Effectiveness of Inductive and Deductive Methods in Teaching Grammar

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Abstract

The study investigates the comparative effectiveness of teaching English grammar by using deductive and inductive teaching models. The study also attempts to see which of these two methods has a positive effect on the grammar academic achievement of the university students and elementary school students in Jordan so it answers the following questions:

- What is the effect of inductive method on grammar achievement compared with deductive method at university level?
- What is the effect of inductive method on grammar achievement compared with deductive method at elementary stage?

To answer the questions of the study, the researcher prepares two programs based on inductive and deductive methods for each level based on its syllabus. The sample consists 180 students; eighty at the 1st year level in English departments at university level and one hundred at the elementary stage. The participants of the study consisted of four assigned sections. Firstly, at the university level, two colleges are randomly selected out of the eighteen faculties of Albalqa' Applied University; two sections are randomly selected; one group is randomly assigned as the 1st experimental group (by using inductive method) and the second experimental group (by using deductive method). Similar process is adopted in the case of school students at the elementary stage. The relevant pre-tests are administered to the students of both groups at each stage (university and school) to make sure that the groups are equivalent at the time of starting the experiment. The researcher designs two grammar achievement tests as the instruments of this study (one for the elementary stage and one for university level). The instrument of each stage consists of two achievement tests (pre- test and post-test). At the end of the treatment period, relevant post-tests are administered to the students of both the groups. The results of the study revealed that there were significant statistical differences at ($\alpha \leq 0.09$) among the grammar performance means of both groups at both levels due to inductive method.

Keywords: Inductive method, Deductive method, Elementary stage, University level, Academic achievement

1. Introduction

According to Bastone (1994), grammar is multi-dimensional; it is a formal mechanism, a functional system from signaling meanings, or a dynamic resource which both users and learners call on in different ways at different times. The main goal of grammar teaching is to enable learners to achieve linguistic competence; learners use grammar as a tool or resource for comprehension, and creation of oral and written discourse efficiently, effectively, and appropriately depending on the situation (Huang, 2005).

Teaching grammar plays a central role in every English foreign language (EFL) teacher's classroom and has been the focus of language teachers and learners for many years. Some people perceive it as essential to teaching any foreign language whereas others view it as an impediment to second language acquisition (SLA). Through his empirical study, (Ellis, 2006) concluded that grammar teaching can help students enhance both their language proficiencies and accuracy, facilitate the internalization of the syntactic system of the second and foreign language, and supply the development of fluency. In addition, grammar teaching can contribute to both acquired knowledge as well as learned knowledge.

Although grammar is given importance in the classroom teaching in Jordanian universities and schools, its rules are taught in isolation and sufficient practice is not given in the use of different aspects of grammar in reading, writing, speaking and listening. Also, functional grammar is not taught and practiced in the class room. More importance is given to the teaching of English textbook and grammar is taught without adopting suitable method e.g. inductive method or deductive one. This problem of teaching of English grammar can be solved by changing our teaching methods and using different techniques of teaching for instance adopting the inductive method (Socratic, rule-discovery,

bottom-up) of teaching English grammar or deductive method (rule-driven, top-down).

Inductive method based on group work activities and giving generalizations and examples firstly. Richards et al (1985) claimed that learners are not taught rules directly, but are left to discover - or induce - rules from their experience of using the language. On the other hand, in deductive method, the rules of grammar are dictated to the students and then particular examples are given. Also, sufficient practice is not provided in the use of different aspects of grammar. The inductive approach, instead of basing on a teacher-fronted transmission-style classroom, is student-centered and allows learners to become deeply involved in the language they are studying and offers potential for reflection. In the process of experiential learning (learning-and-doing) the students feel more important less passive, and do not get bored so easily during the lesson. Therefore, the inductive technique can render great service to teachers who have problems with keeping their students disciplined, concentrated and occupied, as it partly obviates these problems. Knowing that they can work out the rules from examples by themselves greatly increases learners' motivation, makes them attentive, more actively involved in and confident and enthusiastic about the learning process rather than simply passive recipients, and at the same time contributes to its effectiveness.

