An investigation into inductive and deductive methods in teaching grammar to German EFL learners: A comparative study

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Abstract

The present study was a comparative analysis of the inductive and the deductive methods in teaching English. Indeed, the major aim of the study was to compare the efficiency of these two approaches in teaching English grammar by inspecting students' performance. To this purpose, two identical groups of German pre-service teachers were randomly selected to participate in this research. Then, two English grammar topics (future tense and conditional sentences) were taught to them by the usage of present, practice and produce method as the deductive approach and the guided discovery technique as the inductive approach. Regarding the methodology, the design of the study was in comparison with group design (between-subjects design) and the test-teach-test method was obtained in which a grammar pre-test and post-test comparison were executed to check the level of improvement in the students. The achieved scores in the tests indicated that both the inductive and the deductive methods were equal in terms of efficiency.

Keywords: Inductive teaching, deductive teaching, teaching grammar, comparative study.

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1. Introduction

Nowadays, in many English courses all around the world, the method of teaching has, to some extent, changed from explicit grammar teaching to more communicative-based approaches; however, many pre-service teachers are not well acquainted with the new techniques and methods. It is mainly due to the fact that teachers have mostly been educated in English by the traditional methods like memorisation of the grammar rules (Farrell, 1999).

The importance of the grammar, as a central key to learning English—and every other language—is not debatable. In fact, grammar skills not only influence all four skills—reading, writing, listening and speaking—directly; but also have an undeniable effect on every aspect of life from education to leadership and social life to employment opportunities (Long & Richards, 1987). As a matter of fact, grammar is a useful instrument for learners to achieve linguistic competence, a tool or resource for comprehension and creation of oral and written discourse in different situations (Huang, 2005). At the same time, grammar is not the most favourite part of learning a language in the most of the learners' point of view. Therefore, the controversial issue regarding the grammar is to find the most appropriate way to teach it efficiently.

To date, different instructional approaches have been proposed to teach grammar. From one hand, the deductive approach is simply the traditional way of teaching that has been used for many decades. In this approach, the learner is first given a rule and then the teacher provides some examples regarding the topic (Johnson, 2013). From the other hand, in the inductive method of teaching, the main emphasis is on noticing the patterns or discovering the rules through exposure to several examples and using more indirect approaches (Negahdaripour & Amirghassemi, 2016). This method systematically produces intentional concept descriptions from extensional concept descriptions and 'tries to include a general rule from a set of observed instances' (Chopra, 2012, p. 238).

In order to address the need for research, the aim of the present study was to compare the effectiveness of the inductive and the deductive methods in teaching English grammar by inspecting the students' performance. Therefore, this research question was addressed in this study:

Which of these two approaches is more appropriate for teaching English grammar to German English as a foreign language (EFL) learners; the inductive or the deductive method?

Null Hypothesis: None of the approaches is more appropriate than the other one for teaching English grammar to German EFL learners.

The significance of the current study is based on the fact that nowadays, in many English classrooms around the world, the method of teaching has changed from explicit grammar explanation to more communicative approaches over the years. However, many pre-service teachers are not familiar with the new techniques. It is because they have been educated in English by the traditional methods such as memorisation of the grammar rules (Farrell, 1999). Since all the participants in the current study were pre-service teachers, participating in such study might have given them the opportunity to be exposed to both explicit and communicative teaching methods. As the future educators, they need to be able to use communicative teaching in their jobs as a beneficial tool. This is especially important because of German education system emphasis on the usage of creative and communicative approaches as well as integrative, collaborative and constructive teaching in the classrooms. The intelligent gathering, classifying, restructuring and applying the information to the students in order to expand their knowledge is defined as a substantial process in learning English (Lehrplan Gymnasium, Englisch, 2011, p. VIII).

2. Review of the related literature

In order to gain an understanding of the theoretical and applied aspects of inductive and deductive learning, it seems quite necessary to have a review of the literature. Although a scan on literature may reveal studies on this area of inquiry, there is still needs to broaden the scope of this area of research by doing further research studies.

3. Origin of the inductive and the deductive instructions

In the past, grammatical structures were presented directly in the text books and the deductive approach was preferable as the major method of teaching grammar in language schools. However, the teaching approaches have been changed from deductive to inductive since the inductive approach is more student-centred and pays a special attention to the meaning (Rutherford & Smith, 1988).

