Methods of Instruction and Higher Cognaffective Behaviors Among Iranian High School Students: a case for scientistic attitude

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Abstract: From a constructivist perspective, teacher education programs need to help with the development of a scientistic attitude in teachers in order to facilitate such a development in students. What is meant by "scientistic" is that which is associated with scientists. Scientists are constructivists by the very nature of their work -construction of knowledge at the species level- although they may consider themselves of a different philosophical persuasion. Philosophical persuasions in teacher education programs, and in teachers themselves, are determining factors in defining educational goals and influential in the utilization and promotion of different instructional methods. The conventional methods are least constructivist as they are reductionistic and one-dimensional, and emphasize bottom-top processing. The post-conventional methods, on the other hand, are much more constructivist in nature, as they are holistic and multidimensional, and emphasize top-bottom processing. Hence, their use both requires and promotes a scientistic attitude among teachers and students alike, and could lead to higher affective-behavioral-cognitive achievements (cognaffective behaviors!). The performance of the 20 million strong student population of Iran in different arenas has provided the Ministry of Education with the incentive to toy with the idea of educational reform and instructional improvement. One medium through which such changes have been introduced is the in-service training program wherein the new methods of teaching/learning are introduced, albeit within a conventional setting! However, despite the efforts and the expenditures, the new methods have not caught on and only some teachers use their renditions of the constructivist approaches in their classrooms. Therefore, additional effort, through comparative/evaluative studies, is needed to show the practicality and effectiveness of these approaches versus that of the conventional methods. The present study has been such an effort. Two selected classrooms using the two approaches were observed, tested, and interviewed on multidimensionality of their achievement and higher "cognaffective" behaviors. Results show the relative supremacy of the cooperative method over the direct method of teaching in all, except the affective, dimensions. It could be that the attitudes have not turned fully scientistic, and the new methods are not fully internalized.
Keywords: scientistic attitude, teaching methods, constructivism, in-service training

Introduction

Learning/instructional theories, based on different philosophies, advocate different methods. The more traditional and teacher-centered methods stem from the positivistic principle of independent objectivity and emphasize one way transference of knowledge from teacher to student (Safe, 2002). Furthermore, the responsibility of encouraging, monitoring, and evaluating this transference lies with the teacher as well (Mehrmohammadi, 2000). According to Hameedy (2002), these methods are reductionistic, one dimensional, and emphasize bottom-up processing. As such, besides ignoring the affective and social dimensions of the learner, they do not foster the development of higher level cognitive functions either (Woolfolk, 2001). The more contemporary theories provide for different methods.

In constructivist theories, based on the post- positivistic principles of relativity and constructivity of knowledge, learning is considered to be the construction of meaning through active personal experiences (Safe, 2002). In the social constructivist theories of Vygotsky and Bruner, knowledge is, prior to becoming internal through interaction of the learner with the environment, is external and is constructed using cultural tools (Fetsco & McCuller, 2005). Vygotsky considers human learning as a social phenomenon in which language plays the central role, as does the learner who is considered the active constructor of knowledge. The constructivist methods are holistic, multidimensional, and emphasize top-down processing. The teacher or the learning assistant is considered as a guide and facilitator rather than a transferring agent (Santrock, 2002). Teachers need to help the learners in getting involved with others actively in order to construct new knowledge. Problem solving through scaffolding and cooperative learning are among student-centered approaches to teaching/learning (Fetsco & McCuller, 2005).

Cooperative learning is a method in which students pursue common goals through cooperation and as such is compatible with the principles of the social constructivism. Johnson & Johnson (2002) considers five characteristics necessary for any cooperative learning situation to be constructive: Positive interdependence, progressive and face to face interaction, personal and group accountability, interpersonal and intragroup skills, and group monitoring. Thus, according to Hameedy (2002), the teacher needs to have a plan in which a set of learning activities, instrumental in reaching the expressed goals and objectives, are identified. Furthermore, the goals and the activities planned need to be in affective and behavioral as well as cognitive domains. As such it can be expected that different methods bring about different outcome, but the question is do they in any and all educational settings, like those experienced by Iranian students.

