

TEACHING HOW TO RIDE A BALANCE WHEELED BICYCLE TO AUTISTIC CHILDREN USING THE DIRECT INSTRUCTION METHOD

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ÖZET

Bu çalışmanın amacı; otistik çocuklarda doğrudan öğretim yönteminin denge tekerlekli bisiklet kullanma becerisinin kazandırılmasına etkisini araştırmaktır. Bu genel amaca ulaşmak üzere çocuklara psiko-motor (ince- kaba devinsel) beceriler ve dikkat kontrolünü artırıcı bir öğretim sunulmuştur. Çalışmaya 3-6 yaş arası denge tekerlekli bisiklet kullanma becerisinden yoksun 3 otistik çocuk alınmıştır. Araştırmanın örneklemine alınan çocukların 3'ü de erkektir. Araştırma tek denekli araştırma yöntemlerinden denekler arası yoklama evreli çoklu yoklama modeline göre yapılmıştır. Bu çalışmada çocuklara denge tekerlekli bisiklet kullanma becerisi öğretimi için doğrudan öğretim yöntemi kullanılmıştır. Çalışmalar bire bir yapılandırılmış ortamlarda gerçekleştirilmiştir. Çocuklar bu beceriyi öğrendiklerinde; dikkat gelişimi, beden denge kontrolü ve kas gelişimlerine katkı sağlayacağı düşünülmektedir. Araştırmanın sonucunda genelleme, izleme, uygulama ve gözlemciler arası güvenilirlik verileri toplanmıştır. Araştırmaya katılan çocukların hepsi denge tekerlekli bisiklet kullanma becerisini kazanmışlardır.

Anahtar kelimeler: Doğrudan öğretim yöntemi, denge tekerlekli bisiklete binme, otistik çocuklar, tek denekli araştırma.

ABSTRACT

The aim of this research was to examining the effectiveness of using direct instruction method for teaching of balance wheeled bicycle riding ability to the autistic children. In order to research this aim a teaching method composing of activities increasing attention control and psycho-motor abilities was used. Participants were 3 male autistic children. In this research, direct instruction method was used in order to teach the ability of riding balance wheeled bicycle. The autistic children were trained individually in an organized and controlled environment. At the end of the study, the data such as generalization, observation, application and reliability of observers were gathered. According to the results of the study, all the 3 autistic children developed the ability of riding a balance wheeled bicycle.

Keywords: Direct instruction, riding balance wheeled bicycle, autistic children, single subject design

Introduction

It is necessary for each individual, whether disabled or not, to identify the environment in which s/he lives in and has motor skills to adapt. Leo Kanner states that autistic children have normal motor development. Some distinctions have been observed among these children in the development of motor skills from the same age children although their physical appearance is quite normal.

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Even though they seem physically enough to perform most of the skills on time, the development of some skills can be late. The development of motor skills for autistic children is generally convenient to their ages chronologically. In spite of all these, they might have some difficulties in performing the action in accordance with the instruction and quickly. Some deficiencies have been told such as cutting paper, throwing cubes into a box, lining up beads onto a string. The reason of motor problems observed among autistic children is due to motor coordination problems. It was restated that their being ready to perform an action is not as good as their peers. (Anonymous, 2000, Anonymous, 2003; Attwood, 1998; Berninger & Rutberg, 1992; Beversdorf *et al.*, 2001; Ryoichiro, Chisato, & Reiko, 2000). Vestibular deficiencies are generally seen among autistic children (Kimberly, 1990). Vestibular system is related with perceiving senses caused by differences in the position and movement of the head. Inner ear bodies (semi-circular veins) are responsible for perceiving them. An individual is not aware of the emotional system and the senses produced by it. On the other hand, this system must work normally for eye movements, body stand and motor coordination. (Halker 2001).

The children with vestibular function deficiency: a. they can be sensitive to movement, b. they can't tolerate with any movement, or c. there is an insecurity towards gravity, or d. they can ignore movement (Bahr, 2001; Fisher, 1991; Kranowitz, 1998).

