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Long-term Effects of the Use of Inductive and Deductive Methods on The Acquisition of English Passive Voice

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Abstract

This study aims to investigate the long-term effects of the use of inductive and deductive teaching methodologies on the acquisition of English passive voice. To find answers to the questions, we prepared two teaching programs based on inductive and deductive approaches. Sixty-five pre-university students from were assigned as participants. These students were divided into two groups named as inductive and deductive. Both groups took two pre-tests. The first pre-test was administered in order to find out the homogeneity of both groups in terms of English proficiency level and the second pre-test was administered to find out how much background English passive voice knowledge they possessed. One of the groups was taught inductively and the other one was taught deductively. Three treatment sessions were conducted to present English passive voice. The study included three delayed post-tests which were administered four weeks, eight weeks and 12 weeks after treatment sessions. The analyses of the tests were conducted using descriptive statistics, independent samples test, and repeated-measures ANOVA. The analyses of the data revealed that both methodologies had significant effect on learning English passive voice. The inductively taught learners performed better in a short range of time. However, participants of the deductive group gained higher scores in a long range of time. Since the aim of the research was to investigate the long-term effects of the aforementioned methodologies, it was concluded that although inductive approach is efficient in the beginning, the deductive approach proves to be more efficient in the course of time.

Keywords: Deductive Method High School Context Inductive Method Passive Voice

1. Introduction

Teaching grammar is an important part of English language teaching and according to Ur (1999) knowledge of a language, among other things, is knowing its grammar. Ellis

(2006) believes that grammar teaching can enhance students' both language proficiency and accuracy, facilitate the internalization of the syntactic system of the second and foreign language, and improves fluency. Although grammar teaching is an inseparable part of English language curriculum in Iranian high schools, there have been arguments among authors about the efficacy of different approaches and methodologies of teaching grammar and there has not been a consensus about the effectiveness of a specific method of grammar teaching. One of the most controversial issues in teaching grammar is whether grammar should be taught inductively or deductively. As a basic definition, deduction is the top-down learning process starting with the general and then going to the specific, while induction is a bottom-up concept that goes from the specific to the general. Decoo (1996) states that deduction is a concept that consists in giving students a grammatical rule at the beginning of the learning process and have them apply it afterwards by using examples and exercises, while the use of an inductive approach is more complex. The degree of instruction, according to Decoo (1996) can range from a conscious and guided process to a more natural process which is similar to first language acquisition. There are different studies considering both methods effective. Studies including Mohammed and Jaber (2008), Erlam (2003), and Robinson (1996) advocate deductive approach to teaching grammar while Herron, and Tomasello (1992), Haight, Herron, and Cole (2007) and Vogel, Herron, Cole, and York (2011) proved that inductive approach to language teaching is more effective.

2. Objectives of the Study

The core aim of this study is to compare the long-term effects of deductive and inductive approaches in teaching passive voice to twelfth-grade high school students in Ardabil, Iran. To this aim, two research questions were brought up:

1. Do deductive and inductive teaching methodologies have a significant long-term effect on passive voice acquisition among Iranian twelfth-grade high-school students?
2. Is there a significant difference in passive voice grammatical achievements between

inductively and deductively taught learners in a long range of time?

Considering the individual characteristics of students participating in this study, the deductive approach is expected to be more effective, since they have been taught English grammar deductively in their recent years of education.

Significance of the Study

English teachers in Iranian high schools usually argue the effectiveness of inductive and deductive teaching methods on students' linguistic competence especially twelfth-grade high school students who prepare for the university entrance exam; consequently, they need to learn the language contents more effectively and recall them after a long time. There are also no comparative studies investigating the long-term effects of the methods mentioned above. Therefore, this study can provide useful information for teachers and curriculum planners to make positive changes in introducing and teaching language grammar.

3. Review of Literature

The history of deduction-induction dichotomy goes back to the 1880's when the Reform Movement was at its height. During that era, the conflict between direct and indirect methods used deduction versus induction opposition to identify natural versus grammatical foreign language learning (Decoo, 1996). The deduction-induction conflict remained as a matter of controversy through the first half of the 20th century and reached new heights in the 1960's when the conflict between audio-lingual methods and cognitive approaches came to existence. Since then, induction and deduction have been studied considering the opposition between them.

A deductive approach derives from the definition of deduction. As a basic definition, deduction is the top-down learning process starting with the general and then going to the specific. It is "the process that goes from the general to the specific, from consciously formulated rules to the application in real language. It evokes the image of the grammar-based methods and of cognitive approaches" (Decoo, 1996, p. 96). In a deductive approach

the teacher works from the general to the more specific, which is informally called a top down approach. These approaches are concerned with explicitly explaining the grammar rules to the learners and then having them apply those rules to other contexts.

