the first session, 0% in the second session and 0% in the third session at the preliminary starting level. Following the completion of implementation phase for the first subject, collective probe phase was applied for all students. Three groups of questions each composed of four questions out of twelve questions were asked respectively during the collective probe phase. The third subject answered the questions with the following percentages of accuracy: 0% in the first session, 0% in the second session and 0% in the third session during the collective probe phase. Following the completion of implementation phase for the second subject, collective probe phase was applied for all students. Three groups of questions each composed of four questions out of twelve questions were asked respectively during the collective probe phase. The third subject answered the questions with the following percentages of accuracy: 0% in the first session, 0% in the second session and 0% in the third session during the collective probe phase. During the teaching session following collective probe phase,five consecutive sessions were held for the third subject by using direct instruction method and a rapid increase was observed in target learning level. Percentage of right answers reached the stability with the following percentages of accuracy: 25% in the first session, 50% in the second session, 75% in third session, 100% in the fourth session, 100% in the fifth session within the first session during implementation phase. Thus sixth session was cancelled and the teaching session was ended. Collective probe phase was implemented for all students. During the collective probe phase, three groups of questions each composed of four questions out of twelve questions were asked respectively. The third subject answered the questions with the following percentages of accuracy: 100% in the first session, 100% in the second session and 100% in the third session during the collective probe phase. Monitoring sessions were held in order to observe that learnt items were maintained during the 2nd, 4th and 6th weeks and the third subject answered the questions with the following percentages of accuracy: 75% in the first session, 100% in the second session and 100% in the third session during the monitoring phase.

Figure 1.3: Percentage of Right Answers by Subject 3 during Sessions



4. DISCUSSİON

Direct instruction method was found to be effective in teaching students with learning disabilities about science in the present study. It was detected that subjects were able to maintain learnt items after two, four and six weeks following the teaching of solar system in science lesson. A significant relation was observed between order of instruction and the success of students. Accordingly it was concluded that success obtained during implementation phase by first and second subject for whom the first implementation was carried out was also stable in the monitoring sessions. A generalization was possible since the instruction of all subjects was carried out simultaneously in the same environment.

Other results of the study indicated that students with learning disabilities were not successful in science lesson according to their previous educational experience and it was resulted from the fact that an individual instruction method was not used considering the learning disabilities of the students. It was concluded that teachers should necessarily explain the importance of science lesson to the students and materialize the subject with visual materials as much as possible for the students. Some of the studies on the effectiveness of direct instruction for the students affected from the deficiencies within the field of special education are as follows:

Studies in the literature reveal the positive effects of direct instruction method on different students in different fields (Mitchell, 2008). For instance a study compared the educational behavior in preschool through twelve models such as analysis model, parental education model and comprehension model. The results indicated that direct instruction was not only superior to other models but it was also superior in adopting factors such as reading, mathematical abilities, superior comprehension abilities and self-confidence in the school (Mitchell, 2008).

Bintaş (2007) did a research on the effectiveness of Instructional Material prepared according to Direct and Cascaded Instructional Approaches in provision, continuity and generalizability of basic addition and telling time skills for students with mental disabilities. According to the results of the research, presentation with Instructional Material prepared according to Direct Instructional Approaches was more effective than the presentation with Instructional Material prepared according to Cascaded Instructional Approaches in providing basic addition and telling time skills and it enabled the continuity and generalization of the acquired skills.

Research of Köroğlu (2008)handled the effects of teaching students with mild mental disabilities about mathematics through structuralist approach by comparing with direct instruction method. Students were provided either with structuralist or direct instruction method for teaching mathematics. According to the results of the research, students made a significant progress during the whole education program in both cases. However students thought by means of direct instruction made a better progress compared with the student thought by means of structuralist approach. The results indicate that students with mild mental disabilities may benefit from structuralist approach however direct instruction seems to be more effective for them.

The study of Çelik (2007)compared the effectiveness and efficiency of Direct Instruction and Simultaneous Prompting in teaching about concepts. According to the findings of the research, both Direct Instruction and Simultaneous Promptingwere effective for three subjects however Direct Instruction was also effective for the remaining subject. Concepts which could not be taught to the remaining subject through Simultaneous Prompting were thought by means of Direct Instruction upon the completion of implementation. However Simultaneous Prompting was observed to be more effective than Direct Instruction in terms of trial number, number of errors and the duration of instructional sessions.