The inductive approach was first adopted in scientific experimental learning and mathematics in the 20th century. It emerged from 'inductive reasoning, cognitive development and constructivist epistemology which was first used by Jean Piaget in 1967' (Yuen, 2009, p. 25). In other words, the inductive instruction is labelled as a general term including numerous methods such as inquiry learning, problem-based learning, project-based learning, case-based teaching, discovery-learning and just-in-time teaching. All of these methods share some common characteristics. They are all learner-centred methods and could be considered as the constructive methods based on the assumption that 'students construct their own versions of reality rather than simply absorbing versions presented by their teachers' (Prince & Felder, 2006, p. 123).

In addition, in all of these methods, the learning process is active through discussion and problem-solving skills. Teamwork and collaborative or cooperative learning are significant in these methods (Prince & Felder, 2006). As Larsen-Freeman (2009, p. 528) believes, using an inductive method is 'very fitting for complex rules, which are difficult to articulate or internalise'.

Deduction, on the other hand, can be explained as 'a form of reasoning in which one proceeds from general principles or laws to specific cases' (Carr, 2009, p. 47). Similarly, Decoo (1996, p. 96) defines deduction in language learning as the process of going 'from the general to the specific, from consciously formulated rules to the application in language use'. Usually, in deductive teaching, the grammars are first presented to the subjects and then they are provided drills. What is important in deductive teaching is that the subjects are not given enough practice on the various aspects of grammar (Alzu'bi, 2015). Indeed, the deductive method is related to conscious learning. This method tries to place a great emphasis on error correction and presentation of explicit rules. The deductive method is often used with adult learners. The teacher in this method teaches the rule explicitly to learners, and they are ready to cope with exercises given (Hmedan & Nafi', 2016, p. 42).

According to Hammerly (1975, p. 15), the deductive instruction was criticised for producing learners 'who knew about the language but could not speak it' in the 16th century and even earlier. He states that the deductive teaching was the major method in the 18th and 19th century; despite the occasional objection to purely deductive instruction. In the 19th century, the first reactions against the grammar translation method were appeared and continued to the 20th century in which the inductive method in the form of the direct method was approved.

Hagboldt (1928) suggested the deductive and the inductive methods as two major ways of teaching grammatical structures at the beginning of the 20th century. He exemplified the inductive approach through several linguistic problems and asserted that this method was used rarely. According to Decoo (1996, p. 96), during the Reform Movement of the 1880's, in order to distinguish between 'natural and grammatical' learning, the contrast between direct and indirect method was represented through the 'induction versus deduction'. The differences between these approaches continued to be shown in form of the conflict between cognitive and audio-lingual method.

The inductive method arose as a subtype of explicit instruction, based on the audio-lingual method (Shaffer, 1989). According to Fischer (1979), the deductive method has been historically associated with the cognitive approach and the inductive approach with the audio-lingual method. In the present thesis, present, practice and produce (PPP) method which is chosen as the deductive teaching approach is a subset of the cognitive approach. For the inductive teaching, the participants are first exposed to some examples in order to find out the rules. Thus, it is more linked to the guided discovery method rather than the audio-lingual method.

4. Grammar explanation in TESOL

It is not difficult to understand the importance of learning English—as an international language of business and communication—in today's world. The importance of the grammar, as a central key to learning English—and every other language—is not debatable as well. In fact, grammar skills not only influence all four skills—reading, writing, listening and speaking—directly (Long & Richards, 1987), but have an undeniable effect on every aspect of life from education to leadership, and social life to employment opportunities. Indeed, grammar is a useful instrument for learners to achieve linguistic competence, a tool or resource for comprehension and creation of oral and written discourse in different situations (Huang, 2005).

At the same time, grammar is not the most favourite part of learning a language in the most of the learners' point of view and is considered by many as an obstacle for mastering a second language (Hariri & Pourdana, 2016). Therefore, the controversial issue regarding the grammar is to find the most appropriate way to teach it efficiently. In every EFL classroom, grammar plays a central role. Eisenstein (1978) believes that the age of the learner is significant in determining whether or not the grammatical explanation should be conscious. It is because there is a critical period for language acquisition. Children learn differently from adults. Actually, they learn a foreign language in a natural way through the exposure to the different situations made by their teacher in the classroom or sometimes outside of the classroom in the environment (e.g., by watching English TV programmes). That is why 'neither formal instruction nor conscious grammatical explanations have been shown to have any positive influence on children' (Eisenstein, 1987, p. 286). Therefore, these instructions for children are advisable only when there is a lack of contact with the natural setting. At the same time, formal instructions are suitable for adults since they may have quite different kinds of learning systems based on their previous experiences.