An inductive approach uses the concept of induction in presenting rules. As a basic definition, induction is a bottom-up concept that goes from the specific to the general (Decoo, 1996). Felder and Henriques (1995) state that induction is a reasoning progression that proceeds from particulars (observations, measurements, data) to generalities (rules, laws, theories). Decoo (1996) claims that induction evokes natural language learning and a variety of direct methods which in contemporary terminology, it is named as acquisition.

An inductive approach is a process in which the teacher starts from creating a situation and giving examples to the generalization where students should discover such generalization by themselves or with the teacher's help. Erlam (2003) states that in an inductive instruction, learners are directly engaged with particular forms and try to reach metalinguistic generalization on their own.

Decoo (1996) suggested five modalities of induction and deduction since he believed that the traditional dichotomy of induction and deduction is not sufficient to identify a number of obvious modalities of induction and deduction in the educational process. Decoo considers the distinction between induction and deduction as a continuum with a five marked brands in it. They are as follows:

Modality A – Actual deduction

Modality B – Conscious induction as guided discovery

Modality C – Induction leading to an explicit "summary of behavior"

Modality D – Subconscious induction on structured material

Modality E – Subconscious induction on unstructured material

According to Decoo (1996), modality A is actual deduction. In this modality, "the grammatical rule or pattern is explicitly stated at the beginning of the learning process and the students move into the application of this grammar" (Decoo, 1996, p. 97)

The second modality, known as modality B, is where we can find signs of inductive teaching. In this modality, students are given some examples related to the structure they are supposed to learn. Then, the teacher asks a few questions in order to help the students discover and formulate the rules. The reason of this technique is that students discovering the rules on their own will benefit from rule discovery techniques.

Modality C is where a more behaviouristic tradition is taken into account. In this modality, students practice a structure intensively and as a result of that, the rule is internalized or induced to some extent. Then, the teacher summarizes the structure explicitly at the end of the class. Methodologists advocating this approach avoid the impression that this explanation is important. Therefore, they call it a summary of behaviour. The early proponents of audio-lingualism benefited from this approach. It can also be detected in some other specific methodological recommendations in the past three decades.

Subconscious induction is understood as the learning process that will not make use of explicitly formulated grammar (Decoo, 1996). Abstractions and generalizations are left to students' subconscious capabilities. In Subconscious induction on structured material, the students are in touch with the language that has been structured to facilitate the inductive process. It advocates that through systematic repetition of the same pattern, through graded variations, and through drill and practice, the students will be able to come to an integrated mastery of the rule, without conscious analysis. Many audio-lingual methods around 1960 and especially the French audio-visual methods advocated this modality.

Modality E does not seem to be an instruction at all. It looks more like acquisition. In this modality, "only intense language practice is given, on the basis of authentic input, without any linguistic structuring or manipulation. Generalizations will come naturally, comparable to first language acquisition" (Decoo, 1996, p.98). This modality requires more time than any other modalities, because the input is not structured in a way that facilitates

learning.

Decoo's modalities are greatly helpful and clarifying because while there is a fair amount of studies regarding the deduction-induction dichotomy, authors do not always view induction in the same way. For example, Erlam (2003) used an inductive approach in which students were not told that there were rules governing the grammatical structure they were practicing. Therefore, they were not explicitly told to find any grammatical rules. However, the students were encouraged to tell their classmates why determined exercises were grammatical or ungrammatical. Robinson (1996) asked students to induce the rule for themselves as well. In Abraham (1985), the students in the inductive group were given more exercises than the deductive group but the former did not have to verbalize the rule governing the grammar structure. In Rosa and O'Neill (1999) the students were told to ask for the rule during the presentation. Shaffer (1989) asked students to verbalize the rule after the presentation. In Herron and Tomasello (1992) the students were not told to verbalize the grammatical rule. Only Haight et al. (2007) and Vogel et al. (2011) used the same inductive approach, which was modelled based on the guided induction model seen in Herron and Tomasello (1992) and the PACE model. According to Haight et al. (2007) the PACE model is taught through targeted structures that are presented naturally in a text.

There are many factors causing different results in such studies. Age, proficiency level in the target language and similarity of the native language to the target language differ in those studies mentioned above and they seem to have impacts on the results. Most of the studies mentioned here were carried out in university context, while only Erlam (2003) and Shaffer (1989) carried out their research in high school context. Erlam (2003) studied the impacts of inductive and deductive approaches on students who were 14 years of age and Shaffer (1989) worked with high school students whose ages ranged from 13 to 18 years. Mohammad and Jaber (2008) stated that their participants' ages ranged from 18 to 20. Herron and Tomasello (1992), Haight et al. (2007) and Vogel et al. (2011) stated that their participants were of a similar age. Although they do not go into detail about this, they

report that the participants were college students. Robinson (1996) worked with people whose ages ranged from 19 to 34 years. Rosa and O'Neill (1999) and Abraham (1985) stated that their participants were university students.

