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An Investigation on the Effects of PECS and Observational Learning in Initiating and Maintenance of Communication among Children with Autism ^{**}

Abstract

The purpose of this research is to identify the efficacy of PECS provided in gaining of independent communicative initiation and maintenance skills to children with autism. Population of this research consisted of six children currently receiving education and diagnosed with autism during preschool period. To implement observational learning procedure, children were grouped as pairs. To that end, during the first and second phases of PECS three autistic children received training on the skills of independent communicative initiation and maintenance. The remaining three autistic children for whom direct teaching was not the objective the objective was to measure to what extent they learned the skills they had observed. Dependent variable of this study is independent communicative initiation and maintenance. Independent variables of the study are implementing the first and second phases of PECS. In the course of interventions generalization data were collected as pre-test and post-test by different implementers and settings. Data of the research were analyzed graphically and efficacy of each single implementation showed no differentiation for the learner nor observer children at the acquisition phase. It did not differ at the phase of permanence and generalization neither. For collecting social validity data, semi-structured interviews were conducted among mothers and fathers and data were analyzed descriptively Mothers-fathers reported that both PECS and observational learning were significant for their children and that peer observation significantly contributed to children with autism.

Keywords:

Autism, PECS (Picture Exchange Communication System), Observational Learning, Single-Subject Design

Introduction

Autism is a neurodevelopmental disorder categorized under special education. Communicative problems bear particular importance within autism spectrum disorder (ASD) since a majority of problems experienced by autistic individuals stem from the failure to communicate with other individuals. Gaining communication skills plays vital role in knowledge acquisition, establishing connection with humans, indicating preferences and aiding independent living (Boutot & Myles, 2011). Thereby it is

suggested to implement systematic, effective and scientifically-proven practices in the process of gaining communication skills to children with autism (Webber & Scheuermann, 2008; Wong et al., 2014). PECS-Picture Exchange Communication System, demanding low-technology, is a special visual alternative system harnessed to gain communication skills to children with ASD (Bondy & Frost, 2001). As relevant literature on PECS implementations is probed into, it is witnessed that PECS fueled a positive effect in requesting demands and communicative initiation behaviors and spoken words among

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** This study was supported by a Grant from Anadolu University Research Fund (Project No: 1505E445).

children with ASD (Adams -Hill & Flores, 2014; Carre, Le Grice, Blampied, & Walker, 2009; Cummings, Carr, & Le Blanc, 2012; Dogoe, Banda, & Lock, 2010; Gillespie-Smith, Riby, Hancock, & Doherty-Sneddon, 2014; Jurgens, Anderson, & Moore, 2009; Kravits, Kamps, Kemmerer & Potucek, 2002). As literature review studies on the implementation of PECS are analyzed; it is detected that there exists a long list of findings on PECS. Findings pertaining to PECS are such: (a) It is a general intervention method effectively applied among children with ASD quintessentially, but also among individuals exhibiting a myriad of diagnoses (mental deficiency, cerebral palsy, attention deficit and hyperactivity disorder) and from a range of age groups; (b) it is an equally or even better- effective intervention method similar to miscellaneous communication systems such as sign language or word-generating communication tools (VOCA etc.); (c) in a number of cases it has been reported that as a result of concurrent increases in verbal language and other social behaviors, there is likelihood to witness some decrease in problematic behaviors (Flippin, Reszka, & Watson, 2010; Hart & Banda, 2010; Preston & Carter, 2009; Sulzer-Azaroff, Hoffman, Horton, Bondy, & Frost, 2009). Furthermore, the findings evidence that criterion related to all phases of PECS could be met in a relatively short period of time (Charlop-Christy, Carpenter, LeBlanc, & Kellet, 2002; Ganz & Simpson, 2004). The next part of our research provides insights on PECS and observational learning.

In literature studies, there exist a range of definitions on observational learning. Bandura (1977) describes observational learning as knowledge gained via cognitive processing of events by going way ahead of simply mimicking the actions of nearby individuals (Corbett, 2003). It has been witnessed in numerous studies that children could learn large numbers of single-step and chain skills while observing (Campbell & Mechling, 2009; Ross & Stevens, 2003). In short, it is known that observational learning relates to acquisition of new behaviors via observing a behavior exhibited by the model (Bandura, 1977).

An extensive body of research points that children with autism can acquire single-step and chain skills after being trained on observational learning. Some include word reading, completion of a long activity chain (Schoen & Ogden, 1995; Werts, Caldwell, &

Wolery, 1996), asking for help when injured (Christensen, Lignugaris-Kraft, & Fiechtl, 1996), preparing food (Tekin-iftar & Birkan 2010), learning of general culture skills (Ihrig & Wolchik, 1988), maintaining and ending a conversation (Goldstein & Moussetis, 1989), observing and complying with the behaviors of typically-developing peers (Varni, Lovaas, Koegel, & Everett, 1979), reaching a reinforcer by observing typically developing peers (Egel, Richman, & Koegel 1981), game skills (Tyron & Keane, 1986), expressing the pronunciation of words within a group (Kamps, Walker, Locke, Delquardia, & Hall, 1990), word reading (Rehfeldt, Latimore, & Stromer, 2003), using sign language (Venn, Wolery, & Greco, 1996), watching friends' responses (Pereira-Delgado & Greer, 2009), imitation skills (Ganz, Bourgeois, Flores, & Campos, 2008), and social communication (Wilson, 2013). Learning via observing other individuals has been a widely-approved skill with respect to educational, economic and social aspects. Children with autism are in need of intensive and one-to-one education (Smith, 2001). This education holds utmost vitality and effectiveness for children with autism, but the truth is intensive and one-to-one education is a high-cost implementation and can hardly be put into practice in general educational environments. A set of autistic children can, through receiving early-intensive behavioral training, demonstrate the kind of behaviors required to receive training in general education classes (Taylor & DeQuinzio, 2012; Townley-Cochran et al., 2015). On that account, it is of vital importance to teach observational learning skills to children with autism (Taylor & DeQuinzio, 2012). Furthermore, observational learning is a type of skill that bears major social outcomes for children with autism. Imitation is a skill that has huge gravity in acquiring observational learning skill, but what should be highlighted at this point is the result of observed behavior. Observer individual concomitantly observes the outcomes of observed behavior. In the presence of a reinforcement with the implementation of any behavior, the observer exhibits the same behavior whilst in the absence of a reinforcer or presence of punishment at the end of displayed behavior, observer individual may be less inclined to perform observed behavior (Townley-

Cochran, et al., 2015; Taylor and DeQuinzio, 2012).