There are several methods for grammar explanation in ESL such as grammar translation, direct method, audio-lingual method, situational reinforcement, cognitive code, the silent way and counselling learning (Alqahtani, 2015). Besides, there are different ways in which a grammar explanation could be presented in a second language lesson like isolation, conscious statement and inductive or deductive statement (Thornbury, 1999). Among various methods for teaching a foreign language, nobody could claim that which approach gives definitely successful results, because there has been no principled basis for a decision on which aspect of which method one should choose in a particular circumstance. These different methodologies for language teaching have met with varying degrees of success and failure… there is some examples of successful language learners for different and even contradictory methods, … [but] the question of which overall method is superior remains to be answered (Eisenstein, 1978, p. 82).

5. Comparison between the inductive and the deductive approaches

The deductive method of teaching is a top-down (from general to specific) approach in which the grammatical rules are first introduced, followed by applying them to the examples by the students. The inductive method, on the other side, refers to bottom-up (from specific to general) style of learning—or teaching—in which the language context (examples and situations) is introduced first and the learners can induce the rules themselves or with the help of their teacher (Azmi Adel & Hanna Abu, 2008).

In deductive teaching, the learners generally rely on their teacher or textbook as the main source of knowledge while in inductive instruction, the students may become independent learners after a while; since they are encouraged to continue learning outside the classroom (Wang, 2002). In addition, the role of the teacher in the inductive method is different from that of deductive. In a deductive teaching, the teacher is the authority and the organiser in the classroom whose main role is to present the new grammar items to the learners and provide them some exercises. In opposition, in an inductive approach, the teacher plays the role of a guider or instructor. In other words, the teacher's role is to help the students rather than teach them (Rice, 1945).

Numerous researchers have studied the differences between the inductive and the deductive teaching in terms of the effect on the short and/or long-term learning of grammar and students' attitudes towards these approaches (Alzu'bi, 2015; Emre, 2015; Kuder, 2009; Seliger, 1975; Yuen, 2009). In some of these studies, the results showed that there was not a significant difference between the effects of two approaches. Part of them suggested that the deductive grammar instruction was more effective in terms of performance on grammar tests while some found the inductive approach more useful.

Emre (2015) conducted a study to determine the effects of inductive grammar instruction and deductive grammar instruction on grammar accuracy in writing tasks as well as grammar test scores. The findings revealed that the effects of the inductive and the deductive approaches did not differ significantly.

Seliger (1975) performed an experiment in which the inductive and the deductive rule presentation for a group of adult ESL learners were compared. The results of this experiment showed no significant differences in learners' performance on a 'recall test' (a test conducted 1 day after the lesson) while in 'retention test' (a test conducted 3 weeks later) the learners who were taught deductively performed expressively better than the first test.

In her research, Kuder (2009) examined the outcome of a deductive versus an inductive lesson teaching direct object pronouns in Spanish to 44 college-aged participants in two separate intermediate classes. The two groups of students were exposed to the opposing methods of instruction, then evaluated on their level of acquisition of the grammar structure in question using identical assessment measures. The results of the study indicated that there was a slightly higher level of achievement as well as a higher level of satisfaction in the group exposed to the inductive lesson in comparison to the group exposed to the deductive lesson.

Mountone (2004) believes that the deductive method is superior in the situations in which the aim is to make the students solve a problem quickly and accurately. Younie (1974) states that since the teacher chooses the information and the sequence of presentation in the deductive approach, it is a more predictable method. One of the criticisms regarding the deductive approach in Shaffer's (1989) point of view is that the deductive approach emphasises on the grammar at the expense of meaning and promotes passive rather than the active participation of the students. However, Goner and Walters (1978) state that the deductive approach is quite suitable for both students who have a basic knowledge regarding the topic (higher level students mostly) as well as those who prefer very traditional learning style.

Some scholars believe that the inductive approach is complex for weak or slow students and that only more intelligent students benefit from this method. In contrast, some research studies indicate that all of the students regardless of their level of intelligence do benefit from the inductive approach (Shaffer, 1989). For example, Brown (2007) discusses whether the grammar should be presented inductively or deductively. He concludes that an inductive approach is more appropriate in most of the contexts, because it is more in keeping with natural language acquisition (where rules are absorbed subconsciously with little or no conscious focus.) … it conforms more easily to the concept of interlanguage development in which learner's progress, on variable timetables, through stages of rule acquisition… it allows students to get a communicative 'feel' for some aspect of language… it

builds more intrinsic motivation by allowing students to discover rules rather than being told them (p. 365).