The children with some difficulties about the above items feel themselves defendless when they have no connection to the ground. The insufficiency of those basic senses cause them have insecurity towards gravity. Insecurity towards gravity means the child's abnormal reaction of anxiety and stress to the possibility of falling down. Movement doesn't entertain him/her; on the contrary, makes him/her fear. When his/her head moves, s/he feels as if s/he is falling down or can't control himself/herself. So s/he doesn't move or gives too much reaction. S/he can be irritable and nervous or avoid moving. Some autistic children have difficulties in performing some skills like climbing, standing on one foot, walking on a single line and jumping. Furthermore, those kids may have problems in repeating, starting and stopping a movement themselves. Those kids may refuse to ride a bike. Children with those problems frequently show emotional and movement deficiencies. They have lasting anxiety of falling down (Ayres and Mailoux, 1983; Fazlıođlu, 2004; Fisher 1991; Kimberly, 1990; Kranowitz 1998; O'Roidon 2000; Özlü-Fazlıođlu& Baran, 2004).

Autistic children may generally have balance problem or weakness in motor development and reflex due to the deficiencies in vestibular system. In normal circumstances, they get accustomed to living in society independently and gain most skills necessary for their social lives, such as self-care skills like eating, wearing or psychomotor skills like tearing and sticking with the opportunities provided during growing-up process or by modelling people around. (Snell,1993). The studies in this field have shown that it's difficult for autistic children to explore and control their environment through movement or play.

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That's why it's important to have them gain various movement experiences. Developments of basic movement skills are also important in gaining more complicated behaviors. Achieving these skills base to other body movements and help to perceive complicated movements. Afterwards, they can be advised to the sports activities. That's why directing autistic children to a branch of sport (like swimming) at pre-school ages effect their development (Connor, 1990; Cornish & McManus, 1996; Darıca, Gümüřçü, & Piřkin, 2000; Korkmaz, 2000; Fazlıođlu, 2004). Furthermore, movement teaching can be used to help then search new and creative solutions to overcome the problem in self-expression and to developed problem solving skills (Eichstaedt & Lavay 1992; Kimberly, 1990).

Movement teaching can also be used in the development of basic skills of autistic children like focusing mind on a subject and care development. They achieve emotional and social gain through movement teaching. The children can develop some skills like recognizing other children, getting on well with them communication and co-operation with the help of a well-organized planned movement education. It's an important for autistic children to be educated in the places especially prepared (constructed) for them. Building education classes especially designed for the children effects their development positively. Daily physical activities like swinging in hammock, sliding on quoits, running, swimming, cutting, painting and some musical activities will have led the education program to be successful. It was declared that exercises and programs including physical activities help the children calm down and participate in the actions. Moreover, it is claimed that exercises which require spending more energy like running are important in reducing self warning behaviours of the children (Donnellan, Anderson, & Mesaros, 1984; Egel, 1989; Grandin 1996, Grandin, 1998; Gümüřçü and Piřkin 1994, Kırcaali-İftar, 2003; Kimberly, 1990; Leary & Hill, 1996; O'Neill & Jones, 1997; Rinehart, Bradshaw, Brereton, & Tonge, 2001).

This study has been conducted to determine the effectiveness of education of autistic children to ride on balance wheeled bicycles by using the direct instruction method. In the study, the questions below have been tried to be responded:

1. Is it effective to use the direct instruction method in teaching autistic children how to ride on balance wheeled bicycles?
2. Will it be possible for autistic children to keep this skill six weeks later after education if the education of autistic children how to ride balance wheeled bicycles by using the direct instruction method is effective?
3. If the education of autistic children how to ride balance wheeled bicycles by using the direct instruction method, can be can this be generalized to other individuals and materials?

Method

Participants

Three autistic children aged 5-6 were selected for the research. All of them are male. One of them is the only child, but the others have one sister. All of them benefit from both education for integration and private education service. These topics were noticed for the experimental subjects that they hadn't been educated systemically with the direct instruction method before or they hadn't participated any training to ride a bike or whether they can hear and apply verbal commands like (look, catch, touch, point, give, sit) or whether they have any physical disabilities to do the primary basic activities to ride a bike.

Trainers

Three researchers have carried out the study. Two of them have executed the practice session. One of the researchers who executed the practice part has 10 year experience in the field of educating children who need special attention whereas the other (male) researcher has 8 years of experience. The third researcher worked as a counselor for the families and helped in writing. And she has 5 years of experience in psychological counseling and guidance.

Setting

The first part of the research was applied in an individual training class of a rehabilitation centre whereas the second part was in a park which has a bicycle lane where the children can ride bicycle confidentially. In the first phase of the research the items that can disturb motivation were removed from the class. A table and a chair suitable for physical development of the child, a balance board necessary for balance studies, a ball of gymnastics, an air bed and a video camera to record data were used. In the second phase of the research a park was selected where the child could ride a bike easily and away from the city noise and other disturbance of motivation of the child, so safety was initiated. The park is wide enough for three individuals to ride on bikes at the same time.