As relevant literature is reviewed it is detected that a good number of studies that used PECS implementations were put into practice in structured environments via one-to-one teaching settings (Preston & Carter 2009). As PECS-implementation focused studies and PECS guide are examined, a list of suggestions has been produced to generalize PECS across natural environments as routine parts of everyday activities (Bondy & Frost, 2001; Greenberg, Erickson-Tomaino, & Charlop, 2012). A set of autistic children can, upon receiving early-intensive behavioral training, demonstrate the kind of behaviors necessary to receive training in general education classes. On that account, it is of vital importance to teach observational learning skills to children with autism. Furthermore, observational learning is a type of skill that bears major social outcomes for children with autism. Nevertheless, the restricted ability of children with autism in observational learning has been labeled as a disadvantage. Regardless of that assumption however, children with autism can benefit from not only group arrangements but inclusion environments likewise. As PECS-related arrangements are planned in line with group settings it may be feasible to concomitantly teach communicative initiation and maintenance skills to larger quantities of students by implementing PECS.

Communication skills are "prioritized" skills that have been intensively and systematically studied across autistic children programs. Starting from the baseline skills of communication skills, children with autism should also be taught how to concomitantly utilize a number of techniques (alternative systems, natural teaching, interaction-sensitive teaching etc.) (Sigafos, O'Reilly, & Lancioni, 2014). As mentioned here in above it is seen that behaviors reinforced during observational learning process are generally learnt by the subject (Plavnick & Hume, 2014). It is thus safe to claim that it would be educationally effective to concomitantly teach reinforcer-based PECS across two or greater number of children. Driven from this point of view, the objective of our study is to identify the efficacy of PECS provided to children with autism on the teaching of independent communicative initiation and maintenance skill. In parallel with this general

objective, our study will seek answers to the below-listed questions:

1. Are the first and second phases of PECS provided to children with autism effective in teaching independent communicative initiation and maintenance skills?

2. Provided that independent communicative initiation and maintenance skills can be taught, will the permanency of such skills remain unaffected one and two weeks later?

3. Provided that independent communicative initiation and maintenance skills can be taught, will the children be able to generalize such skills in varied environments and individuals?

4. While independent communicative initiation and maintenance skills are being taught to children with autism via first and second phases of PECS, to what extent will the partner children observing this teaching can learn the observed skills?

5. Upon the completion of research, what are the views of mothers & fathers on the programmed teaching of communicative initiation and maintenance skills for children with autism as regards the exhibited performance levels and implemented teaching method?

Method

Participants

Six male children diagnosed with ASD participated in this research on the following parts, more information about participants is given. Deniz is an autistic male student aged 6 years and 3 months. Deniz's test score from Turkish version of GOBDO-2-TV (Gilliam Autism Rating Scale Second Edition) (Diken, Ardic, Diken & Gilliam, 2012) is 94, which means he is in the high-risk group of autism. Deniz receives training in a special education and rehabilitation center three days per week. Deniz experiences challenges in social and communication skills. Deniz demonstrates repetitive behaviors (following the light, swaying on his own), obsession with objects and toys. He cannot initiate independent communication. Deniz's partner Emir is a 5 year and 7-month-old autistic male student. Emir received 85, which means he is in the high-risk group of autism from GOBDO-2-TV test (Diken et al., 2012). Emir receives training in a special education and rehabilitation center three days per week in addition to receive

ing preschool training every single day. Emir experiences challenges in social and communication skills. Emir has the ability to concentrate on an activity in progress for 5-10 minutes. He fails to express his demand via consistent words. He cannot initiate independent communication.

Huseyin is an autistic male student aged 5 years and 4 months. Huseyin received 92, which means he is in the high-risk group of autism from GOBDO-2-TV test (Diken et al., 2012). He experiences challenges in social and communication skills. He can establish short-term eye contact and generate repetitive but meaningless sounds. He cannot initiate independent communication. Huseyin's partner Eren is an autistic male student aged 6 years and 11 months. Eren received 102, which means he is in the high-risk group of autism from GOBDO-2-TV test (Diken et al., 2012). He experiences challenges in social and communication skills. Eren has the ability to concentrate on an activity in progress for 3-5 minutes. He fails to consistently express his demands via gestures. Eren exhibits repetitive behaviors (waving, walking on the balls of the feet), obsession with objects and toys. Furthermore, he demonstrates self-injuring behaviors (hitting on the head and beating hard his knees on the floor). He cannot initiate independent communication.

Kerim is an autistic male student aged 3 years and 8 months. Kerim received 96, which means he is in the high-risk group of autism from GOBDO-2-TV test (Diken et al., 2012). He experiences challenges in social and communication skills. He can establish short-term eye contact. Kerim exhibits repetitive behaviors (waving, walking on the balls of the feet), obsession with objects and toys. He cannot initiate independent communication. Kerim's partner Efe is an autistic male student aged 5 years and 3 months. Efe received 99, which means he is in the high-risk group of autism from GOBDO-2-TV (Diken et al., 2012). Efe experiences challenges in social and communication skills. Efe has the ability to concentrate on an activity in progress for 3-5 minutes. He can generate no vocabulary but attempts to imitate via lip movements. He frequently expresses his demands via pointing. He demonstrates no repetitive behaviors but has obsession with objects and toys. He cannot initiate independent communication.