At the same time, he claims that there might be occasional moments when a deductive approach works out quite suitably, Eisenstein (1978) confirms Brown's statement by referring to the positive aspects of the inductive approach; bringing order, clarity and meaning to the previous educational experiences and an active participation are some of these benefits. In contrast, she mentions a study of the different language learners by Hartnett (1974) in which it is indicated that some learners are more successful in the deductive language classes while others do better in the inductive lessons. Eisenstein (1987, p. 287) also believes that this difference is related to 'different neurological mechanisms in the learners'.

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6. Methodology, design and materials of the study

The design of the current study was of comparative group design in nature to investigate the differences between deductive and deductive teaching methodologies. This selection was due to the fact that the two groups received different treatments. The subjects of the present study were the students of the 12th- and 13th-grade classes in Freie Fachschule für Sozialwesen Dresden, Germany, participating in a pre-service teacher training course. The learners were all German adults above 20 years old and consisted of both male and female. Eighty-four percent of them are females. The average number of the participants in each class was thirteen subjects (26 together) and the average English level was elementary. In order to do the research in the current study, two grammar topics— conditional sentences and future tense—were picked out among many other grammatical subjects in the course outline. The reason for this selection was that these two topics had the possibility of being taught by using either the inductive or the deductive method.

After choosing the grammar topics, it was time to present them to both groups by applying the inductive and the deductive methods. The PPP method was used to teach the grammar topics deductively and the guided discovery technique to teach them inductively. Since each class had to receive both methods, crossing usage of the inductive and the deductive methods for teaching the grammar topics in both classes was beneficial in order to avoid depriving the learners of a classroom of one specific approach. Consequently, conditional sentences were taught inductively to group A and deductively to group B and future tense was taught deductively to group A and inductively to group B.

A test-teach-test (TTT) method was used in the process of data collection of the current research. The pre-test consisted of 10 multiple-choice questions regarding the chosen grammar topic. The learners were asked to try to answer the questions and if they did not know the answer to a question, they would leave it unanswered in order to avoid involving any lucky guesses in the final results. The aim of doing a pre-test in the current study was to indicate which of the students should not be considered as the participants. It means that later in evaluating the students' papers, the results of those pre-test papers with 'all' the answers correct, were put out of the data. It was because the students who had answered all of the questions correct regarding the grammar topic were not assumed as the 'real learners' since they already had had enough knowledge about the topic and they were actually needless of improvement or even being taught. The rest of the students—real learners–– who had given wrong answers to one or more questions in the pre-test, were all considered as the participants of the study.

The post-test was given immediately after the teaching section. The reason was to make sure that the learners had no access to any external source in order to improve their knowledge or ability regarding the topic. In such situation, any improvement in the results of the tests could be a direct consequence of the teaching section. The questions of the post-test were identical to that of the pre-test. The number of the questions was optimal for this research since less than 10 questions might not give the sufficient data for having clear results and more questions might make the test tedious for the participants and bring about inaccurate results.

7. Data analysis

In order to ease the process of data analysis in the current paper, the collected data were divided into four different groups according to the classes (A and B), the method of teaching (inductive and deductive) and the taught grammar topic (future tense and conditional sentences). Since the future tense was taught deductively to group A and inductively to group B, the teaching division was indicated as group A + deductive method + future tense (ADF) and group B + inductive method + future tense (BIF). In the same way, conditional sentences were taught inductively to group A and deductively to group B. So, they were called group A + inductive method + conditional sentences (AIC) and group B + deductive method + conditional sentences (BDC).