The Iranian educational system is faced with many challenges among which the grade repetition ranks high. One million students, across all grades, and 27% of the high school

population failed to progress in previous year (Zarafshaan, 2005; Haajee, 2005). As a result attempts have been made to remedy the situation by improving or upgrading the teaching methods employed by teachers through in service training and experimental projects. Despite efforts in introducing new methods, the traditional approaches to teaching are still dominant and only a small minority of teachers, based on their personal preferences and interpretation, choose to use new methods such as cooperative learning. Bringing about change in teaching methods, like in any other aspect of the educational system, requires certain foundations without which the expected results are not achievable. Among these prerequisites is awareness and acceptance of the theoretical basis of the methods used, without which the utilization would be superficial and ineffective. Furthermore, any changes implemented in the system must be based on research findings. Evaluation of the traditional and new methods of teaching/learning and the comparison of their processes and products is a step in that direction. Considering the time and effort spent on promotion of new methods, the question being asked here is whether the students who are using the cooperative method achieve more cognitively, affectively, and behaviorally than those using the traditional teacher centered method. The main goal has been to help make the case for changing the methods of learning/teaching in order to improve the overall quality of education.

Literature Review

Research on cooperative learning is abundant. They all show the positive effect of cooperative learning across subject matters, grades, schools, and countries (Ghodratee, 2001). Santrock (2002) has also cited research findings that show cooperative learning as an effective approach. This method is effective when members of the group are held personally accountable for their own and the group's achievements and receive group rewards Fatheeaazar (2003). Neesee, Najaaryaan, & Shaykhaanee (2003) reports better school performance, as well as longer recall of the materials, among those using the cooperative learning method. Shachar & Fischer (2004) has also found cooperative learning effective especially for the low and average achieving students. Ghorbaanee (2001) cites research that shows for the lower level cognitive tasks, the cooperative learning has no advantage over the traditional methods, but for the higher level cognitive tasks is much more effective. Furthermore, it helps with the improvement of social skills (Keraamatee, 2003), social cohesion, self esteem, and reasoning (Taajeek, 2004). In music education, cooperative learning improved students' motivation to learn, attitude towards music as well as towards own musical talents (Ibid.). Johnson & Johnson (2002) has found cooperative learners more hard working and internally motivated, and consequently better achievers using higher cognitive skills.

The abundance of works done on cooperative learning has lead to many reviews and meta analyses that in a way evaluate the findings. Slavin in reviewing 27 studies on cooperative

learning reports that 25 of them have found positive impact of the method on achievement, interpersonal relations, self esteem, interest in school related activities, attention and time allotted to studying, and working with others (Mashhadee, 2003). In reviewing 14 studies conducted in the past ten years in Iran, the effectiveness of the method in the cognitive (school achievement, middle level skills), affective (self concept, and self esteem), and behavioral (social skills) domains has been supported. However, most of them on school achievement, few on social skills and self concept, and only one has addressed all three dimensions. However, most of these lack a clear explanation of the theoretical basis of the method as they do a critical review of the literature. Methodological deficiencies in most of these studies also undermine validity of their findings. In the present study not only attempts have been made to avoid these deficiencies, but by undertaking a multidimensional perspective, it is hoped that a clearer picture of the situation in a case of using cooperative learning in Iran emerges. Considering the theoretical framework and the findings of the studies reviewed, it was hypothesized that cognitive, affective, and behavioral achievement of learners using the cooperative learning method is higher than those utilizing the traditional method of lecturing by the teacher, as is their use of higher cognitive abilities (evaluation, synthesis, and analysis).

Methods

There were two groups of data sources in this study which were comparable in terms of gender, grade, overall achievement, socio-economic status, teacher characteristics (years in practice and level of education), and students' subject matter performance in previous year. Both groups were engaged in learning the same subject matter through out one semester using two methods. These two groups' characteristics were measured three times. The data collection was carried out by one of the researchers and her female assistant, and within the natural setting of the classroom through observation, inquiry, and testing. The observation was carried out during three class sessions, the written inquiry and the testing were conducted a week following the last observed session.

The data sources were 113 female high school sophomores attending two sections of the same grade in two schools in the same district. 51 of them were in two classrooms where the traditional method was used and 62 in two other classes where the cooperative method was utilized. The traditional group was selected in such a way that it was comparable to the cooperative group on characteristics mentioned above.