Implementers

During the implementation procedure, in all sessions except generalization, in parallel with the implementation principles of the first and second phase of PECS, two teachers were assigned; one as prompter and the other as communicator. Both teachers had teaching background on PECS implementations. One implementer teacher was assigned during the sessions of baseline, generalization, post-training assessment, observational learning assessment and monitoring. During intervention sessions on the other hand, two implementers were assigned one as prompter. One of the implementers, also the author of current research, is a graduate of the department of teaching of mentally-handicapped. The author also holds PhD degree in the field of special education. Second author is a graduate of the department of teaching of hearing-impaired. The author also holds master's degree in the field of special education. The third author-implementer is a graduate of department of special education and has 20 years of teaching experience.

Settings

In current study baseline, intervention and maintenance sessions were implemented in the group-teaching class of the third author commissioned in University Unit. The classroom size is 6 x 5 m. The classroom is furnished with a cabinet in which tools and equipment are placed, one wallboard, one smart board, desks and chairs to seat the children. Generalization sessions however were implemented by different implementers in the cafeteria within unit building and playroom.

Materials

Within the scope of conducted research PECS materials (reinforcers, one file and 3X3 cm picture cards), and one camera, one tripod and data collection forms were harnessed to record reliability data. In order to identify reinforcers effective for children, family members of participant children were interviewed and a list was prepared to highlight the reinforcers that they believed to be effective for their children. Afterwards, preferred reinforcers of children were assessed and for each single child specific reinforcers were selected from food and toy categories. Final-

ly, four reinforcers were defined from those categories for each child.

Experimental Model

In this research, towards the aim of testing the efficacy of PECS implementation which was provided in the teaching of independent communicative initiation and maintenance skills, multiple probe across participants' design, which is among single-subject research designs, was utilized. Multiple probe designs aim to assess efficacy of any training or program in multiple situations. In such designs, it is no longer required to constantly collect baseline-level data and such designs are applicable to all behaviors, let them be reversible or irreversible. (Kennedy 2005).

Dependent and Independent Variable

Dependent variable of present study is correct response levels in independent communicative initiation and maintenance skills across children trained in this study. The other dependent variable of the study is the acquisition levels of observational learning of pairs who haven't been included in the implementation part of the study.

The research was planned in line with the projects of integrating training on these skills into individual training programs (IEP), teaching of these skills by families and teachers and prioritizing such skills. Independent variable of our study implementing the first and second phases of PECS that is typically applied in the teaching of communicative initiation and maintenance skills.

Experimental Procedures

This research consisted of sessions titled as baseline-level probe, intervention, post-training assessment, observational learning assessment, monitoring and generalization. All phases of (implementation) experimental procedures of this study were implemented by relevant researchers. In each intervention session pairs of two children were formed. While direct presentation was offered to one child, other children watched the intervention presentation. In multiple probe, generalization, monitoring, intervention and post-training assessment sessions five trials were performed and group criterion for observational learning was identified (Collins., Gast, Ault, & Wolery, 1991. Since the children who participate in this study are at same ages, at

the same risk group of autism, it seems reasonable to define the group criterion for the identified skill as %100.

Baseline and Multiple Probe Sessions

Baseline probe sessions were arranged prior to starting intervention session whilst multiple probe sessions were arranged in a manner to encompass both intervened and observer children upon meeting the skills criteria for children. The procedure was repeated till stable data were collected in minimum three successive sessions. In these sessions PECS materials and preferred foods and objects of the children (as identified in reinforcer detection sessions) were kept in the setting. The child was expected to pass the picture card unaidedly to his communicative partner. Communicator teacher stood in front of the child and waited the child to give an independent response (taking and passing the card to his communicator teacher). If the child failed to pass the card to the teacher in 10 seconds, the reaction was accepted as "no response given".

Intervention Sessions

Upon determining baseline performances of children, intervention sessions of the first phase of PECS were launched. Intervention sessions were performed as intervention settings formed by two children. While implementer conducted training to one child, he conducted guidance for the other child to observe (handing "watch your friend" instruction and when needed, physically helping the child to look in the right direction) and repeated the physical help if need arose. Independent communicative initiation trials were tested individually and successively. Second phase of PECS was implemented among children who could successively meet 100% criterion in consecutive three sessions in the first phase. In the second phase once the criterion was met in the same manner, intervention was terminated. While intervention was conducted on the targeted child, his partner child observed the session. If intervened child managed to meet the criterion sooner, intervention session was continued till his partner child could also meet the criterion.

Below given steps were applied in the sessions in which the first phase of PECS was implemented.

1. The child was given the opportunity to get busy with the relevant object for a few seconds or he was led to eat some of the food which was identified as effective reinforcer.

2. Communicator teacher held the object/food in one hand. The child was expected to reach or grab the object or food or make an effort to take the item.

3. Once the child reached object/food, communicator teacher opened his/her other hand, prompter teacher provided physical clue and enabled the child to grab the picture in file and release to the open hand of communicator teacher.

4. Once the child released picture card to the open hand of communicator teacher communicator teacher instantly handed the object/food to the child and implemented social reinforcement.

During sessions in which second phase of PECS was implemented, below listed steps were successively implemented.

1. The child was given the opportunity to get busy with the relevant object for a few seconds or he was led to eat some of the food which was identified as effective reinforcer.