Before starting the analysis of the collected data, the given answers were evaluated and the correct answers (overall score) in each pre- and post-test were separately counted. The aim was to determine the 'level of improvement' of each student by subtracting the total number of the correct answers in the post-test from the total number of the correct answers in the pre-test. Figure 1 shows an overview of the level of improvement for each group:

Results of the Raw Data

	Conditional Sentences	Future Tense	Conditional Sentences	Future Tense
	Deductive		Inductive	
■ Percentage of Improvement	20,00%	4,17%	24,38%	6,43%
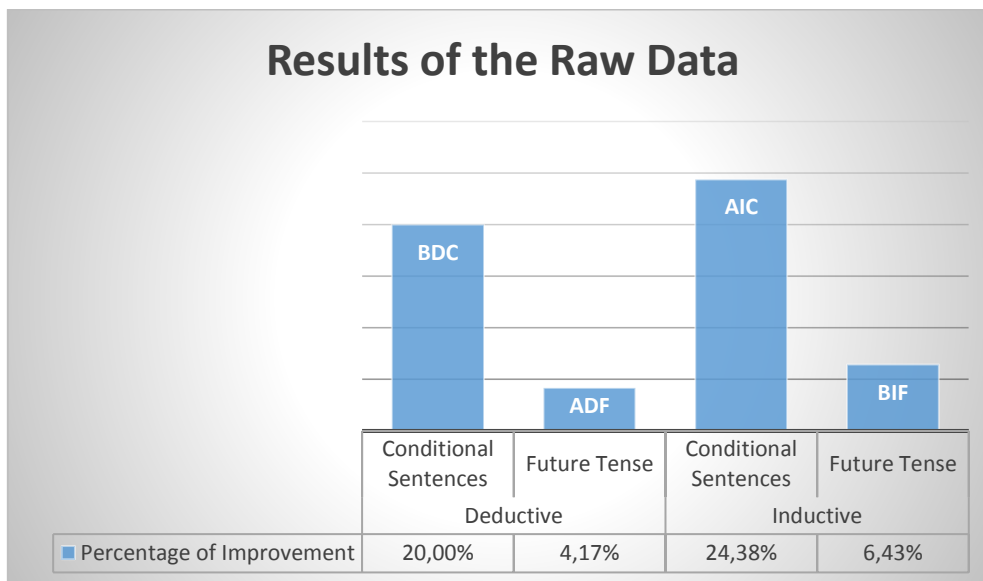
Figure 1. Overview of the level of improvement (raw data)

The bar graph indicates that for both grammar topics, the learners showed a higher level of improvement in the inductive approach (24.38% and 6.43%) than the deductive approach (20.00% and 4.17%). This improvement was obviously higher in conditional sentences compared to future tense which could be a result of the intricacy of future tense for the learners. However, this was only an initial overview without statistical measurements and therefore could not be trusted as the confirmed results. For gaining more accurate conclusion, the results had to be statistically investigated to find out whether this diversity was significant from a scientific point of view.

As a first step, a normality test was run to indicate whether if the data were normally distributed. Normality test in statistics is used to determine if a sample or any group of data are well-modelled by a normal distribution (Thode, 2002). There are two main methods for assessing the normality; numerically and graphically. In numerically method, Kolmogorov–Smirnov (K–S) test and Shapiro–Wilk test are much used among many different statistical tests for the assessment of the normality. These tests compare the scores in the sample to a normally distributed set of scores with the same mean and standard deviation. Here, two definitions are significant to be considered. The first one is the null hypothesis which assumes that all of the values are sampled from a population that follows a Gaussian distribution. The second item is the P-value. The P-value helps to compare the means of these groups. It indicates that the two populations have different or equal means. Therefore, the P-value helps to make sure that the difference between two sets of data reflects a 'true' difference. To check whether the data pass the normality test, the P-value is usually compared with 0.05. If the P-value is greater than 0.05, the answer is Yes (the null hypothesis is accepted) and if the P-value is less than or equal to 0.05, the answer is No (the null hypothesis is rejected).

Table 1. Normality test for pre-test scores of ADF group (pre-test_ADF)

Pre-test/group A/deductive/future tense		Statistic	SE
Pre-test_ADF	Mean	6.8333	0.50503
	95% confidence interval for mean — Lower bound	5.7218	
	95% confidence interval for mean — Upper bound	7.9449	
	5% trimmed mean	6.9259	
	Median	7.0000	
	Variance	3.061	
	Standard deviation	1.74946	
	Minimum	3.00	
	Maximum	9.00	
	Skewness	−0.797	0.637
	Kurtosis	0.648	1.232

Pre-test_ADF	Kolmogorov–Smirnov			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
	0.164	12	0.200	0.927	12	0.350

As Shapiro–Wilk test and a Kolmogorov–Smirnov test show that pre-test scores of ADF group are approximately normally distributed. It is because the P-value (Sig.) in this test is higher than 0.05. The skewness of the scores is −0.797 (standard error (SE) = 0.637) and the kurtosis of the scores is 0.648 (SE = 1.232)

