Effectiveness met cognition strategies on children with spelling learning disabilities

Forough Barkhordar\textsuperscript{a}, Mansoureh Moghtadaie\textsuperscript{b,\*}, Amir Saleh Amin Jafari\textsuperscript{c}

\textsuperscript{a}BA, Payam Noor Esfahan University, Esfahan, Iran
\textsuperscript{b}MA, Esfahan University, Esfahan, Iran
\textsuperscript{c}MA, Esfahan University, Esfahan, Iran

Abstract

The purpose of this research was to determine the efficacy of metacognitive strategies on improvement in Spelling learning ability among male students with Spelling learning disabilities in grade 3 elementary schools. For this purpose, 40 disabilities male student in the spelling in the third grade of primary by multistage sampling method and 20 subjects randomly in tow groups control and experiment were replaced. In order to identify disabilities children in spelling, the spelling learning ability test was performed on them. After selecting the subjects and the pretest measure of spelling ability, the experimental group received metacognitive strategies training. After completion training, the Spelling learning ability test was administered to both groups. Analysis results showed that there were significant differences in mean scores of spelling ability in experimental group. The results suggested that the effectiveness meta cognitive strategies training to students with learning disabilities, especially in spelling, their performance was improved.

1. Introduction

One of the most common and significant students’ problem is learning disability. So in same educational conditions, some students show lower performance. Learner (2003) considers learning disabilities as a homogeneous group of learning problems which appears in various forms or is like a fundamental problem in listening, speaking, reading, writing, reasoning or mathematics and is not due to sensory and intellectual deficits. A type of learning disability is the disability in written expression. The mentioned disability has different degrees and rarely is found separately from other learning problems (Sousa, 2006). Most problems that come in to existence in written expression are in three areas of handwriting, spelling and written expression (Safe Naraghy & Nadery, 2005). Dysgarphia or spelling disability is a major disability in writing (Graham, 2000). According to research done by Shahn Yeylagh, Karami, Shekar ken and Mehrabi Sade Honarmand (2003), the epidemiology rate is 7%. Existence of these high rates of students with disabilities in writing is a warning to the educational system that requires prompt

* Corresponding author. Tel.: +98-913-316-0453; fax: +98-311-33-44-500.
E-mail address: m.ml1430@yahoo.com.
measures to resolve such problems. In many cases, spelling problems of these students are not due to intelligence agent or brain and neurological damages or environmental factors. But they are mostly due to defect or failure to use cognitive and Meta cognitive learning skills and learning conditions are changeable. These students could be taught how to change or control their learning strategies. Teaching cognitive and Meta cognitive skills and strategies can be effective in various files. It seems that the Meta cognitive skills play an important role in various cognitive activities including verbal exchange of information, reading comprehension, verbal understanding, writing, language learning, perception, attention, memory, problem solving, social cognition, self-directed learning and etc. Kraus (2006) noted that students with learning disabilities are less developed in the Meta cognitive processes related to the selection and application of learning strategies compared with their peers. For example, students with learning disabilities are less aware of writing strategies and their writing processes are less regulated (Wang, Battler, Fuser & Kapris, 2006). Meltzer research (2009) stated that the cognitive and Meta cognitive strategies increase writing ability in students with writing expression disability in planning, organizing, editing and correcting their writings. The cognitive strategies which are used for disability in written expression include teaching the cognitive and self regulation strategies (Smaared- Clurman & Ellison, 2009). The cognitive strategies teach students how to set their own goals, self- monitoring in writing (Graham, 2003 & 2009; quoted from Smaared- Clurman & Ellison, 2009). Englert (2009) finding showed that with teacher’s cooperation and teaching of the Meta cognitive strategies at primary and middle levels, we can increase learner’s development in learning, reading and writing strategies. Many research findings in this area show that interventions related to teaching the executive functions including the meta cognitive strategies, are effective in performance improvement of students with learning disabilities (belger & Banich, 1998; Bely & Torenton, 2001; McIn & Hitch, 2001; Swonson & Wilson, 2006; Van Der Slovi, Dey Jand & Nederlich, 2003; Gerston, Jordan & Flojo, 2005; Swanson & Jerman, 2006; Mcklosky, Perkiness & Dioner, 2009; Panigton, 2009; Meyer, 2010; Jordan, 2010; Gari, 2010) they report that primary students with learning disabilities have lower performances in the executive functions test particularly in meta cognitive strategies compared to normal students. Therefore, it seems that this study can increase our knowledge about the role of Meta cognitive strategies and skills and enhance the researcher’s theoretical in formations and generalize previous studies. And also considering learning problems are known as the most important factors in school failure, so improvement of the performance of students who have learning disabilities including spelling disability, can draw more attention of the educational system to the role of teaching strategies and Meta cognitive skills in learning. In this study we sought to answer this question: dose teaching Meta cognitive strategies have effect on improvement and correction of spelling ability skills in students with spelling disabilities.