The effectiveness of deductive and inductive approaches has been investigated in empirical studies. Harmer (1989) ascertains that these two techniques encourage learners to compensate for the gap in their second language knowledge by using a variety of communication strategies. A number of research studies, likewise, has reported that successful learners often adopt certain learning strategies such as seeking out practice opportunities or mouthing the questions put to other learners (Peck, 1988). Inductive and deductive models offer this chance to learners because these two models foster a cooperative atmosphere among students. According to Celce-Murcia et al (1997), the communicative classroom provides a better environment for second language learning than classrooms dominated by formal instruction so learning deductively and inductively is among the communicative approaches that encourage students to communicate fluently. The importance of students' active involvement in the learning process is increasingly growing in this era of information explosion. Educators continue to unravel ways to assist learners in developing their cognitive potential. Deductive learning and inductive learning which help students articulate their mental processes seem to incorporate many of the research studies propounded by ESL practitioners. These approaches have proved to give students the ability to rationalize what information is needed and, thereby, to make them conscious of the intent and content of the lessons presented to them.

This study is undertaken to see whether the inductive or deductive models in teaching of English grammar has a positive effect on the academic achievement of the elementary school and university students. So, the need is to find the comparative effectiveness of teaching English grammar by using deductive model and inductive model.

1.1 Objectives of the study

The main aim of the present study is to find the comparative effectiveness of deductive and inductive methods on the academic achievement of the elementary school and university students.

The objective is split into the following sub-objectives:

- To find the effect of both models on the students' grammar academic achievement in schools.
- To find the effect of both models on the use of the rules of grammar by the university students.

1.2 Significance of the study

In Jordan, The traditional methods of teaching English are being practiced at the school level and university one so the study may help the teachers and the students in bringing a positive change in the classroom. The curricula planners and teachers can rely on the findings of the relevant study instead of relying on their own unaided intuition. Finally, there are not comparative studies on the effect of inductive and deductive on grammar in the context of the Arab world in particular in both levels" university level and school level at the same time".

1.3 Definition of Terms

The important terms of the study are operationally defined as follows:

- Inductive way: It refers to the way in which one stores a number of specific instances and induces a general law or rule or conclusion that governs or subsumes the specific instances (Brown, 1994).

- Deductive way: It refers to the continuous presentation of rules, generalizations, principles, or examples of the rules as they apply in specific instances (Thomas, 1970).

-Grammar achievement: It is the score that each student in both the experimental and control group gains in the post grammar test of different aspects of grammar which are immediately administered after the completion of the program.

2. Literature Review

Many researchers are interested in comparing the effectiveness of deductive and inductive methods in teaching EFL. In the present study, the researcher mentioned some of their studies that conducted at school level, while others were conducted at university level.

2.1 Studies related to university level

In a study done by Vogel et al. (2011), they compared the effect of a guided inductive and a deductive approach on short- and long-term learning of 10 grammatical structures to intermediate-level French college students. A mixed-methods design was adopted to assess performances and preferences in both conditions. The researchers prepared a

questionnaire to assess students' preferences and its relationship with performance. Findings indicated a significantly greater effect of the guided inductive approach on short-term learning and students who preferred explanations of the rules performed better with a guided inductive approach.

Another study done by (Haight and et al., 2007) investigated the effect of deductive and guided inductive methods on teaching grammar in college French classrooms. The participants of the study are forty seven French students who taught eight grammatical structures (four with deductive and four with guided inductive method). Two instruments were prepared; the first one is a questionnaire to complete background information in order to assess previous language study and other demographic information that might be pertinent to this investigation and its findings. The second one is a grammar test; a posttest was identical to the grammar pretest. At the end of the semester, 14 weeks after the pretest, the grammar posttest was administered to the participants to measure the long-term learning of the grammatical structures as well as the effectiveness of each presentational approach. To answer the questions of the study, t-test and ANOVA were conducted. The results indicated that the guided inductive method had statistically significant effects on the long-term learning of grammatical structures. Also, the findings of the study supported using guided inductive instructional method to teach grammar at the beginning-level FL classrooms.

Similarly, Jong-Won, (2007) also conducted a study aimed at investigating whether there would be a significant difference between an explicit-inductive/cooperative instruction and an explicit-deductive/individualistic instruction for the acquisition of English relative clauses in Korean university-level EFL learners. This study used a mixed method design of data collection and analysis. The subject of the study consisted of 90 undergraduate EFL students at Cheongju University, Korea. Two groups randomly assigned to one of the treatments. Students were administered a pretest, a posttest, and a delayed posttest with two sections: a Sentence Combining Test (SCT) and a Grammaticality Judgment Test (GJT). The results of the study revealed that both groups significantly increased their overall learning outcomes from the pretest to the posttest, but the experimental group scored significantly higher than the control group. Therefore, the explicit-inductive/cooperative instruction was more effective than the explicit-deductive/individualistic instruction. Also, both groups consistently scored higher on the SCT than on the GJT, but the experimental group scored significantly higher than the control group on both the SCT and the GJT.