2. Communicator teacher held the object/food in one hand. The child was expected to remove the card from file, pass it to communicator teacher, and release the card to communicator teacher's hand.

3. If needed, prompter teacher presented physical clue to remove the card from file. However, it was expected that the child on his own would attempt to reach the card or file before the teacher provided any clue.

4. Communicator teacher placed his hands near to his own body, thus the child was forced to reach further in order to release the card to communicator the teacher. In that way teacher gradually moved away from the child.

5. Once the child released the card to communicator teacher's hand, communicator teacher provided verbal reinforcement and passed the reinforcer to the child.

6. In the subsequent steps communicator teacher stood in a distance far enough for the child to stand up to release the card.

7. While communicator teacher stood nearby the child, communication file was moved a little away from the child.

8. Once the child was consistent in moving towards a file in 2-3 m. away and could

grab the card and release it to communicator teacher, intervention was terminated.

Post-training Assessment Sessions

Post-training assessment sessions were implemented at least 30 minutes after intervention sessions. During these sessions PECS materials and preferred foods and toys of the child were kept in the setting, the child was expected to unaidedly pass the picture card to communicator teacher. Communicator teacher sat in front of the child and waited for the child to give an independent response (taking and passing the card to communicator teacher). If the child failed to pass the card to the teacher in 10 seconds, the reaction was accepted as "no response given". Trial was terminated and a few seconds later, a new trial was initiated. If the child independently grabbed the card and passed it to the teacher, it was accepted as "correct response" and after waiting as required amount of time, a new trial was initiated. In post-training assessment sessions five trials were implemented. Data provided in the "implementation phase" of graphic show correct response levels that children gained in post-training assessment sessions.

Observational Learning Assessment Sessions

Observational learning assessment sessions were organized separately for observer children. Observational learning assessment sessions were arranged similar to post-training assessment sessions. During these sessions PECS materials and preferred foods and toys of the child were kept in the setting, the child was expected to unaidedly pass the picture card to communicator teacher.

Maintenance and Generalization Sessions

Once the criterion for identified skill was met, maintenance data were individually collected for each child one and two weeks after. In monitoring sessions, the same procedure followed in post-training assessment and multiple probe sessions were tracked. Generalization sessions were collected as pre-test session right before the start of intervention sessions after the completion of post-test and intervention sessions. Generalization sessions were conducted by different implementers in different settings.

Social Validity

In order to collect social validity data, semi-structured interviews were conducted with mothers & fathers of participant children. Applicable to the question format of semi-structured interviews, "Social Validity Data Collection Form" was developed. Social validity question form consists of seven questions. It was thus aimed to identify the views of the families of participant children on the objectives of research and training implementation utilized to serve these objectives.

Reliability

In this research two types of reliability data were collected: (a) interobserver agreement data and (b) treatment integrity data. In 30% of all implementations, reliability data were collected. While collecting treatment integrity data all accounted behaviors for all participants were computed as 100% in baseline level, intervention, post-training assessment, observational learning assessment and multiple probe, generalization and monitoring sessions. Interobserver agreement data collected in the research for all participants were computed as average 100% (range 98%-100%) all sessions.

Results

This part presents further explanations on the level that observer children gained independent communicative initiation and maintenance skills while they were not directly intervened whilst their partners were intervened in the first and second phases of PECS. Details about Deniz, Hüseyin and Kerim are respectively illustrated in Figure 1.

Deniz, at the end of a total of nine sessions integrated to the first and second phases of PECS provided for gaining independent communicative initiation and maintenance skills, achieved to perform relevant skills that met the criterion. Deniz completed the first phase of PECS in six sessions. Deniz completed the second phase of PECS in three sessions that met the criterion. To let Deniz respond in a way that performed skills met the criterion, each intervention session lasted approximately 2 min. 30 seconds. In these intervention sessions Deniz was trained approximately 2 min. 22 sc. in the first phase of PECS and approximately 3 min. 10 sc. during the second phase.

Hüseyin, at the end of a total of 10 sessions integrated to the first and second phases of PECS provided for gaining independent communicative initiation and maintenance skills, achieved to perform relevant skills that met the criterion. Hüseyin completed the first phase of PECS in seven sessions. He completed the second phase of PECS in three sessions that met the criterion. To let Hüseyin respond in a way that performed skills met the criterion, each intervention session lasted approximately 3 min. 25 seconds. In these intervention sessions Hüseyin was trained approximately 2 min. 9 sc. in the first phase of PECS and approximately 2 min. 40 sc. during the second phase.

Kerim, at the end of a total of 11 sessions integrated to the 1st and 2nd phases of PECS provided for gaining independent communicative initiation and maintenance skills, achieved to perform relevant skills that met the criterion. Kerim completed the first phase of PECS in five sessions. He completed the second phase of PECS in six sessions that met the criterion. To let Kerim respond in a way that performed skills met the criterion, each intervention session lasted approximately 5 min. 34 sc. In these intervention sessions Kerim was trained approximately 2 min. 10 sc. in the first phase of PECS and approximately 2 min. 52 sc. during the second phase.

Findings on Observational Learning

This part presents further explanations on the level that observer children gained independent communicative initiation and maintenance skills while independent communicative initiation and maintenance skills were being taught during the first and second phases of PECS. Regarding the first pair (Deniz and Emir), second pair (Hüseyin and Eren) and third pair (Kerim and Efe) performance levels of observational learning are as depicted in Figure 1.