Data Collecting Tools

The tools required for data collection are: a. tools for riding a bike (helmet, knee guard and elbow pipes), b. tools for coordination between hands and eyes and balance control devices (measurement devices), c. data collecting verifiers among observers (inter observers reliability), d. practice reliability information collecting tool, and e. a video camera.

Experimental Control

In the study, experimental control has been conducted by showing that there has been no change in the independent variable at the beginning, but the value of dependent variable has increased during the application stages, while the direct instruction teaching method was being used.

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Research Design

The study was conducted as a multiple probe design with probe session across subject models, one of the single subject designs. In this study, the direct instruction method has been used to teach children to ride on balance wheeled bicycles.

In the study of the three children, the data were first collected from all the subjects simultaneously. After the baseline level shows stability, the maintenance is started with the first subject. When the maintenance meets the criteria in the first subject, data are collected in all three steps by considering the probe sessions in all subjects. It was expected that the probe data would be able to meet the criteria in the first subject and have similar characteristics with the baseline level in the others. After the probe sessions, the application is directed to the second subject. It is expected that the probe data are able to meet the criteria in the second subject and be at the same level as the baseline level in other cases. This application is revised for all subjects (Kırcaali-İftar and Tekin, 1997).

In the study, the baseline level data of these three subjects were first collected in the multiple probe design with multiple probe sessions. After the baseline level data became stable, the first subject was taught riding on balance wheeled bicycles skills. When the criteria were met in the first subject, the initial data were collected in the three subjects by considering the probe sessions. It was expected that the inspection data were able to meet the criteria in the first subject and have similar characteristics with the baseline level in the others. This maintenance was presented to all the subjects one-to-one. In the last probe sessions, the data of the three subjects were expected to meet the criteria. The data were collected by the application tool prepared by the instructor to teach riding on balance wheeled bicycles.

Dependant and Independent Variables

Dependant variable of the research is the subjects' level of riding balance wheeled bicycle. The independent Variable of the research is the assessment tools for balance, hand and eye coordination used with The Direct Instruction Method. Baseline, probe, follow-up, and generalizing data's were collected through data collecting tools prepared for Baseline and probe Sessions.

Baseline and Instruction Sessions

Before starting to train how to ride a balance wheeled bike, all three subjects exposed to an individual or group education in a class for six weeks, three times a week and one lesson hour (45") in order to introduce the activities increasing hand-eye coordination and specialties of the bicycle. In this process, the skill to ride a bike was demonstrated with ordering cards and video films. Later training the skill to ride a bike was started.

Baseline, probe, follow-up, and generalizing data's were collected through the data collecting tools prepared. Multiple probe design was used to collect the data's at baseline level and probe sessions.

Below processes were followed to determine the performance level through data collecting tools.

Instructions

Training practice was started with specified teaching skill to the first subject and training went on until the determined measure was provided. Forward chain method was used to teach the skill.

The process of teaching the skill to ride a balance wheeled bicycle

In the teaching sessions the subject was primarily told to pay attention to study as in the baseline level and probe sessions. When s/he focused on intensively, s/he was encouraged. Next instruction about riding a bike was presented and told the subject that at that moment s/he would ride the bike: *"Watch me carefully, later you will ride."* The subject was modeled with these instructions. At the modeling stage; the operator comes toward the bike, upon coming near the bike holds the steering wheel, holds his right foot up, and passes it from the body part of the bike. He puts his right foot on the pedal, and then he puts his left foot on the left pedal by leaning over the steering wheel. He sits on the chair, after adjusting balance, puts the steering wheel into straight position. The operator rotates the wheels by turning the pedal with his right and left feet. After riding a distance, he stops the bicycle with a brake pedal on the steering wheel. Then he puts his left foot on the ground. He holds up his left foot from the pedal while leaning over the steering wheel. He passes his foot back through the body and steps on the ground next to the other and gets off. After that the operator tells the subject: *"Now it's your turn, to ride the bike."* The operator gives the subject verbal tips and helps physically when he needs. Reactions of the subject are reinforced verbally. (Such as: *Well done, very good and so on*) Each stage of the subject's actions, getting on and off the bicycle, was given as verbal instructions after waiting ten seconds for each instruction; a tip (*verbal tip or physical help*) was given according to the child's need, and went on the next stage. 10 seconds were spent for a reaction to the instruction. When the subject gave the correct reaction, it was reinforced like *"well done, very good, or patting the head and so on"*. When the subject didn't give the correct reaction, the practice was continued until true reaction was supplied by giving tips. This practice was given all the subjects in the same way. The practice was continued until the subjects fulfilled the planned goal. Although true reactions were reinforced verbally and socially, nothing was done for false reactions.