Finally, Takimoto, (2005) conducted a study aimed at investigating the effect of inductive and deductive methods on the acquiring of pragmatic competence. The sample o the study consisted of sixty Japanese native speakers with inter-mediate level proficiency in English were distributed randomly on three experimental groups (deductive, inductive with problem solving, and inductive with structured input tasks) and one control group. Each group contains fifteen participants. They have to complete the study during six weeks. The pretests and posttests were applied. The results indicate that the three experimental groups performed significantly better than the control group and the inductive method is effective when combined with problem-solving tasks or structured input tasks. The researcher recommended that teachers might get the benefits of the outcomes if they use the inductive method in teaching pragmatics.

2.2 Studies related to School level

On the other hand, other studies have been done on the use of the inductive way at school level. For example, (Tammenga-Helmantel, 2014). Conducted a quasi-experimental study to compare the effectiveness of deductive, inductive, implicit and incidental grammar instruction. The sample of the study consists of 981 Dutch students in lower secondary education learning German, English or Spanish as a second language. The design of the study consisted of a pre-test, a series of lessons about the degrees of comparison and a post-test. Both meta-linguistic knowledge and production of the grammatical structure were tested. By using analysis of variance, differences in students' test scores between instruction forms were examined. The findings show that any kind of grammar instruction (explicit and non-explicit forms) is more effective than no grammar intervention/exposure.

Also, Aisha (2002) conducted a study to investigate the comparative effectiveness of teaching English grammar with the help of textbook (deductive method) and by using group work activities (inductive teaching model). The sample size was eighty (80) at the secondary and one hundred and twelve (112) at the elementary stage in Pakistan. The duration of teaching was about one month with daily period of thirty-five minutes at each stage. The experimental group at each stage was taught English grammar through group work activities by using the inductive teaching model whereas the control group was taught English grammar through textbook using deductive method (traditional method). At the end of the treatment period, relevant post-tests were administered to the students of both the groups at each stage and were scored. The main findings of the study were; the experimental and control groups at both the elementary and secondary stage were equivalent at the time of starting the experiment and the teaching of English grammar through group work activities (inductive approach) played a positive role in improving the academic achievement of the students studying English at the elementary as well as the secondary stage.

Finally, Al- Emami (2005) carried out a study aimed at comparing the effect of the inductive and deductive ways of teaching on learning relative clauses in English Language. The sample of the study consisted of 160 scientific and literary male and female students who were divided into two groups, the inductive and deductive. This sample was given a pre- test to find out if there was a statistically significant difference ($\alpha \leq 0, 05$) between the means of students' achievement marks. After conducting the experiment, a post- test was given to the students in both groups; results indicated a statistically significant difference ($\alpha \leq 0, 05$) between students` achievement on relative clauses according to way of instruction, sex and stream of study. Concerning the first question of this study which addresses if there are any statistically significant differences ($\alpha \leq 0, 05$) in the students` achievement according to ways of instruction, results show a significant difference in favor of the inductive way of teaching.

 After reviewing the related literature, the researcher concluded that the use of inductive method in teaching grammar has proved to be effective in most of the cases (at university or school level), whereas the deductive method was not the same. There are no studies that compared between the effect of both methods on students' grammar achievement at university level and school level together so the researcher investigate the effect of the both methods on grammar at university level on one hand, and its effect on students grammar achievement at school level, on the other hand. Moreover, few local or foreign studies deal with the relationship between deductive and inductive ways of teaching and students' achievement in general grammar. Therefore, the present study hopefully tried to shed light on the best ways of teaching which can be used by EFL teachers in teaching general grammatical structures to Arab students at both levels.

3. Methodology

3.1 Subjects of the Study

The sample of the study was randomly chosen from Jordanian EFL learners at universities and schools. They were divided into four experimental groups. The first and second groups learn grammar at university level (deductive and inductive methods) by the two instructors (specialized in TEFL& curricula); the third and fourth groups learn grammar by using inductive and deductive methods in schools by English teachers. Duration of teaching university students is about one month with weekly period of five classes of an hour at each class, twenty lessons for the two classes but duration of teaching school students is about one month with daily period of forty-five minutes at elementary stage.

3.2 Instruments of the Study

To achieve the aims of the study, the researcher design the following Instruments:

- A grammar achievement test for university students(as pre-post test& post-test) and a grammar test for elementary school students(as pre-post test& post-test)
- Inductive instructional program based on the syllabus of each level and deductive instructional program based on the syllabus of each level.