At the end of research; Emir learnt independent communicative initiation and maintenance skills that were taught to his observational partner (Deniz) in 100% accuracy level in a total of 10 intervention sessions. Eren learnt independent communicative initiation and maintenance skills that were taught to his observational partner (Hüseyin) in 100% accuracy level in a total of 10 intervention sessions. Efe learnt independent communicative initiation and maintenance skills

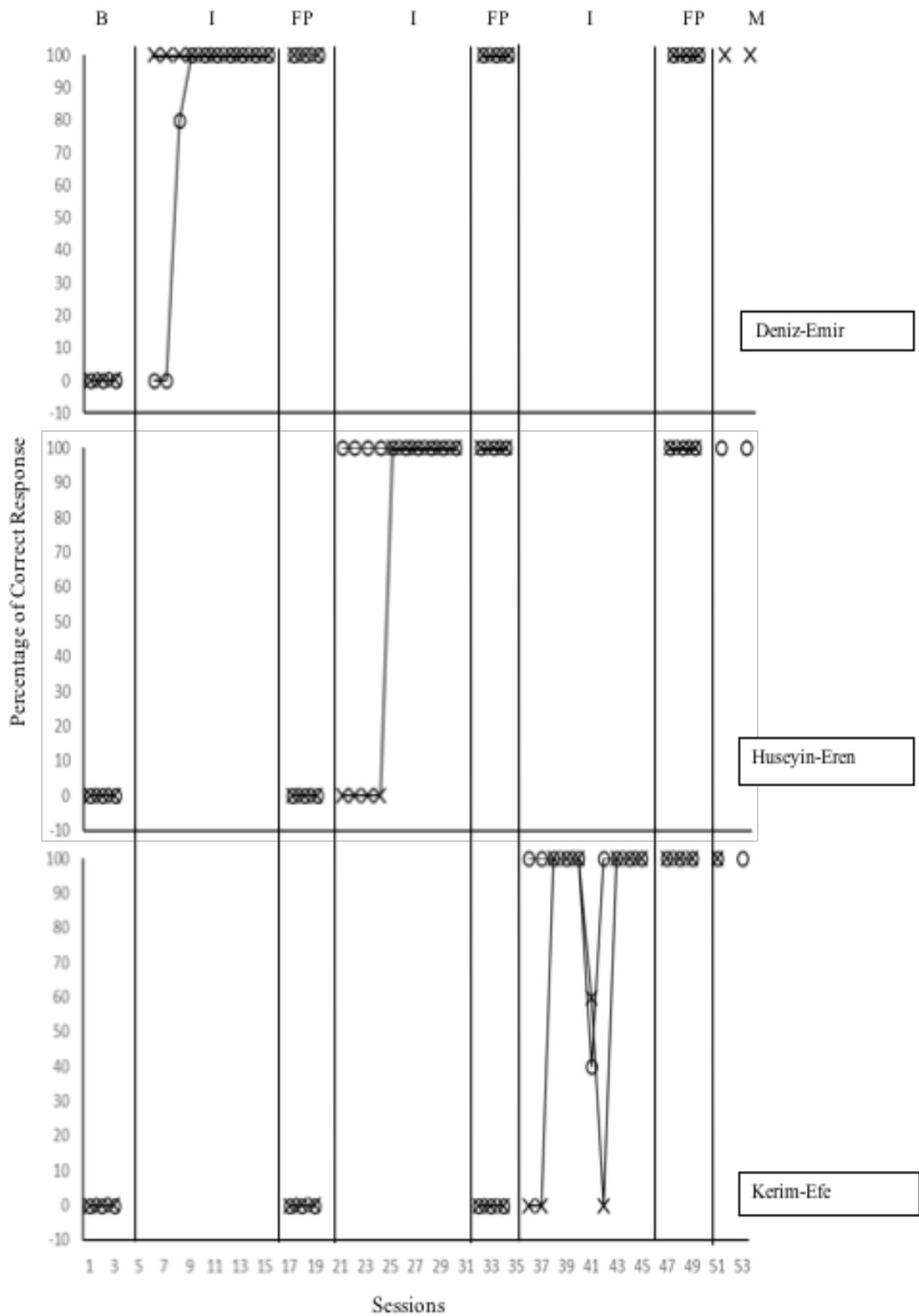


Figure 1. Percentage of correct responses for Deniz,-Emir, Huseyin-Eren, and Kerim-Efe during base-line, Post-training assessment, observational learning assessment, full probe and maintenance sessions. Circle shows training sessions, X shows observational learning sessions

that were taught to his observational partner (Kerim) in 100% accuracy level in a total of 11 intervention sessions.

Findings on Social Validity

In the aftermath of research in order to identify the views of mothers and fathers on the performance levels of provided independent communicative initiation and maintenance skills training to children with autism, semi-structured interviews were conducted. Social validity data were collected from five parents of the six children having participated in the research. Social validity data could not be collected from Eren's parents since the family moved to another city that time. The interviews were interpreted and then the answers of the families were examined. In this sense, the social validity data was presented in sum as follows:

All mothers and fathers expressed their gratitude for the training of independent communicative initiation and maintenance skills provided to their children via PECS implementation. Additionally, all mothers and fathers expressed that training of independent communicative initiation and maintenance skills provided to their children were effective. When parents were asked: "Do you think observational learning used in the teaching of skills was important?" all mothers and fathers acknowledged that it was important. When parents were asked: "If you think observational learning used in the teaching of skills was important would you briefly specify the reasons?", some of them said: "*I believe it will be particularly useful for children in inclusive environments*", "*because reinforcers were used, observational learning was higher and that was significant*", "*among children with autism peer monitoring is even more important than other children*", "*children will be more equipped for natural environments*". Lastly mothers & fathers were asked whether they felt uncomfortable about any aspect of the research and they reported that not one single aspect of this research bothered them.

