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The effectiveness of English inductive teaching on Iranian EFL learners' inquiry spirit

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Article Info

Abstract
This study aims at investigating the effect of inductive teaching of English on students' inquiry spirit. For this purpose, 30 nine-graders participated in this experiment. Participants were under the experimental instruction of inductive teaching for two months and half (10 sessions). The comparison between students' inquiry spirit scores in pretest and posttest shows that there is a significant difference between them indicating the growth in their motivations, interests, involvement in the process of learning and inquiry spirit. The results show that the process of active learning, efficient learning, and students' interactions with each other and their teachers are the consequences of inductive teaching. The findings have clear implications for practitioners, researchers and curriculum developers.

Introduction
Educating students as thinkers, questioners and improving their sense of critical thinking is highly required in today's society. Engaging students in complicated and holistic activities rather than simple and isolated skills can better prepare them for life future challenges. It has been proven that creativity and inquiry spirit are not merely instinctive characteristics but different people own this talent in different levels. In addition, some factors such as talent identification, educability, flexibility, level of knowledge and awareness, risk taking and not being afraid of mistakes and failures affect student's creativity, innovation and inquiry. Teacher can recognize all these factors in student and try to improve them.

Inquiry spirit
Inquiry spirit is defined as "having emotional and cognitive reaction to understanding content by asking questions from oneself or others (Heidarpoor, 2016) [5].

Considering the fact that educational system is the main foundation of a society in all aspects and its main purpose is educating students' cognition, this system must make efforts and pay special attention to critical thinking and creative thinking of students (Liaghatdar, Abedi, Jafari, & Bahrami (2023) [7].

The new responsibility and missionary of educational systems in modern era is enabling the new generation of students to direct and purposive searching of information among tons of data. To this aim, the most important requirement is his questions (Mehr Mohammadi, 2010) [8].

Posing questions is one of the most important ways of learning (Yaghobi, 2010) [13]. So, educators, schools and educational environments have to make maximum efforts to improve student's inquiry spirit.

Student's question has an important role in meaningful learning and has strong effect on the quality of their thinking. One who has no ability to ask questions has not been to the start point yet (Hasan-Zadeh Gheshlaghi, 2008) [10].

Gaining information, making interest and curiosity, interaction control, maximizing activities of the other side of interaction, defining attitudes and feelings of the addressee, encouraging group members to leave comments are main functions of inqury (Hargie, Saunders, & Dickson, 1994) [4].

In fact, modern education believes that learners who learn actively not only learn better but also enjoy their process of learning. Because instead of being only listeners, they are actively engaged in their process of learning and are responsible about their own learning process (Gardner & Jevome, 2000) [3].

Inductive teaching

Induction is the action of observing events and then inducing in order to hypothesize based on what has been observed (Shabani, 2011) [11].

Applying inductive teaching can improve the capacity of thinking, gathering, organizing, information control and naming concepts (Farhadipour, Abbasi & Karimzayi, 2015) [2].

Because of students' frequent interactions with each other and their active involvement in learning in inductive approach, their social skill improves and they have higher self-confidence. They can easily use what they've learned in real context (Abbasi, Ahmadi & Lotfi, 2009) [1].

By the use of inductive teaching, learner and teacher are in a condition in which the concepts and content of lessons are taught in a specific order and harmony. Teacher guides learners to lesson objectives by posing purposeful questions. Students follow a posteriori path and will raise awareness of expected concept at the end of the instructional session (Taba, 1967) [12].

Therefore, inductive thinking is the method of learning based on experience. Learners are involved in their own learning process, assess activities to clarify learning, gain useful new insights and use their learning in new situations. This approach consists of experiencing, sharing, analyzing, deducing or generalizing and applying (Reza-Zadeh, 2013) [9].

Purpose of the study

In spite of high level of knowledge in many students, they show little interest to investigation and inquiry. Their whole effort is mainly on homework projects that their teachers have assigned. Thus, the aim of this study is to conduct a research on issues related to changing regular studying habits and improving student's sense of curiosity and inquiry. Since one of the main objectives of inductive teaching is making process of learning cooperative, explorative and active by increasing their curiosity to extract rules form samples, it seems that this approach to teaching might have a significant effect on student's sense of inquiry and is an effective tool for teaching language structures cooperatively.

The study gathered some empirical data to address the following research questions:

- Does inductive teaching of second language impact learner's inquiry spirit?
- Is there any significant difference in pre and post treatment student's inquiry spirit after inductive teaching?

Methodology
Participants

As it was said before, the aim of this study is to investigate the effectiveness of inductive teaching on improving learner's inquiry spirit. To do so, 30 nine-graders participated in this experiment. Participants were under the experimental instruction of inductive teaching for two months (10 sessions). Considering the fact that the research was supposed to be conducted on all students in the class, cluster sampling procedure was applied for choosing participants.