Table 2. Normality test for post-test scores of ADF group (post-test_ADF)

Post-test/group A/deductive/future tense		Statistic	SE
Post-test_ADF	Mean	7.2500	0.42862
	95% confidence interval for mean — Lower bound	6.3066	
	95% confidence interval for mean — Upper bound	8.1934	
	5% trimmed mean	7.2778	
	Median	7.5000	
	Variance	2.205	
	Standard deviation	1.48477	
	Minimum	5.00	
	Maximum	9.00	

				Skewness		−0.312	0.637
				Kurtosis		−1.270	1.232
Post-test_ADF	Kolmogorov–Smirnov			Shapiro–Wilk			
	Statistic	df	Sig.	Statistic	df	Sig.	
	0.193	12	0.200	0.897	12	0.145	

The results of Shapiro–Wilk and Kolmogorov–Smirnov test showed that post-test scores of ADF group is approximately normally distributed as well. It is because the *P*-value (Sig.) in this test is higher than 0.05. The skewness of the scores is −0.312 (SE = 0.637) and the kurtosis of the scores is −1.270 (SE = 1.232).

Table 3. Normality test for pre-test scores of BIF group (pre-test_BIF)

Pre-test/group B/inductive/future tense			Statistic	SE
Pre-test_BIF	Mean		7.4286	0.32673
	95% confidence interval for mean	Lower bound	6.7227	
		Upper bound	8.1344	
	5% trimmed mean		7.4762	
	Median		7.5000	
	Variance		1.495	
	Standard deviation		1.22250	
	Minimum		5.00	
	Maximum		9.00	
	Skewness		−0.397	0.597
	Kurtosis		−0.445	1.154
Pre-test_BIF	Kolmogorov–Smirnov		Shapiro–Wilk	
	Statistic	df	Sig.	Statistic	df	Sig.
	0.180	14	0.200	0.923	14	0.241

As the statistics in Table 3, the scores are normally distributed in pre-test scores of BIF group; meaning that the *P*-value is this test is higher than 0.05.

Table 4. Normality test for post-test scores of BIF group (post-test_BIF)

Post-test/group B/inductive/future tense			Statistic	SE
Post-test_BIF	Mean		8.0714	0.30498
	95% confidence interval for mean	Lower bound	7.4126	
		Upper bound	8.7303	
	5% trimmed mean		8.0794	
	Median		8.0000	
	Variance		1.302	
	Standard deviation		1.14114	
	Minimum		6.00	
	Maximum		10.00	
	Skewness		−0.159	0.597
	Kurtosis		−0.865	1.154

Post-test_BIF	Kolmogorov–Smirnov			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
	0.221	14	0.063	0.916	14	0.190

As can be seen in Table 4, the data are normally distributed in post-test BIF Group and the *P*-value is higher than 0.05.

Table 5. Normality test for pre-test scores of AIC group (pre-test_AIC)

Pre-test/group A/inductive/conditional sentences			Statistic	SE
Pre-test_AIC	Mean		5.3125	0.52216
	95% confidence interval for mean	Lower bound	4.1995	
		Upper bound	6.4255	
	5% trimmed mean		5.2917	
	Median		6.0000	
	Variance		4.362	
	Standard deviation		2.08866	
	Minimum		2.00	
	Maximum		9.00	
	Skewness		−0.024	0.564
	Kurtosis		−1.091	1.091

Pre-test_AIC	Kolmogorov–Smirnov			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
	0.191	16	0.120	0.932	16	0.258

Results in Table 4 demonstrates that since the *P*-value is higher than 0.05, the data are normally distributed.

Table 6. Normality test for post-test scores of AIC group (post-test_AIC)

Post-test/group A/inductive/conditional sentences			Statistic	SE
Post-test_AIC	Mean		7.7500	0.29580
	95% confidence interval for mean	Lower bound	7.1195	
		Upper bound	8.3805	
	5% trimmed mean		7.7222	
	Median		8.0000	
	Variance		1.400	
	Standard deviation		1.18322	
	Minimum		6.00	
	Maximum		10.00	
	Skewness		0.000	0.564
	Kurtosis		−0.554	1.091

Post-test_AIC	Kolmogorov–Smirnov			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
	0.209	16	0.061	0.921	16	0.176

The data in Table 6 represent the distribution of data in post-test scores of AIC group in inductive teaching. As can be seen, the data are normally distributed and the level of *P*-value is higher than 0.05.