Maintenance and Generalization Findings

Upon the completion of whole training, two maintenance sessions were arranged for one and two weeks. Nevertheless, since Deniz and Eren were outside the city, maintenance data could not be collected from them. Except for

Deniz and Eren, in the maintenance sessions organized to detect their level of permanency in communicative initiation and maintenance skills learnt via PECS implementation, there was 100% accuracy level of maintenance. In this research related to communicative initiation and maintenance skills taught via PECS implementation; generalization sessions were actualized by utilizing pre-test, post-test probe design. It was seen that in pre-test generalization sessions related to communicative initiation and maintenance skills taught via PECS implementation, all children responded in 0% level. In post-test generalization session, it was observed that all children were able to generalize the acquired skill in 100% accuracy level in different settings to different individuals.

Discussion

The purpose of this research was to identify the efficacy of PECS provided in gaining of independent communicative initiation and maintenance skills to children with autism. Analyzed questions were whether these skills could be maintained one and two weeks after the training; whether taught skills could be generalized to different settings and individuals and whether children could learn through observation the target skills of their partners. Besides, semi-structured interviews were conducted among mothers & fathers to identify the social validity of our research.

Findings obtained from our study revealed that (a) PECS intervention provided in gaining of independent communicative initiation and maintenance skills to children with autism was effective; (b) independent communicative initiation and maintenance skills gained by children were permanent and children managed to maintain such skills one and two weeks after the training; (c) children were able to generalize in high level the acquired skills in different settings and individuals; (d) children could, via observational learning, gain in high accuracy level the skills taught to other children and (e) mothers-fathers held positive views about the implementation.

Obtained findings are analogous to relevant studies analyzing the efficacy of PECS intervention (Adams-Hill & Flores, 2014; Carre, Le Grice, Blampied, & Walker, 2009; Cummings, Carr & Le Blanc, 2012; Dogoe,

Banda, & Lock, 2010; Gillespie-Smith, Riby, Hancock & Doherty-Sneddon, 2014; Jurgens, Anderson, & Moore, 2009; Kravits, Kamps, Kemmerer & Potucek, 2002). Nonetheless, some points in this research should be discussed.

The fact that observational learning findings demonstrate that PECS can be effectively learnt via observation supports the applicability of PECS in natural environments. It can be claimed that the efficacy of training could be higher if a higher number of children simultaneously could use PECS. As was underpinned in relevant studies and PECS manual (Bondy & Frost, 2001; Greenberg, Erickson-Tomaino, & Charlop 2012) should PECS were more frequently implemented in unstructured settings, higher number of children would be able to learn communicative initiation. It is also reported that during observational learning procedure observer children learnt reinforced behaviors by observing the results of certain behaviors (Greer, Singer-Dudek, & Gautreaux, 2006). The facts that in PECS intervention there were successively reinforced trials and effective reinforcers for children were used might have been positively effective in observational learning. This finding is in parallel with literature studies (Plavnick & Hume 2014).

In this research, all participant children could learn communicative initiation and maintenance skills provided in the first two phases of PECS in a level that met the criterion (range 87%-100%). PECS implementations and manual explain that PECS is a program presented via one-to-one training arrangement and during PECS procedure, effective reinforcers for the child are identified and training is provided in separate trials (Bondy & Frost, 2001). Due to the particular characteristics of children with autism, a long range of skills can be provided via one-to-one trainings (Smith, 2001). This situation leaves no room for observational learning and most of the times it ends with poor generalization of the obtained skills (Townley-Cochran et al; 2015). In order to alleviate this negation, certain measures could be taken and by conducting training with children who exhibit identical performance, the efficacy of training could be enhanced. In this study providing PECS concurrently to the children with similar level of performance and proven effect are in parallel with the above-mentioned opinion.

As studies, relevant of observational learning in children with autism are investigated, it is detected that there is further need for researches that support the findings claiming that for the improvement of language development and social skills in children with autism who were not directly intervened, they should also be given an opportunity to learn through peer observation (Townley-Cochran et al; 2015). By the same token we can argue that presenting the scientifically-proven and systematically-processed PECS of which efficacy was tested in copious studies and taught in schools with an distinct curriculum, concomitantly with observational learning procedures would provide grand contribution to relevant literature in support of communication skills.

Children with autism experience challenges in monitoring and modeling other individuals' behaviors which underlines the necessity of primarily teaching observational learning to children with autism (Plavnick & Hume 2014; Taylor & DeQuinzio 2012). In this study at the onset of intervention, observer children were reminded to monitor their partners. Also during the intervention phase they were occasionally instructed to "Watch your friend" and at the end of training the skill was reinforced since the child watched as instructed. It can thus be argued that providing assistance on how to observe his partner could have been one reason why observational learning findings were robust. During the procedure of acquiring observational learning skills, socially backward children with autism can also learn how to demonstrate the essential social responses and communication skills in any appropriate social settings. This situation holds significance for generalization. In terms of observational learning skills in the arrangements that can be done in one-to-one and small group implementations for children with autism, it may be feasible for children to gain further advantage from general education settings that they might participate in (Ledford & Wehby, 2015). In this study the fact that all children performed in a level that met the criterion during the phases of both acquisition and generalization holds vital importance for the learning environments.

It can also be argued that presence of different implementers and different settings in this study was a natural accelerator of generalization. By the very nature of PECS, differ-

ent implementers concurrently work in the intervention phase alternately as both communicator teacher and prompter teacher. Furthermore, implementation of PECS in all the settings in which the child is present is another factor supportive of generalization. Via observational learning procedure that supports this aspect of generalization awareness of children with autism towards their surrounding is multiplied, thus it may become easier for them to adapt to inclusive environment that they will be placed in future. In the personal interviews with mothers and fathers organized to identify social validity, the views of parents on observational learning procedures were such: *I believe it will be particularly useful for children in inclusive environments, among children with autism peer monitoring is even more important than other children, children will be more equipped for natural environments* and these statements are collectively supportive of our findings. Providing any observational learning opportunities is of vital importance during the training of children with autism (Taylor & DeQuinzo 2012). Implementers should organize the programs varied with implementation requirements and procedures in a manner that promotes observational learning. In addition to that implementers can, by conducting required modifications in such programs with different curriculums, personalize it for different children with autism and make it applicable for observational learning (Townley-Cochran et al; 2015). Implementation of this hierarchical and one-to-one program, PECS, in a manner to support observational learning can be viewed as in the same direction with this finding.