Method

Participants

Design of the present study was experimental with pretest and posttest for the control group. Statistical population of the study consisted of all male students with spelling disabilities in third grade primary in Esfahan city during the 2011-2012 academic semesters. The study samples included 40 male students which acquired the lowest scores on the achieved checklist for identifying spelling disability and then were randomly divided into two groups of 20 and were placed in the experimental and control groups. After parental consent, educational program of the Meta cognitive strategies was administered to the experimental group at 15 sessions, each training session 45 minute and two sessions per week were held. After the end of the teaching sessions for the experimental and control groups at the posttest stage, the achieved checklist of spelling disability was administered. Also Covariance Analyze was used data analyze.

Measures

Checklist to identify children with spelling disability

The checklist of spelling disability symptoms was designed by researchers (Kaplan & Saduck, 2003). Content validity was confirmed by several experts and its reliability was reported 86%.

Achieved checklist to identify students with spelling learning disability in third grade elementary
The checklist in the present was made with the help of five teachers to detect spelling learning disability in third grade elementary, while the textbook changes of this grade were taken in to consideration and then was normalized on 200 students. The checklist has three levels:

A) Highest level: when a student write about 90-100 percent of words correctly

B) Educational level: when a student write about 75-80 percent of words correctly

C) When the numbers of spelling errors are more than 25 percent of spelling test words, in this case the student has performed below his age and with subsequent investigation, receives diagnosis of spelling learning disability. The checklist of this study was designed to identify spelling learning disability in third grade primary students considering textbook changes. The number of checklist words is 152 words. Spelling inability is being diagnosed when a student write more than 25 percent of the words wrongly. The content validity of the test was confirmed by experts. For the diagnostic validity, two learning disorder and normal groups were used and shown a significant difference between two groups. Also the reliability coefficient was 76% using retest method.

Wechsler intelligence test for children

Wechsler intelligence scale for children was applied in the study in order to indicate children don’t have intelligence problem. This test has been developed (1949) by David and Wechsler to measure children’s intelligence. This scale was revised in 1974 and after normalization, was named as revised Wechsler intelligence scale for children (WISC-R) (Shahim, 2004). To determine reliability of scale, reliability of test’s reassessment, IQ scores and final reliability coefficients of test, the scale was evaluated. In reliability of reassessment, the reliability coefficients were varied from 44% to 94% (the reliability coefficients mean is 73%). Also tests reliability was varied from 42% to 97% (the reliability coefficient mean is 69%). After examining the validity of the scale with the WPSI scale the correlation coefficients of verbal, practical and total correlation coefficients of two scales were 84% to 74% and 85% respectively (Shahim, 2004).

Clinical interview

After applying the checklist done for more credibility and more accurate identification of children with learning disabilities, clinical interview and Wechsler intelligence test for children was taken by two experts of exceptional children. The results of interview and Wechsler intelligence test for children confirmed the results of checklists.

Procedure

After referring to schools were randomly selected, at first by referring to third grade primary teachers to introduce students with spelling disability, they were asked to identify and introduce students with spelling disability. Then, the academic record and academic achievement of students with suspected learning disabilities in spelling in previous years were investigated. The achieved checklist to identify spelling disability was administered on these students and for more accurate assessment of intelligence and determining whether students are really having inability to spell, the assessment was conducted based on diagnostic criteria.