Thus this finding was also supported with previous studies (Batu, 2006; Carnine, SilbertveKameeui, 2004; Ekergil, 2000; Kelly, GerstenandCarnine, 1990; Haris, 1973; Gürsel, 1993; KırcaaliİftarBirkanandUysal 1998; Meyer, 1984; Moore andCarnine, 1989; Raymond, 2004; Varol, 1992; Çalık, 2008; Çelik, 2007; Dagseven, 2001; Güzel, 1998; Hastings, Raymond and McLaughlin, 1989; Kroesbergenand Van Luit, 2005) on the effectiveness of direct instruction in teaching about academic skills.

5. CONCLUSIONS and RECOMMENDATONS

5.1. Conclusion

Direct instruction method was found to be effective in teaching students with learning disabilities about the science lesson in the present study. It was detected that success of subjects was even stable after two, four and six weeks following the teaching of solar system in science lesson. A generalization was possible since the instruction of all subjects was carried out simultaneously in the same environment.

A significant relation was observed between order of instruction and the success of students. Accordingly it was concluded that success obtained during implementation phase by first and second subject for whom the first implementation was carried out was also stable in the monitoring sessions.

5.2. Recommendations

1. Findings of the research indicate that direct instruction method is effective and practical. Thus direct instruction method may be recommended for the teachers of special education and science teachers.

2. Direct instruction method may be recommended for teaching students with learning disabilities about skills to be taught step by step (such as academic skills and skills of daily life), knowledge of which limits are specified and defined, and concepts.

3. Teaching science should be attached more importance in order to attain a target thereof, develop mental skills of children and enable the children to understand the world in which they live better.

5.3.Recommendations for Further Studies

Direct instruction method may be implemented for teaching about other subjects included in the science lesson and also other lessons and the effectiveness of the method for children with learning disabilities may be researched. Effectiveness of the method may be researched by comparing the direct instruction method with other instructional methods.

References

Akgün, S. (2004). Fen Bilgisi Öğretimi. Ankara: NASA Yayınları.

Akyol, H. (1997). 'Öğrenme Güçlüğü Olan Çocuklara Okuma yazma öğretimi' Türkiye'de Özel Eğitim, Cilt 7, 16-18.

Ataman, A. (Ed.) (2005), Özel Gereksinimli Çocuklar ve Özel Eğitime Giriş, Ankara: Gündüz Eğitim ve Yayıncılık, 237-249.

AmericanPsychiatricAssociation (1994) Diagnosticand Statistical Manual of MentalDisorders, 4. Baskı (DSM-IV), Washington DC.

Bateman, B. (1965). Learning Disorders: Review of EducationalResearch: Chapter 5, 93-97. McGraw-Hill.

Bintaş, J., (2007). Matematikte öğrenme güçlüğü olan öğrenciler için matematik eğitimi. e-Journal of New World Sciences Academy SocialSciences, 2(4), 439-450.

Butterworth, B., (2005). Developmentaldyscalculia. In: J. I. D. Campbell (Ed.), Handbook of Mathematical Cognition (455–467). Hove: PsychologyPress.

Çilenti,K. (1985). "Fen Eğitimi Teknolojisi" Ankara: Kadıoğlu Matbaası .

Demiriz, S. (2001). Okulöncesi eğitim kurumlarındaki fen ve doğa etkinlikleri ile ilgili uygulamaların belirlenmesi. IV. Fen Bilimleri Eğitimi Kongresi 2000, Bildiriler, Ankara: M.E. s 86.

Gürdal, A., Çağlar, A., Şahin, F., Ökçün, F. ve Macaroğlu, E. (1993). Okulöncesi dönemle ilgili fen faaliyetlerine örnekler. 9. Ya-Pa Okul Öncesi Eğit. veYayg. Semineri, Ankara: s 164.

Hallahan, D.P. ve Kauffman, J.M. (1994). ExceptionalChildren: Introductionto Special Education (Altıncı basım). Allynand Bacon.

Hollingsworth, J.,Ybarra, S. (2009). Explicitdirectinstruction. California: CorwinPress.

Kaptan, F. (1999) Fen Bilgisi Öğretimi, İstanbul: Milli Eğitim Basımevi.

Kırcaali-Iftar, G ve Tekin, E. (2001). Tek Denekli Araştırma Yöntemleri. Ankara Türk Psikologlar Derneği.

Kim, T.,Axelrod, S.(2005). Direct instruction: An Educators' guideand a pleaforaction. TheBehaviorAnalystToday. 6(2). http://ehis.ebscohost.com/ehost/pdfviewer/pdfviewer adresinden 20.07.2011 tarihinde indirilmiştir.