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Table 1. The analysis of the skill of riding a bike listed in order.

<i>The subject's care is focused on the bicycle.</i>
<i>When the subject focused on the activity, he is reinforced verbally. (Well done, very good, etc.).</i>
<i>Hold the steering wheel with two hands (Right one to right side and left one to left side).</i>
<i>Hold up your right foot and pass it through the body of the bicycle.</i>
<i>Put your foot on the right pedal.</i>
<i>Put your left foot on the left pedal leaning over the steering Wheel</i>
<i>Sit on the chair of the bicycle.</i>
<i>After having the balance, put the steering wheel in the straight position.</i>
<i>Push down your right foot heavily.</i>
<i>Repeat this work continuously.</i>
<i>Rotate the wheels of the bicycle by turning the pedal with your feet.</i>
<i>Ride along a specified distance.</i>
<i>Grasp the brake handle with your hand.</i>
<i>Give up turning the pedal (Stop strongly turning the pedal).</i>
<i>Stop the bicycle.</i>
<i>Step your left foot on the ground.</i>
<i>Hold up your right foot from the pedal while getting support from the steering wheel with your hands.</i>
<i>Pass your foot through the body of the bicycle.</i>
<i>Step it next to your left one on the ground.</i>
<i>Get off the bicycle.</i>

Reliability

In the study, all data were recorded to make it possible to analyze the inter-observer reliability and independent variable reliability.

Inter-Observer Reliability

The data of the inter-observer reliability and independent variable reliability were collected in the least 20% of the instruction and independent variable sessions. Reliability was improved by having two researchers not participating to the maintenance period of the study; the inter-observer reliability was processed on The Data Collecting Form by watching the video records separately. The coefficient of inter-observer reliability was calculated by "Agreement/ (Agreement +Disagreement) x 100"formula. While the acceptable coefficient of inter-observer reliability was 80% in single subject studies, the coefficient of ideal inter-observer reliability was 90% or more (Kırcaali-İftar and Tekin, 1997). In this study, a 100% coefficient was obtained in the inter-reliability analysis.

Independent Variable Reliability

Independent variable reliability analysis has been improved to evaluate whether or not independent variable has been applied as planned. All the sessions of this study have been recorded to collect the data of independent

variable reliability. 50% of these records depicted by independent appointment were studied by the researchers inspecting the reliability of this study.

Before beginning to study maintenance reliability, instructors have been told how the instruction would be conducted by the researcher to do the independent variable reliability. While the researcher followed up the data obtained after the maintenance, he/she put (+) and (-) signs on the Independent Variable Reliability Form by deciding if instructors conducted the articles on this form where every step of the maintenance was divided into articles. The calculation of independent variable reliability was conducted by “*Observed Instructor Behaviors/ Planned Instructor Behavior* $\times 100$ ” formula for 50% instruction sessions for each subject determined by Independent Appointment Table. As result of the study conducted by the researcher, the independent variable reliability was found 90%.

Follow-Up and Generalization Sessions

Follow-up data and generalization data have been collected 5 weeks after the completion of application. Generalization data between people and materials have been collected 5 weeks after the completion of the application sessions. The inter-personal generalization data have been collected by two private teaching teachers and a lecturer from the department of private teaching.

The instruction has been started by teaching the depicted skill to the first subject and continued until the criteria depicted for the skill were met. While teaching the concept to the students, advanced chaining method has been used.

Results

This part summarizes the findings related to determine the effectiveness of education of autistic children to ride on balance wheeled bicycles by using the direct instruction method.