Table 7. Normality test for pre-test scores of BDC group (Pre-test_BDC)

Pre-test/group B/deductive/conditional sentences		Statistic	SE
Pre-test_BDC	Mean	5.4545	0.47412
95% confidence interval for mean	Lower bound	4.3981	
	Upper bound	6.5110	
5% trimmed mean		5.4495	
Median		6.0000	
Variance		2.473	
Standard deviation		1.57249	
Minimum		3.00	
Maximum		8.00	
Skewness		0.008	0.661
Kurtosis		−1.066	1.279

Pre-test_BDC	Kolmogorov–Smirnov			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
	0.186	11	0.200	0.943	11	0.557

Table 7 indicates the normal distribution of the data in pre-test scores of BDC group. As can be seen, the *P*-value is higher than 0.05 and the data are normally distributed.

Table 8. Normality test for post-test scores of BDC group (post-test_BDC)

Post-test/group B/deductive/conditional sentences		Statistic	SE
Post-test_BDC	Mean	7.4545	0.56187
95% confidence interval for mean	Lower bound	6.2026	
	Upper bound	8.7065	
5% trimmed mean		7.5051	
Median		8.0000	
Variance		3.473	
Standard deviation		1.86353	
Minimum		4.00	
Maximum		10.00	
Skewness		−0.253	0.661
Kurtosis		−0.430	1.279

Post-test_ADF	Kolmogorov–Smirnov			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
	0.161	11	0.200	0.942	11	0.548

Table 8 shows the normally distributed data for post-test scores of BDC group. As the data show, the data are normally distributed as the level of significance is higher than 0.05.

Table 9. Comparison of pre-test scores of ADF and BIF group

	Group	N	Mean	Standard deviation	SE mean
Pre-test score	ADF	12	6.8333	1.74946	0.50503
	BIF	14	7.4286	1.22250	0.32673

		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. (two-tailed)	Mean difference	SE difference	95% confidence interval of the difference	
									Lower	Upper
Pre-test score	Equal variances assumed	1.199	0.284	−1.017	24	0.319	−0.59524	0.58513	−1.80289	0.61242
	Equal variances not assumed			−0.990	19.278	0.335	−0.59524	0.60150	−1.85296	0.66249

The results in Table 9 suggest that there is not a significant difference between the deductive (ADF) and the inductive (BIF) group regarding the future tense. It is because the *P*-value is much greater than 0.05 which means the null hypothesis is accepted. Therefore, with 95% confidence, it can be stated that ADF and BIF groups were equivalent in terms of English knowledge about the future tense before the teaching section.

Table 10. Comparison of pre-test scores of AIC and BDC groups.

	Group	N	Mean	Standard deviation	SE mean
Pre-test score	AIC	16	5.3125	2.08866	0.52216
	BDC	11	5.4545	1.57249	0.47412

		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. (two-tailed)	Mean difference	SE difference	95% confidence interval of the difference	
									Lower	Upper
Pre-test score	Equal variances assumed	1.609	0.216	−0.191	25	0.850	−0.14205	0.74383	−1.67399	1.38990
	Equal variances not assumed			−0.201	24.723	0.842	−0.14205	0.70530	−1.59547	1.31138

Similar conclusion is obtained from Table 10 in which the *P*-value is again much greater than 0.05. Therefore, the null hypothesis is accepted and with 95% confidence, it could be stated that there is not a statistically significant difference between the English knowledge of the inductive and the deductive groups regarding conditional sentences.

Table 11. Post-test comparison between ADF & BIF groups

	Group	N	Mean	Standard deviation	SE mean
Post-test score	ADF	12	7.2500	1.48477	0.42862
	BIF	14	8.0714	1.14114	0.30498

		Levene's test for equality of variances		t-test for equality of means							
		F	Sig.	t	df	Sig. (two-tailed)	Mean difference	SE difference	95% confidence interval of the difference		
									Lower	Upper	
Post-test score	Equal variances assumed	1.489	0.234	−1.594	24	0.124	−0.82143	0.51530	−1.88496	0.24210
	Equal variances not assumed			−1.562	20.510	0.134	−0.82143	0.52605	−1.91700	0.27414

Table 15 represents that the average post-test scores of the inductive method (BIF group) is higher than the deductive (ADF group), (8.07 > 7.25). However, the *P*-value (Sig. = 0.2) is greater than 0.05, so the null hypothesis is accepted and despite of the slight higher rate of improvement in the inductive method, there is no statistically significant difference between the results of the post-test in two groups.