3.2.1 The tests

For the purpose of the study two grammar achievement tests were used. Forty-item test were prepared for each level by the researcher to cover the Grammar at university and school levels. The general purpose of these instruments was to compare the achievements of the four groups on the pre and posttests.

The test of both levels measures the students' ability to:

1- Recognize the rules of tenses.

2- Recognize subject-verb agreement.

3- Make yes/no questions.

4. Make WH questions.

5- Make or form negative form.

The researcher designed tow tables of specifications for both tests (for university and school students) that show the distribution of questions among content and objectives.

3.2.1.1 Validity and reliability of the tests

To test the validity of the tests, the researcher followed the following steps:

- After developing both tests (for school and university levels), copies were given to the TEFL university instructors, and experienced teachers. They were asked to express their own opinions about the number of questions, arrangement of questions, number of items of each question, mark of each question, total mark of the test and suitability of test time and if the questions measure the grammar.
- The researcher made the necessary modification in light of the notes provided by the jury of judges.

To test the reliability of both tests, the researcher carried out the following steps:

- Two groups consisting of 20 university students and 25 ninth students were randomly chosen.
- These students were given both exams to answer its questions in no more than 30 minutes.
- The researcher graded the answers and recorded their total mark (out of100).
- Two weeks later, the students were given both exams.
- The researcher then collected their total mark on the re-test.
- The reliability values obtained from Pairson correlation were found to be suitable (90% for university level and 80% for school level)

3.2.2 The Instructional Programs

Inductive and deductive programs were used to develop the grammar of the experimental groups. The first program focuses mainly on teaching inductive activities and its main principle can be represented schematically in the following way:

Inductive approach: Specific examples → Practice → General rule

But the second program based on deductive method can be represented schematically in the following way:

 Deductive approach: General rule → Specific examples → Practice

3.3 Variables of the Study

The variables of the study are one independent variable and one dependent variable. The independent variable is the method of teaching, and the dependent one is the students `achievement.

3.4 Statistical Analysis

T-test was used to answer the questions of the study and to find out if there were any statistically significant differences between students` achievement mean scores according to the method.

3.5 Study Procedures:

This study was conducted during the second semester of the academic year 2014 at university level and conducted during the 2nd semester of the academic year 2014 at school level so it finished in June. The following procedures were followed for the purpose of the study:

1. Getting the approval of the selected universities and schools to conduct the study.
2. Drawing a sample of the study from Jordanian schools and universities.
3. Preparing the inductive and deductive programs which were taught to the experimental group and ensuring its validity.
4. Constructing the pre- / post-test and ensuring its validity and reliability.
5. Two instructors (almost similar in respect of educational qualifications, age, training, teaching experience at university level, socio-economic status) are selected; one instructor assigned to the 1st experimental and one to the 2nd experimental group.
6. Administrating pre-test to the four groups of the study to measure their grammar before applying the programs.
7. Training the volunteer instructors and teachers in implementing the programs by the researcher.
8. conducting the experiment and visiting the experimental groups regularly to help them overcome any difficulties or problems that may appear during the implementation of the program,
9. Post-testing the groups to measure their grammar.
10. Analyzing the obtained data.

4. Result of the study

4.1 Results related to the first question

Firstly, to make sure that both groups are equivalent, the pre-test between the two groups of university stage was computed as shown in Table 1.

Table 1. Results of T-test on the grammar achievement on the Pre-test
between the Two Groups of University Stage

	Method	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
PRE	Inductive	21	30.24	10.990	.189	40	.851
	Deductive	21	29.62	10.244			

As can be seen from Table 1, the experimental group's mean score on pre-test was slightly similar to the control group's mean score on the same test (30.24; 29.62) respectively. It indicates that the T value of grammar was.189. Thus, it is not statistically significant at ($\alpha \leq 0, 09$) and both groups are equivalent.

To test the significance of these differences between the mean scores of both groups on the reading comprehension in the post-test, the T test statistical procedure was computed as shown in Table 2.

Table 2. Results of T-test on the Grammar Achievement on the Post-test
between the Two Groups of the University Stage

	Method	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
POST	Inductive	21	37.38	10.230	2.034	40	.049
	Deductive	21	31.48	8.507			

Table 2 indicates that the T value of grammar was 2.034. It is statistically significant at ($\alpha \leq 0, 09$). Thus, the null hypothesis which stated that there is no statistically significant difference at ($\alpha \leq 0, 09$) in the mean scores of grammar between the two groups was rejected. The mean scores of the grammar post-test shown in table 2 indicate that the mean scores of the experimental group were higher than the mean scores of the control, where the mean score of the experimental group was 37.38, while the mean scores of the control group was 31.48.