Results

Using data analysis, the following results were observed. Table 1 shows the mean and standard deviation scores of the posttest and pretest of the experimental and control group.

| Table 1 | The mean and standard deviation of spelling scores of the posttest and pretest of the two groups |
|---------|------------------------------------------------------------------------------------------------|
|         | The pretest                                      | The posttest                                      |
|         | Mean    | Standard Deviation | Mean    | Standard Deviation |
| The Experiment | 6/43     | 4/02               | 13/63   | 3/42               |
| The Control   | 7/86     | 3/39               | 8/53    | 2/72               |
As can be seen in table 1, the mean of spelling scores of the experimental group after applying the independent variable (training of the Meta cognitive variable) has increased, that shows the effectiveness of teaching plan. To compare the posttest mean scores of the test groups with experimental group, the Covariance analyze was used and the summarized results are present in table 2.

Table 2
Covariance analysis of the group membership on the posttest spelling performance

|                | Sum of Squares | df | Mean of Squares | F    | Sig. | Effect Size | Statistical Power |
|----------------|----------------|----|-----------------|------|------|-------------|-------------------|
| pretest        | 62/17          | 1  | 62/174          | 11/61| 0/000| 0/22        | 0/91              |
| Group          | 245/35         | 1  | 122/64          | 22/91| 0/000| 0/53        | 100               |

As can be seen in table 2, the Meta cognitive strategy intervention design could affect spelling ability of the trained experimental group. The results show that the Meta cognitive strategies teaching were effective in spelling performance improvement and there is a significant difference between the mean scores of both control and experimental groups after the teaching at the posttest stage.

Discussion

This study aimed to determine the effect of the Meta cognitive strategies teaching on performance improvement of third grade elementary male students with spelling disabilities in Esfahan city. The findings obviously showed that students with spelling disabilities could have been trained in the Meta cognitive strategies in order to improve their spelling performance. The results confirmed the above mentioned improvement and supported the important role which is given to Meta cognition by learning theories.

In the experimental situation, teaching the Meta cognitive strategies (Planning, Control and Monitoring & Regulation) lead to increased knowledge and students Meta cognitive control during spelling learning. Overly, findings of the present study are consistent with Cruz (2006) studies. He stated that students with learning disabilities are less developed in Meta cognitive processes related to selection and application of learning strategies compared with their peers. And also the findings are consistent with Englert (2009), who stated that with teacher’s cooperation and Meta cognitive strategies teaching at primary and middle grades we can help learners to grow in how to learn reading and writing. Motes studies (2009), stated that cognitive and Meta cognitive strategies increase writing ability of students with writing expression disability namely how to plan, organize, edit and correct their writing. This is main result of the present study. Findings of the study are consistent with research results that indicate the interventions related to executive functions in clouding the Meta cognitive strategies are effective in students performance improvement (belger & Banich, 1998; Bely & Torenton, 2001; Mclin & Hitch, 2001; Swonson & Wilson, 2006; Van Der Slovi, Dey Jand & Nederlich, 2003; Gerston, Jordan & Flojo, 2005; Swanson & Jerman, 2006; Mcklosky, Perkiness & Dioner, 2009; Panigtion, 2009; Meyer, 2010; Jordan, 2010; Gari, 2010). They have reported that primary students with learning disabilities have lower performances in the executive functions test particularly in the Meta cognitive strategies compared to normal students. Overly, the survey findings indicate that Meta cognitive strategies are teachable and using these strategies have a main role in the learners’ performance improvement and their efficiency. The fact that such positive results could be obtained in a relatively short time is very important, because such teachings with other educational and very efficient, because the study has been conducted on third grade primary students with spelling learning disability, then in generalizing findings to other educational grades and other children with learning disability must be careful. Accordingly it is proposed that future research of Meta cognitive strategies teaching to different groups of students, will be accomplished based on age levels and different grades and on other learning disabilities.
Reference

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

Annevirta, Tiina. (2007). Development dynamic of Meta cognition knowledge and text comprehension skill in the first primary school years. *Journal of Meta cognition Learning*, 2 (10), 21-39.

Bley, N.S., & Thornton, C.A. (2001). Anchoring adolescents understanding of math concepts in rich problem-solving environments. *Remedial and Special Education*, 22(5), 299-314.

Belger, A., & Banich, M.T. (1998). Costs and benefits of integrating information between the two hemispheres: A computational perspective. *Neuropsychology*, 380–398, 12.