Table 12. Post-test comparison between AIC & BDC groups

	Group	N	Mean	Standard deviation	SE mean
Post-test score	AIC	16	7.7500	1.18322	0.29580
	BDC	11	7.4545	1.86353	0.56187

		Levene's test for equality of variances		t-test for equality of means							
		F	Sig.	t	df	Sig. (two-tailed)	Mean difference	SE difference	95% confidence interval of the difference		
									Lower	Upper	
Post-test score	Equal variances assumed	3.118	0.090	0.505	25	0.618	0.29545	0.58478	−0.90891	1.49982
	Equal variances not assumed			0.465	15.517	0.648	0.29545	0.63498	−1.05406	1.64497

Table 12 represents the results in post-test between AIC and BDC groups. As the data show, the *P*-value (Sig. = 0.09) is greater than 0.05 and the null hypothesis is accepted. Although the average score of the inductive (AIC) group is slightly higher than that of the deductive (BDC) group

(7.75 > 7.45), this difference is not significant and the results of two groups are equal from statistical point of view.

8. Conclusions, implications, limitations and suggestions for further research

In this study, a comparative analysis between two different methods of teaching, the inductive and the deductive approach was conducted. Actually, the major aim of the current study was to compare the efficiency of these two methods in teaching English grammar to a group of German adults in elementary level. The chosen grammar topics were future tense and conditional sentences which were taught deductively by the usage of PPP method as well as inductively by the usage of guided discovery technique. TTT method was selected as the main technique for executing a pre-test and post-test comparison to check the level of improvement in the students' performance.

The test results showed that both methods helped the students to get improved almost equally. It can be concluded from the outcomes that the distinction between the inductive and the deductive approach is not always ostensible in practice. In addition, every learner is unique and not all people learn languages, in the same manner, so one single method may not be chosen as the definite remedy.

Like any other study, the study in hand suffered from a number of limitations which could affect the findings of the study. One limitation was that the number of subjects was limited; therefore, the researcher could not conduct the research on a bigger group size. The other limitation was that such variables as subjects' prior knowledge, content familiarity or their motivational feelings could have impacts on their achievements and these elements were not taken into account. In addition, although the subjects were all adults, the age range in two classes was from 20 to 40 years old. Choosing more identical students (e.g., from the same educational background and age) in the future studies may provide more reliable results. The time of the classes was also a limitation. Since they were sometimes held in the morning and sometimes in the afternoon, in the afternoon classes, the students did not seem to be as motivated as the morning classes, probably due to their physical conditions; this might have influenced the test results.

Moreover, the results of the tests were not considered as a part of students' final assessment in order to avoid affecting the outcomes by making the situation stressful. At the same time, this might have to lead the students not to take the tests seriously. Therefore, more enforcement might be considered in the further studies. As it was mentioned earlier, gender comparison was not possible due to an unequal number of participants in each gender. Finally, human errors due to environmental distractions and lucky guesses in answering the multiple-choice questions were the other limitations in the process of data collection of the current research.

Despite the limitations, this study has, however, some practical implications for language teaching and language learning. It is concluded from the outcomes of the study that the distinction between the inductive and the deductive approach is not always ostensible in practice. Since every learner is unique and not all the people learn languages, in the same manner, one single method may not be chosen as the definite remedy. Therefore, the pedagogical implication is that teachers can perform both instructional approaches in their classrooms and make a balance between these methods; depending on the cognitive style of the learner and the topic to be presented. This will help the students to learn better if the chosen method comports with their preferred learning styles. The findings of this study can also help teachers in designing appropriate methodologies for teaching grammar. Also, the findings of the current research could be beneficial for curriculum designers. They can use the findings for designing appropriate tasks and teaching methodologies for grammar. In addition, test takers can also find the results of the study useful in conducting comparative studies with regard to grammar teaching approaches.

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Similar further studies may not give the same results due to some effective factors such as gender, age, the complexity of the presented topic, educational background and learning experiences of the participants. Hence, the further studies could be conducted on different groups of the learners in different genders or ages and with more or less learning experiences. It is suggested to do the further studies based on a longer time frame and expanded number of students in order to gain more accurate results. Moreover, another study can be done on the effect of deductive and/or inductive teaching on reading comprehension abilities of EFLs. Also, more studies can be done on the effect of inductive/deductive teaching grammar on EFLs spoken accuracy. The same study could be done on EFLs writing ability.

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