

An investigation on solving cooperative problem solving

Masoumeh sadat Abtahi*

Department of Humanities, Zanjan branch, Islamic Azad University, Zanjan, Iran

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ABSTRACT

One of the most important techniques to improve teaching skills is to use cooperative problem solving (CPS) approach. Implementing CPS techniques in elementary schools helps us train more creative generations. This paper presents an empirical investigation to find out how much elementary teachers use CPS techniques at different schools located in city of Zanjan, Iran. The study designs a questionnaire and distributes it among 90 volunteers out of 120 teachers who were enrolled in elementary schools. The study analyzes the data using some basic statistics and the result indicates that teachers maintain an average CPS score of 39.37, which is well above the average level. The study provides some guidelines for exploring teachers CPS's capabilities.

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1. Introduction

One of the most important methods for teaching effectively is to encourage students to participate in detailed discussion and share their thoughts (Johnston et al., 2000; Nelson, 1999). Cooperative problem solving (CPS) is one of the most popular methods for this purpose (Redish, 2003). Giangreco et al. (1994) presented various techniques of planning, adapting, and implementing inclusive educational experiences for students with different capabilities. Inclusive education can be defined differently. Heterogeneous grouping is the first definition when some students are educated together in groups and student could develop most when in the physical, emotional as well as social presence of having no disabilities.

Inclusive education can be stated as a sense of belonging to a particular group where all students are members of a class, simultaneously (Stainback & Stainback, 1996). Although they have a common objective for cooperation but they have various aims of learning, which is stated as multilevel instruction (Campbell et al., 1988; Collicott, 1991). Inclusive education looks an individualized

*Corresponding author.

E-mail addresses: m_almasi2020@yahoo.com (M. S. Abtahi)

balance between the academic and social characteristics of schooling (Giangreco, 1992). There are several advantages of encouraging students to involve in teaching progress through problem solving procedures. First, most problem solvers are optimistic people and they enter the process with knowledge that every challenge they encounter could be an opportunity to facilitate inclusive education. Second, problem solvers have the right to alter between divergent and convergent thinking. Third, problem solvers also actively defer and engage their judgment. According to Firestien (1989) effective problem solvers refrain from this practice and detect times to actively defer judgment and times to involve judgment, purposefully and they are associated with divergent and convergent thinking. In a divergent phase, judgment is actively deferred while in a convergent phase, judgment is engaged, intentionally. In addition, problem solvers consider challenges as fun and they take necessary action when needed.

Problem-based learning (PBL) has been implemented within health care professional educational programs to help critical thinking skills via a learner-centered technique. Hammel et al. (1999) examined student evaluations of the first three class cohorts taking part in a PBL-based curriculum. They reported that students perceived that a PBL method adopted consistently across the curriculum contributed to the development of information management, critical reasoning, communication, and team-building skills; however, they also detected some challenges such as time and role management, information access, instructor versus PBL expectations and practices, and coping with the ambiguity of knowledge and reasoning.

2. The proposed study

This paper presents an empirical investigation to find out how much elementary teachers use CPS techniques at different schools located in city of Zanjan, Iran. The sample size is calculated as follows,

$$n = \frac{N \times z_{\alpha/2}^2 \times p \times q}{\varepsilon^2 \times (N - 1) + z_{\alpha/2}^2 \times p \times q}, \quad (1)$$

where N is the population size, $p = 1 - q$ represents the yes/no categories, $z_{\alpha/2}$ is CDF of normal distribution and finally ε is the error term. Since we have $p = 0.5$, $z_{\alpha/2} = 1.96$ and $N = 120$, the number of sample size is calculated as $n = 90$. The proposed study of this paper considers the following two questions.

1. How much do teachers use CPS activities at school?
2. Is there any difference between the level of CPS activities and teachers' job experiences?

We have performed normality test using Kolmogorov–Smirnov test where the null hypothesis states that all data are normally distributed and the alternative hypothesis states that data are not normally distributed. Table 1 demonstrates the results of our findings,

Table 1

The summary of Kolmogorov–Smirnov test

KZ	Sig.	Hypothesis	Result
1.093	0.184	Accepting null hypothesis	Data are normally distributed

As we can observe from the results of Table 1, all data are normally distributed and we may use regular statistical observations to examine two hypotheses of the survey. Next, we present details of our findings on testing two hypotheses of the survey.

3. The results

In this section, we present details of our findings on testing two hypotheses of the survey.

3.1. Examining the level of CPS

We first look at the level of CPS among teachers who were enrolled in elementary schools in city of Zanjan, Iran. Table 2 presents details of our findings on mean and max of numbers.

Table 2

The results of scores measured by questionnaire

Teaching Method	Mean	Max	Sum of scores	Maximum of sum of scores
CPS	39.37	45	4905	4291

As we can observe from the results of Table 2, teachers maintain relatively a high level of CPS, which indicates they all have good capabilities of asking students to participate in different discussions.

3.2. The relationship between job experience and CPS capabilities

The second question of the survey is associated with the relationship between teachers' job experience and CPS capabilities. We have categorized teachers in terms of their job experiences and performed an ANOVA test between two groups. Table 3 demonstrates the summary of our findings.

Table 3

The summary of ANOVA test

Variable		Sum of squares	df	Mean of squares	F	Sig.
CPS	Between group	0.36	4	0.89	0.36	0.83
	Inside group	72.7	287	0.25		
Total		73.06	291			

Based on the results of Table 3 we can conclude that there was no difference between two groups and job experience did not play essential role on CPS development skills.

4. Discussion and conclusion

In this paper, we have performed an empirical investigation to study the level of CPS among elementary teachers who were enrolled in different regions of city of Zanjan, Iran. The study has detected that teachers have maintained a good CPS level, which is a good sign of modern teaching skills and they must be supported to improve and retain such capabilities. Unfortunately, in Iran, there are some barriers of CPS implementation. First, CPS implementation may create different discussions and many parents blame CPS adoption because of having noisy classes. Second, many parents ask teachers not to use CPS methods because they believe this method wastes teachers' times. There is no doubt that CPS method is time consuming compared with traditional one but there are many advantages on CPS implementation as discussed earlier in this study. There are also teachers who are not fully familiar with CPS methods and the study recommends offering a short course programs for helping teachers become more familiar with this technique.

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