Data collection instruments

Inquiry spirit questionnaire (Heidarpoor, Ahmadabadi, & Yarmohammadian, 2016) [5] was applied as a data collection tool for measuring students' level of inquiry. This questionnaire has been constructed based on different resources and texts and includes three main components including investigation, critical thinking and research ability. The questionnaire has thirty-five statements and is designed based on Likert Scale (ranged from totally disagree-1 to totally agree-5). The following table presents the content of each statement based on the three components:

Table 1: Categories of questionnaire statements based on spirit inquiry components

Components	Questions
Investigation	1 to 12
Critical thinking	13 to 22
Research ability	23 to 35

Cronbach's alpha coefficients were reported 0.78, 0.79, 0.91, 0.79 for investigation, critical thinking, research ability and inquiry spirit variables respectively which shows the accuracy of measuring instrument in this study.

Data collection Procedures

In order to measure learner's inquiry spirit at the beginning and end of the course, two strategies were used. The first one was using inquiry spirit questionnaire and the second one was the scores the teacher gave to the learners about their spirit of inquiry. The second strategy is used to make sure students don't overestimate their inquiry spirit level in questionnaires thus the results are more dependable and worth making decisions upon. Teacher's scoring is based on some criteria and factors such the extend students show curiosity and inquiry in the class during the course and express their problems and ask questions. To measure the reliability of scores, intra-rater reliability method was used in which, the teacher scored students twice in pretest and posttest and calculated the correlation coefficient as the reliability index and made sure about the reliability of scoring. Intra-rater reliability indexes in pretest and posttest were 0.75 and 0.83 indicating an acceptable reliability. The total score for inquiry spirit of each student is the average of questionnaire and teacher's scoring.

Data analysis procedure

The questionnaires were distributed among the learners and at the same time the teacher scored students' inquiry spirit. Then the learners went through the instruction of English structures inductively in two months and half including ten sessions. At the end of the course, they were given the questionnaires and the teacher scored their inquiry spirit once again as posttest. The collected data was statistically analyzed using SPSS software to investigate the extent to which the mean scores have changed in posttest compared to pretest.

Results

Since the experimental research in this study is based on the comparison between pretest and posttest mean scores, paired-t test was used to analyze the scores. Considering the fact that paired t-test is based on the assumption that there is a normal

distribution of data, normality test was conducted first to make sure about it. The result of normality test is presented in table 2:

Table 2: Test of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest	.146	30	.101	.928	30	.042
posttest	.127	30	.200[*]	.939	30	.086

Regarding the quantity of Sig. in the table in two different normality tests of Kolmogorov-Smirnov and Shapiro-Wilk, it is obvious that the distribution of scores is normal in pretest and posttest. Although there was a little evidence on the abnormality of distribution in Shapirov test, the assumption is based on normality of distribution according to Kolmogorov test.

The next step is using paired-t test for data analysis. The result is presented in table 3:

Table 3: Paired samples statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	69.6500	30	32.89774	6.00628
	posttest	74.8500	30	32.96841	6.01918

The term 'Mean' presents mean of scores in pretest and posttest. As it is shown in table 3, mean scores of inquiry spirit have significantly increased in posttest. N indicates the number of participants in this study.

Table 4: Paired samples test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	pretest - posttest	-5.20000	2.46912	.45080	-6.12198	-4.27802	-11.535	29	.000

Table 5 presents the correlation between pretest and posttest scores. Considering the table, pretest and posttest mean scores are highly and positively correlated. Regarding the quantity of Sig. presented in the table, there is a significant correlation between the two variables.

Table 5: Paired samples correlation

		N	Correlation	Sig.
Pair 1	pretest & posttest	30	.997	.000

Conclusion
The study aimed at investigating the effect of inductive teaching on EFL learner's inquiry spirit. Considering the findings and results of this study, inductive teaching has a positive significant effect on learner's inquiry spirit and can increase it. In fact, this approach to teaching language structures can enhance spirit of inquiry, curiosity and cooperation in learners and thus it can optimize classroom teaching-learning process. Inductive teaching has an important role in improving critical thinking, cooperative thinking, reasoning, analyzing etc. In inductive approach, learners' social skills and self-confidence increase as the result of frequent interaction of learners with each other and with their teacher. Continuing this process can eventually lead to the improvement of their inquiry spirit and active collaboration in learning environment. Since one of the main objectives of inductive teaching is making process of learning cooperative, explorative and active by increasing their curiosity to extract rules form samples, it seems that this approach to teaching might have a significant effect on student's sense of inquiry and is an effective tool for teaching language structures cooperatively. These findings have clear implications for practitioners, researchers, curriculum developers and every language instructor who wants to teach efficiently.

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