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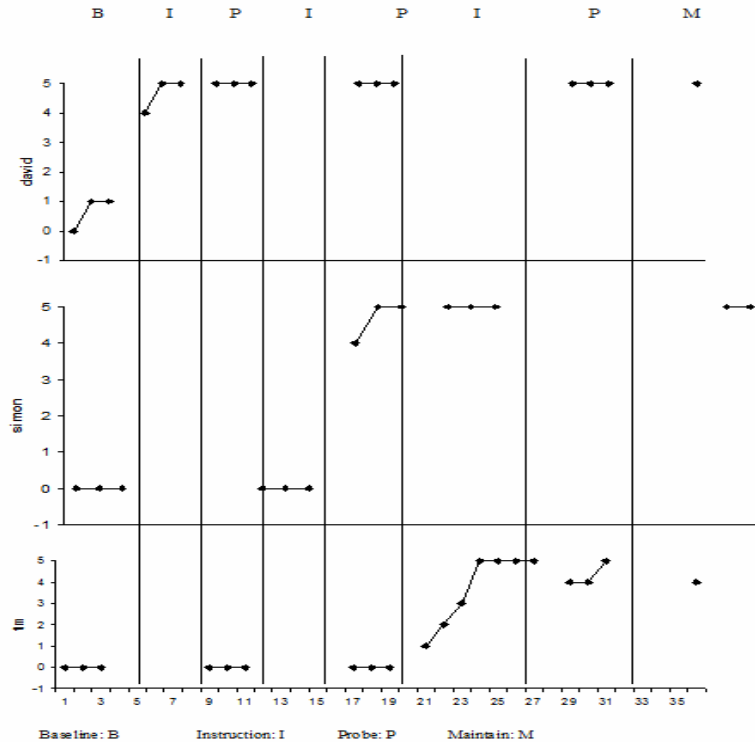


Figure 1. Bicycle riding skill in autistic children

As seen in the first graph in figure 1, the baseline level data was 10% in the first subject but it was 0 in the others. As stability was gained in three sessions in the baseline level data, the instruction was started with the first subject. The established criteria were met by conducting the instruction of riding on balance wheeled bicycles as 100%. After the subject maintenance sessions, the maintenance phase was ended when the desired behavior was gained and the second maintenance phase was started. It was observed that the first subject showed the desired behavior as 100% in three probe sessions.

As seen in the second graph in figure 1, the baseline level data were 0 in the second subject. As the stability was gained for the baseline level data in three sessions, the instruction was started with the second subject. The established criteria were met by conducting the instruction of riding on balance wheeled bicycles as 100%. After the subject maintenance sessions, the maintenance phase was ended when the desired behavior was gained and the second maintenance phase was started. It was observed that the first subject showed the desired behavior as 100% in three probe sessions.

As seen in the third graph in figure 1, the baseline level data were 0 in the third subject. As the stability was gained for the baseline level data in three sessions, the instruction was started with the third subject. The established

criteria were met by conducting the instruction of riding on balance wheeled bicycles as 80%. After the subject maintenance sessions, the maintenance phase was ended when the desired behavior was gained and the second maintenance phase was started. It was observed that the first subject showed the desired behavior as 80% in three probe sessions.

Discussion

The most effective teaching method in educating autistic children to ride balance wheeled bicycle through The Direct Instruction Method is seen in total probe, follow-up and generalization data's.

When we look at the studies about teaching some skills to autistic children, Ryoichiro *et al.* (2000) examined 10 children with asperger and 15 autistic children with high functions in the point of motor problems. They found out motor dysfunction in 50 % of children with asperger syndrome and 67 % of children with high functioned autism. Furthermore, they stated that those children had problems of visual motor integration, visual-spatial perception and three dimensional perceptions. However, it was observed that sports activities let autistic children have emotional and social benefits. In another research, Kimberly (1990) made integration study to physical education with autistic children, and offered them various activities improving balance and motor skills. As a result of the education for motor skills of autistic children, it was determined that positive improvements have been observed in the behaviors of autistic children positively. In another research made by Yılmaz, Yanarda, Birkan, ve Bumin (2004), a child was trained to swim and some decrease was obtained in the repeating autistic behaviors of children. In the research made by Kern and his friends (1982) with autistic children, they discovered that physical activities caused reduction in hyperactivity and stereotype behaviors of autistic children. Also in other studies made in this field physical sport activities lead negative behaviors of autistic children to transform positive ones and help reduction in hyperactive behaviors of autistic children. (Kern, Koegel & Dunlap, 1984; Watters & Watters, 1980). As a result of our study reduction in repeating behaviors of autistic children, self confidence and will to participate in social environment were observed.

Different teaching methods may be used in teaching motor skills to autistic children. Furthermore, some materials can be developed to facilitate teaching those skills and they can be submitted to teachers' use dealing with autistic children. In order to increase generalization of the study, the same research can be made on different subjects, in different circumstances using different teaching methods.

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