The instrument used for observing the students' behaviors during the learning sessions consisted of six most frequent behaviors that were observed during a preliminary observation session (e.g. asking, answering, and commenting). Vygotsky's emphasis on the interactions of the learner with peers and adults guided the preliminary observation. The instrument was

evaluated by educational psychologists and high school teachers as being valid and in a trial session wherein two observers used the instrument yielded a 0.92 inter-rater reliability. Both observers attended two sessions prior to data collection in order to minimize, if not eliminate, the effect of their presence on the students behavior. Another measure that was constructed and used to assess the characteristics of the learners was a 24-item questionnaire that measured their attitude (affective, cognitive, and behavioral dispositions) towards the subject matter, learning in general, and prospects of continuing their education. The content of the questionnaire was deemed valid by two educational psychologists and its test-retest reliability was measured to be 0.79 following revisions suggested by a group of students who reviewed the questionnaire for clarity. The internal consistency of the three sub-measures was also calculated to be 0.78. The third instrument used in the study was a test constructed to measure three (high, medium, and low) levels of cognitive tasks using the content of one chapter in the textbook used in the course. The test was initially evaluated as valid by content area experts and then revised following a trial run in which its indices of difficulty and discrimination were assessed. Considering that the test included open (short answer)questions, an inter-rater reliability of the scores given by two graders to these questions was calculated to be 0.96 as the internal consistency of the measure was assessed to be 0.89 for the objective part and 0.75 for the short answer part.

The data thus collected were considered to be interval data for the cognitive and affective functions and hence were analyzed using the independent t-test since the research hypotheses were on the differences of two groups. However, given the possibility of some of the requirements for the use of t-test not having been met, the non-parametric test of Mann Whitney was also conducted. The behavioral data were frequency data and were analyzed using the Chi Squared test.

Results

The t-test on the cognitive data showed a significant difference between the two groups ($t=2.47$, $df=111$, $\alpha=0.01$) where as the affective data showed no such a difference. The Mann Whitney test also gave the same results. The Chi Squared test on the behavioral data also yielded a significant difference between the two groups ($\chi^2=2.47$, $df=5$, $\alpha=0.005$). Thus the first hypothesis on the superiority of the cooperative method in relationship to all three dimensions is only supported for the cognitive and behavioral dimensions. As for the second hypothesis on the superiority of the cooperative method in relationship to the high cognitive functions, again the t-test showed a significant difference between the two methods ($t=2.26$, $df=111$, $\alpha=0.02$) and hence the hypothesis was supported by the data.

Discussion

The results for the cognitive and behavioral data are compatible with the theoretical framework of the study. Constructivist theories assume that learners actively construct knowledge and meaning through their experiences. They interpret the new data by relating them to the old information they have, thus making their learning deeper and more meaningful (Fetsco & McCuller, 2005). In other words, the knowledge thus constructed is more meaningful than that handed out by the teacher and received by the student (Barkheh, 2004). In cooperative learning all learners have the opportunity to be active, listen to each other's views and thoughts, review and criticize each other's ideas, communicate, and help each other to learn. Within such a learning environment obviously the learners achieve more and the findings of this study support this. In cooperating with others, the learner constantly reconstructs and reorganizes his/her knowledge which leads to a more meaningful learning.

Moreover, the cognitive and behavioral results are also compatible with the findings of other studies such as Ghorbaanee(2001), Khosravee (2003), and Mashhadee(2003) wherein the cooperative approach has lead to better school achievement. However, the affective data did not yield results compatible neither with the theoretical framework nor with the other findings. Nevertheless, Sha'baanee(1995) has also reported no affective difference due to the method used. Other studies point to the effectiveness of cooperative learning in interpersonal relations among learners, interest in school and its subjects, and their attitude toward learning and school.

The results also verified the second hypothesis as the group using the cooperative approach scored significantly better on the higher level cognitive tasks. Social constructivism emphasizing the fundamental role of social interaction in learning considers higher level cognitive tasks such as reasoning and critical thinking are initially performed within the social interactions and only later internalized (Woolfolk, 2001). This finding is also supportive of the other studies' findings. Neesee, et.al. (2003) and Ghodratee (2001) have also shown the effectiveness of cooperative learning in improving the higher level cognitive functions.

Failure of the present study to show any effect on the affective dimension may be due to its methodological shortcomings or stem from the participants' affective difficulties. The way that the cooperation in learning has taken place in the observed classrooms could be the cause of incompatible finding. However, given the low scores of both groups on the affective component of their attitude towards school, it could be said that the ineffectiveness of the cooperative method is more due to that than anything else. The weak attitude towards learning could be one of the main problems in the educational system that manifests itself in high rates of grade repetition. Yet the efforts of the planners in setting up interventions aimed at remedying the problems seem not to have been successful because the underlying

philosophical and epistemological tendencies of the planners as well as those of the participants are more compatible with the traditional methods. Most of them still consider knowledge as something that can be given and taken rather than constructed. The emphasis is still on memorization and recall; i.e. limiting teaching and learning to the lowest level of cognitive functioning while ignoring the affective and behavioral domains.

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