Englert, C. S. (2009). The Learning to Learn Strategies of Adolescent Students with Disabilities. *Journal of Assessment for Effective Intervention*, 34 (3), 147-161.

Geary, D. C. (2010). Mathematical disabilities: reflections on cognitive, neuropsychological, and genetic components. *Learning an individual Differences*, 20, 130-133.

Gersten, R., Jordan, N., & Flojo, J. R. (2005). Early identification and interventions for students with mathematics difficulties. *Journal of Learning Disabilities*, 38, 293-304.

Graham, S. (2000). Handwriting & spelling instruction for students with learning disabilities. *Journal of Learning Disabilities*, 22, 78-98.

Jordan, N.C., Glutting, J., & Ramineni, C. (2010). The importance of number sense to mathematics achievement in first and third grades. *Learning and Individual Differences*, 20, 82-88.

Kraus, R. M. (2006) *Cognitive and Motivational Strategies for Reaching Individuals with Learning Disability: Developing a Toolkit for Practitioners*. PhD Thesis. Union Institute & University Cincinnati, Ohio.

Lerner, J. W. (2003). *Learning disabilities: theories, diagnosis and teaching strategies*. Boston: Houghton Mifflin.

Mazzocco, M.M.M., & Hanich, L.B. (2010). Math achievement, numerical processing, And executive functions in girls with Turner Syndrome(TS):Do Girls with Ts have Math Learning Disability? www.SID.ir. *Learning and Individual Differences*, 20, 70-81.

McCloskey, G., Perkins, L., & Divner, B. (2009). Assessment and intervention for executive function difficulties. New York: Routledge Press.

McLean, K., & Hitch, J. (2001). Executive functions in student with and without mathematics disorder. *Journal of learning disabilities*. 30:214-225.

Meltzer, L. (2009). *Executive Function in Education (from theory to practice)*. New York: The Guilford Press.

Meyer, M.L., Salimpoor, V.N., Wu, S.S., Geary, D.C., & Menon, V. (2010). Differential Contribution of specific working memory components to mathematical achievement in 2nd and 3rd graders. *Learning and Individual Differences*, 20,101-109.

Pennington, B. F. (2009). Diagnosing learning disorders: A neuropsychological framework. New York: Guilford Press.

Safe Naraghy, M., Nadery, E. (2005). *Special Failures in Learning*. Tehran: Mikhail publication.

Semrud–clikeman, M., & Ellison, P. A. T. (2009). *Child neuropsychology (assessment and intervention for neuron developmental disorders)*. Springer press.

Shahim, S. (2004). Revised Wechsler intelligence Scale for children/ conformity and standardization: Shiraz university publication.

Shahn Yeylagh, M., Karami, J., Shekar Shaken, H., & Mehrabi Zadeh, M. (2003). Examining epidemiology of spelling disability in primary school male and female students in Ahvaz city and the effect of multi-sensory therapy in reducing spelling disability in them. *Journal of Educational sciences & psychology*, NO: 3(4), 129-144.

Sousa, D. (2006) *How the Special Needs Brain Learns*. Thousand Oaks, CA: Corwin Press Incorporated.

Stel, M., Veenman, V. J. (2008). Relation between intellectual ability and Meta cognitive skillfulness as predictors of learning performance of young students performing tasks in different domains. *Journal of Learning and Individual Differences*, 18, 128-134.

Swanson, H. L., & Wilson, K.M. (2001). Are mathematics disabilities due to a domain–general of ad main specific-working memory defect? *Journal of Learning Disabilities*, 34 (3), 237-48.
Swanson, H., L & Jerman, O (2006). Math Disabilities: A selective meta-Analysis of the literature. *Review of educational Research*, 76, 249-251.

Van der Sluis, S., de Joung, P. F., Van der Leij, A. (2003). Inhibition and shifting in children with learning deficits in arithmetic and reading. *Journal of Experimental Child Psychology*, 87, 239-266.

Wong, B. Y. L., Butler, D. L., Ficzere, S. A., & Kuperis, S. (2006). Teaching adolescents with learning disabilities and low achievers to plan write and revise opinion essays. *Journal of learning disabilities*, 29(2): 197-212.