4.2 Results related to the second question

The pre-test between the two groups of school stage was computed to show that both groups are equivalent as shown in Table 3.

Table 3. Results of T-test on the Grammar Achievement on the Pre-test
between the Two Groups of School Stage

	Method	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
PRE	Inductive	20	29.55	9.654	-.328	38	.744
	Deductive	20	30.60	10.545			

As can be seen from Table 3, the experimental group's mean score on pre-test was slightly similar to the control group's mean score on the same test (30.24; 29.62) respectively. It indicates that the T value of grammar was -.328. Thus, it is not statistically significant at ($\alpha \leq 0, 09$) and both groups are equivalent.

To test the significance of these differences between the mean scores of both groups on the reading comprehension in the post-test, the T test statistical procedure was computed as shown in Table 4.

Table 4. Results of T-test on the Grammar Achievement on the
Post-test between the Two Groups of School Stage

	Method	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
POST	Inductive	20	36.45	8.900	2.769	38	.009
	Deductive	20	28.95	8.217			

Table 4 indicates that the T value of grammar was 2.769. It is statistically significant at ($\alpha \leq 0, 09$). Thus, the null hypothesis which stated that there is no statistically significant difference at ($\alpha \leq 0, 09$) in the mean scores of grammar between the two groups was rejected. The mean scores of the grammar post-test shown in table 2 indicate that the mean scores of the experimental group were higher than the mean scores of the control, where the mean score of the experimental group was 36.45, while the mean scores of the control group was 28.95.

5. Discussion

5.1 Discussing the first question

According to the second question, which addresses if there are any statistically significant differences ($\alpha \leq 0, 09$) in the university students` achievement according to ways of instruction, results also show a significant difference in favor of the inductive way of teaching. This result is expected because of the characteristics of inductive method where all students like to learn grammar through communicating and practicing structures so they do not need to speak grammatically correct sentences to communicate well. Also, in inductive method, the teacher Provides as many examples as possible in teaching structures so eliciting the grammatical rules from examples, make students improving their grammatical accuracy.

The result of the first question is consistent with Takimoto (2005), who proves experimentally that the difference in students' score is in favor of the inductive way of teaching when combined with problem-solving tasks or structured input tasks. It is also consistent with Vogel et al. (2011) whose results indicate a significantly greater effect of the guided inductive approach on short-term learning. On the other hand, the result of (Haight and et al., 2007) shows that the guided inductive method had statistically significant effects on the long-term learning of grammatical structures.

5.2 Discussing the second question

Concerning the first question of this study which addresses if there are any statistically significant differences ($\alpha \leq 0, 09$) in the school students` achievement according to ways of instruction, results show a significant difference in favor of the inductive way of teaching. This result can be explained through the fact that the Ministry of Education has recently held many training courses for English language teachers in order to acquaint them with up - to - date or contemporary methods of teaching English language. I think that these training courses have changed the atmosphere of the class to become more suitable for students to induce the grammatical rules from relevant activities and exercises. Also, the teachers understand the instructions and strategies given in the "Teacher's Book" that based on inductive method so they make students infer the rules from the given examples.

The result of the second question is consistent with Al- Emami (2005) who proves experimentally that the difference in students' score is in favor of the inductive way of teaching. It is also consistent with Aisha (2002) whose results show the efficiency of the inductive method in teaching English grammar to non- native speakers.

5.3 Conclusion

The expected findings of the study indicate that the experimental groups at both primary and university stages are equivalent at the time of starting the experiment and the teaching of English grammar through inductive approach plays a positive role in improving the academic achievement of the students studying English grammar in both levels (university and elementary).

5.4 Recommendations

- It is necessary for teachers to vary their techniques and ways of teaching according to their students' interests and achievement levels with more emphasis on using the inductive way of teaching grammar.
- Teachers and instructors are encouraged to attend different intensive training courses held by the Ministry of Education in order to be aware of various modern ways of teaching English language. They are also encouraged to apply modern ways of teaching in their classes since this is one of the aims of the Educational Reform for Knowledge Economy.
- Researchers should conduct other studies in other regions and on other areas on syntax in order to obtain a more comprehensive idea about which way of teaching is more influential in teaching grammar in Jordan.

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