As for the limitations of this study such remarks can be noted: This study is limited with the training of communicative initiation and maintenance skills only treated in the first and second phases of PECS. The reason why this skill was targeted within the scope of current study is that in the IEP of participant children communicative initiation skill was specified as the target behavior. Another issue is that with respect to observational learning the third and remaining phases of PECS are more personalized compared to the first two phases (for instance, some children have discrimination ability while some lack this skill) which in effect necessitates further planning for observational learning. Based on

the findings of the current study suggestions for new researches can be listed as follows: Driven from the findings of current study analogous researches can be executed with different implementers (mothers-fathers or teachers etc.) in order to further enable observational learning and also with the participation of larger numbers of subjects in varied disabilities in differing types and intensity. Another suggestion is to execute the remaining phases of PECS implementation in a favorable plan to enable observational learning. The use of PECS concurrently with alternative and complementary communication skills acquisition methods (methods with high technology, IPAD) in differing levels with respect to the efficacy and efficiency of observational learning can be further examined. In addition, new researches could focus on planning the systematic implementation of PECS in group settings within natural environments.

References

- Adams-Hill, D., & Flores, M. M. (2014). Comparing the picture exchange communication system and the Ipad for communication of students with autism spectrum disorder and developmental delay. *TechTrends*, 58(3), 45-53.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bondy, A., & Frost, L. (2001). The picture exchange communication system. *Behavior Modification*, 25(5), 725-744
- Boutot, E. A., & Myles, B. S. (2011). *Autism spectrum disorder: Foundations, characteristics, and effective strategies*. Upper Saddle River, NJ: Pearson Education.
- Campbell, M. L., & Mechling, L. C. (2009). Small group computer-assisted instruction with smart board technology: An investigation of observational and incidental learning of nontarget information. *Remedial and Special Education*, 30(1), 47-57.
- Carre, A. J. M., Le Grice, B. L., Blampied, N. M., & Walker, D. (2009). Picture Exchange Communication (PECS) training for young children: Does training transfer at school and to home? *Behaviour Change*, 26(1), 54-65.
- Charlop-Christy, M., Carpenter, M., Le, L., LeBlanc, L., & Kellet, K. (2002). Using the

- Picture Exchange Communication System (PECS) with children with autism: Assessment of PECS acquisition, speech, social-communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis*, 35, 213–231.
- Christensen, A., Lignugaris-Kraft, B., & Fiechtl, B. J. (1996). Teaching pairs of preschoolers with disabilities to seek adult assistance in response to simulated injuries: Acquisition and promotion of observational learning. *Education & Treatment of Children*, 19, 3-18.
- Collins, B. C., Gast, D. L., Ault, M. J., & Wolery, M. (1991). Small group instruction: Guidelines for teachers of students with moderate to severe handicaps. *Education and Training in Mental Retardation*, 21, 18-32.
- Corbett, B. A. (2003). Video modeling: A window into the world of autism. *The Behavior Analyst Today*, 4, 367-377.
- Cummings, A. R., Carr, J. E., & Le Blanc, L. A. (2012). Experimental evaluation of the training structure of the Picture Exchange Communication System (PECS). *Research in Autism Spectrum Disorders*, 6(1), 32-45.
- Diken, I. H., Ardic, A., Diken, O., & Gilliam, J. E. (2012). Exploring validity and reliability of Turkish Version of Gilliam Autism Rating Scale-2. *Education and Science*, 37(166), 318-328
- Dogoe, M. S., Banda, D. R., & Lock, R. H. (2010). Acquisition and generalization of the Picture Exchange Communication System behaviors across settings, persons, and reinforcer classes with three students with autism. *Education and Training in Autism and Developmental Disabilities*, 45(2), 216-229.
- Egel, A. L., Richman, G., & Koegel, R. L. (1981). Normal peer models and autistic children's learning. *Journal of Applied Behavior Analysis*, 14, 3-12.
- Flippin, M., Reszka, S., & Watson, L. (2010). Effectiveness of the Picture Exchange Communication System (PECS) on communication and speech for children with autism spectrum disorders: A meta-analysis. *American Journal of Speech-Language Pathology*, 19, 178-195.
- Frost, L. A., & Bondy, A. (2002). The picture exchange communication system training manual (2nd ed.). Newark, DE: Pyramid Education Products
- Ganz, J. B., Bourgeois, B. C., Flores, M. M., & Campos, B. A. (2008). Implementing visually cued imitation training with children with autism spectrum disorders and developmental delays. *Journal of Positive Behavior Interventions*, 10, 56–66.
- Ganz, J., & Simpson, R. L. (2004). Effects on communicative requesting and speech development of Picture Exchange Communication System in children with characteristics of autism. *Journal of Autism and Developmental Disorders*, 34, 395–409.
- Gillespie-Smith, K., Riby, D. M., Hancock, P. J. B., & Doherty-Sneddon, G. (2014). Children with autism spectrum disorder (ASD) attend typically to faces and objects presented within their picture communication systems. *Journal of Intellectual Disability Research*, 58(5), 459-470.
- Goldstein, H., & Moussetis, L. (1989). Generalized language learning by children with severe mental retardation: Effects of peers' expressive modeling. *Journal of Applied Behavior Analysis*, 22, 245-259.
- Greenberg, A. L., Erickson-Tomaino, M., A., & Charlop, M. H. (2012). Assessing generalization of the Picture Exchange Communication System in children with autism. *Journal of Developmental and Physical Disabilities*, 24(6), 539-558.
- Greer, R. D., Singer-Dudek, J., & Gautreaux, G. (2006). Observational learning. *International Journal of Psychology*, 41, 486–499.
- Hart, S. L., & Banda, D. R. (2010) Picture Exchange Communication System with individuals with developmental disabilities: A meta-analysis of single subject studies. *Remedial and Special Education*, 31(6) 476–488.
- Ihrig, K., & Wolchik, S. A. (1988). Peer versus adult models and autistic children's learning: Acquisition, generalization, and maintenance. *Journal of Autism and Developmental Disorders*, 18(1), 67–79.
- Jurgens, A., Anderson, A., & Moore, D. W. (2009). The effect of teaching pecs to a child with autism on verbal behaviour, play, and social functioning. *Behaviour Change*, 26(1), 66-81.