Kirk SA (1963) Behavioraldiagnosisandremediation of lear-ningdisabilities. Proceedings of theconference on explorationintotheproblems of theperceptuallyhandicappedchild. Chicago, PerceptuallyHandicappedChildren.

Kirk, S.A ve Gallagher, J.L. (1983). EducationExceptionalChildren. Boston, HoughtonMifflin.

Korkmazlar Ü (1999) Özel öğrenmebozukluğu (Öğrenme güçlükleri), Ben Hasta Değilim. A Ekibi (Ed), istanbul, Nobel Kitabevi, s.285-295.

Korkmaz B (2000) Öğrenme Bozuklukları Pediatrik Davranış Nörolojisi. İstanbul, İstanbul Üniversitesi Yayınları, s.189- 216.

Köroğlu, E., (2008). DSM-IV-Tanı Ölçütleri Başvuru Kitabı. (4. Basım). İstanbul: HYB Yayıncılık.

Marchand-Martella, N.E.,Martella, R.C., Ausdemore, K. (2005). An overview of direct in struction.http://home.blarg.net/~building adresinden 14.07.2011 tarihinde indirilmiştir.

MEB, (2010). Okullarımızda Neden, Nasıl, Niçin Kaynaştırma, Yönetici-Öğretmen-Aile Kılavuzu. Özel Eğitim Rehberlik ve Danışma Hizmetleri Genel Müdürlüğü, Eylül, Ankara.

Öktem Ö (1999) Gelişimsel bir öğrenme güçlüğü (Gelişimsel disleksi), Ben Hasta Değilim. A Ekibi (Ed), İstanbul, Nobel Kitabevi, s.300-309.

P. Mitchell, 2008Learning architecture: issues in indexingAustralianeducation in a Web 2.0 worldIndexer, 26 (4) (2008), pp. 163–169

Rosenshine, B.(2008). Fivemeanings of directinstruction. Center On Innovation&Improvement. www.formapex.com adresinden 22.06.2012 tarihinde indirilmiştir.

Rupley, W.H. (2009). Introductiontodirect/explicitinstruction in readingforthestruggling Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, Aralık 2014, Sayı 32, 86 - 113 108 reader: phonemicawareness, phonics, fluency, vocabularyandcomprehension. Reading&WritingQuarterly. 25, 119 – 124. www.tandfonline.com/doi/pdf/10.1080 adresinden 20.11.2011 tarihinde indirilmiştir.

Rupley, W. H.,Blair, T.R., Nichols, W. D.(2009) Effective Reading InstructionforStrugglingReaders:The Role of Direct/ExplicitTeaching. Reading &WritingQuarterly, 25(2), 125-138. www.tandfonline.com/loi/urwl20 adresinden 20.11.2011 tarihinde indirilmiştir.

Rymarz, R.M. (2013). Direct instruction as a pedagogicaltool in religiouseducation. British Journal of ReligiousEducation. 35(3). 326–341. http://dx.doi.org/10.1080/01416200.2013 adresinden 30.07.2013 tarihinde indirilmiştir.

Sarı, H. (2005). 'Ağır ve Çok Engelli Öğrencilerin Kaynaştırılması İçin Stratejiler'

Sarı ve İlik (2014) 'Bireyselleştirilmiş Eğitim Programı' Eğiten Yayıncılık, Ankara, sh 22-23

Share D.L., Silva, P.A. (2003). Genderbias in IQ-DiscrepancyandPostdiscrepancyDefinitions of Reading Disability. Journal of Learning Disabilities, 36(1) 4-14

Silver LB (1996) Developmentallearningdisorder, Child andAdolescentPsychiatry A ComprehensiveTextbook. M Lewis (Ed), Baltimore, Williams &Wilkins, s.520-526.

Şenel, H. (1995). ' Özel Öğrenme Güçlüğü Terimi Yerine Alternatif Arayışlar'. Özel Eğitim Dergisi, Cilt 2, Sayı 1, sh 40-44.

Temizyürek, K. (2003). Fen Öğretimi ve Uygulamaları. Ankara: Nobel Yayın Dağıtım.

Trott, C., (2003). Mathematicssupportfordyslexicstudents". MSOR Connections, 3(4), 17–20.

Tuncer, T. ve Altunay, B. (2004). Doğrudan Öğretim Modelinde Kavram Öğretimi (1.baskı). Ankara: Kök Yayıncılık.

Watkins, C., Slocum, T.A. (2003). The Components of Direct Instruction. Journal of Direct Instruction, 3(2), 75-110.