- Kamps, D., Walker, D., Locke, P., Delquadria, J., & Hall, R. V. (1990). A comparison of instructional arrangement for children with autism served in a public school setting. *Education & Treatment of Children, 13*, 197-216.
- Kennedy, C. H. (2005). *Single-Case Designs for Educational Research*. USA: Pearson.
- Kravits, T. R., Kamps, D. M., Kemmerer, K., & Potucek, J. (2002). Brief report: Increasing communication skills for an elementary-aged student with autism using the picture exchange communication system. *Journal of Autism and Developmental Disorders, 32*, (3), 225-230.
- Ledford, J. R., & Wehby, J. E. (2015). Teaching children with autism in small groups with students who are at-risk for academic problems: Effects on academic and social behaviors. *Journal of Autism and Developmental Disorders, 45*, 1624-1635
- Pereira-Delgado, J., & Greer, R. D. (2009). The effects of peer monitoring training on the emergence of the capability to learn from observing instruction received by peers. *The Psychological Record, 59*, 407-434.
- Plavnick, J. B., & Hume, K. A. (2014). Observational learning by individuals with autism: A review of teaching strategies. *Autism, 18*, 458-466.
- Preston, D., & Carter, M. (2009). A Review of the Efficacy of the Picture Exchange Communication System Intervention. *Journal of Autism and Developmental Disorders, 39*(10), 1471-1486.
- Rehfeldt, R. A., Latimore, D., & Stromer, R. (2003). Observational learning and the formation of classes of reading skills by individuals with autism and other developmental disabilities. *Research in Developmental Disabilities, 24*, 333-358.
- Ross, A. H. & Stevens, K. B. (2003). Teaching spelling of social studies content vocabulary prior to using the vocabulary in inclusive learning environments: An examination of constant time delay, observational learning, and instructive feedback. *Journal of Behavioral Education, 12*(4), 287-309.
- Schoen, F. S. & Ogden, S. (1995). Impact of time delay, observational learning and attentional cuing upon word recognition during integrated small-group instruction. *Journal of Autism and Developmental Disorders, 25*(5), 503-519.
- Sigafoos, J., O'Reilly, M. F., Lancioni, G. E., & Sutherland, D. (2014). Augmentative and alternative communication for individuals with autism spectrum disorder and intellectual disability. *Current Developmental Disorders Reports, 1*, 51-57
- Smith, T. (2001). Discrete trial training in the treatment of autism. *Focus on Autism and Other Developmental Disabilities, 16*, 86-92.
- Sulzer-Azaroff, B., Hoffman, A., Horton, C., Bondy, A., & Frost, L. (2009). The Picture Exchange System (PECS): What do the data say? *Focus on Autism and Other Developmental Disabilities, 24*, 89-103.
- Taylor, B., & DeQuinzio, J. A. (2012). Observational learning and children with autism. *Behavior Modification, 36*, 341-360.
- Tekin-Iftar, E., & Birkan, B. (2010). Small group instruction for students with autism: General case training and observational learning. *The Journal of Special Education, 44*, 50-63.
- Townley-Cochran, D., Leaf, J. B., Taubman, M., Leaf, R., McEachin, J., & Autism Partnership Foundation. (2015). Observational Learning for Students Diagnosed with Autism: A review paper. *Journal of Autism and Developmental Disorders, 2*, 262-272.
- Tyron, A. S., & Keane, S. P. (1986). Promoting imitative play through generalized observational learning in autistic like children. *Journal of Abnormal Child Psychology, 14*(4), 537-549.
- Varni, J. W., Lovaas, O. I., Koegel, R. L., & Everett, N. C. (1979). An analysis of observational learning in autistic and normal children. *Journal of Abnormal Child Psychology, 7*, 31-43.
- Venn, M. L., Wolery, M., & Greco, M. (1996). Effects of every-day and every-other-day instruction. *Focus on Autism and Other Developmental Disabilities, 11*(1), 15-28.
- Webber, J., & Scheuermann, B. (2008). *Educating students with autism: A Quick start manual*. Austin, Texas: Pro-ed.
- Werts, M. G., Caldwell, N. K., & Wolery, M. (1996). Peer modeling of response chains: Observational learning by students with disabilities. *Journal of Applied Behavior Analysis, 29*(1), 53-66.

Wilson, K. P. (2013). Teaching social-communication skills to pre-schoolers with autism: Efficacy of video versus in vivo modeling in the classroom. *Journal of Autism and Developmental Disorders, 43*, 1819–1831.

Wong, C., Odom, S. L., Hume, K., Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnick, J.B., Fleury, V. P., Schultz, T. R. (2013). *Evidence-based practices for children, youth and young adults with autism spectrum disorder*. Chapel Hill: The University of North Carolina, Frank Porter Graham Child Development Institute, Autism Evidence-Based Practice Review Group.