Another factor which is worth taking into account is the expected level of proficiency that participants of previous studies had with the TL before the beginning of the treatment. In Robinson (1996) the participants claimed to have possessed the pre-intermediate level of English proficiency and were taking an intermediate ESL course during the study. In this study, 94 subjects were native speakers of Japanese, five subjects were native speakers of Korean and five subjects were native speakers of Mandarin Chinese. Erlam (2003) carried out her study with participants who were about to finish their second year of instruction in French. Not all the subjects were native speakers of English, but those who had a different L1 had a level of English which was good enough to exempt them from additional English classes. The differences in the level of proficiency of the participants in studies which favored the deductive approach were also present in those studies which favored the inductive approach. Decoo (1996) states that "there is a tendency to state that simple, obvious structures can best be learned through an inductive approach, while complex structures are best explained from the onset through a deductive approach" (p. 111). Therefore, it might be true that students who just begin learning a language and is in contact with more simple structures can benefit from an inductive approach. On the other hand, those students who are in intermediate or advanced level of English proficiency and deal with more complex structures may benefit from a deductive approach.

There is a large amount of literature investigating the inductive and deductive approaches to grammar teaching. However, the results of these studies advocate both inductive and deductive methods which seems quite conflicting. Mohammed and Jaber (2008), Erlam (2003), and Robinson (1996) concluded that the deductive approach was more effective when teaching a specific piece of grammar. On the other hand, Herron and Tomasello (1992), Haight et al. (2007) and Vogel et al. (2011) stated that the inductive

approach proved to be more successful than the deductive approach. Finally, Abraham (1985), Rosa and O'Neill (1999) and Shaffer (1989) found no significant differences between an inductive and a deductive approach.

4. Methodology

In order to provide answer to the previously stated research question, a quantitative approach was employed. The methodological design for this study is quasi-experimental as the participants of each the groups were not assigned randomly.

4.1. Participants and Settings

Participants of this study were 65 twelfth-grade experimental science students. Their age ranged from 17 to 18. They were divided into two groups of 32 and 33 named as inductive and deductive. They all had basic proficiency level of English and they had already passed the previous compulsory English courses (Vision 1 and Vision 2). During the study, they were taking the third compulsory English course (Vision 3) which was designed for twelfth-grade high school students. This study was carried out at the first semester of 2020-2021 academic year and ended before students had started their mid-term exams.

4.2. Data collection

As previously mentioned, participants of this study were divided into two groups named as inductive and deductive. The school had already grouped them into two classes. This grouping was done based on the participants' overall performance in the previous semester of study and the school had arranged them in two groups so that they had appropriate level of homogeneity. However, we gave a placement test to ensure that the students had also been divided homogeneously based on their English proficiency level. Although they had all passed the previously mentioned compulsory English courses and, in that case, they appeared to be homogeneously divided. The pre-test questions were designed

from students' previous English course (Vision2) and it was taken at the beginning of the semester. The data for this study was collected using a pre-test (to check how much background knowledge participants possess before carrying out the treatment sessions) and three delayed post-tests which participants took four weeks, eight weeks and 12 weeks after the last treatment session. Three 75-minute treatment sessions (including presentation and practice) were carried over between the pre-test and the post-tests.

4.3.Procedure

According to the school schedule, the treatment sessions took place consecutively in both groups. First, the deductive group received treatment and then, the inductive group received treatment shortly afterwards. Both groups were not told that a research was being carried out so that it would not affect their performance. The participants were taught the passive voice of present simple, present continuous, past simple, past continuous, future and present perfect tenses during the treatment sessions. In each treatment session, the participants of the deductive group were taught grammatical rules explicitly. The teacher explained what passive voice is and how they are transformed from active sentences to passive ones. Then, he provided some examples of active sentences and turned them into passive sentences. Finally, the teacher assigned some workbook exercises. There were two types of exercises assigned by the teacher: make passive voice sentences using active sentences and write passive verbs in correct tenses. The teacher then checked the students' answers and provided feedback so that they corrected their wrong answers.

In the inductive group, unlike the deductive group, there was no explicit instruction. The teacher first presented some examples of passive voice by showing some pictures in which the performers of actions were not obvious. He then wrote passive sentences describing the pictures. After getting familiar with the passive structures, the participants were presented the passive structures in contexts (short conversations and reading passages). Then, the teacher assigned the same workbook exercises which he had assigned to the deductive group participants before. However, he did not provide the correct answers and

tried to pave the way for the students to discover the rules themselves. Before receiving treatment, the participants took a pre-test one week before the first treatment session so that we could measure how much background knowledge they had on passive voice. We intended to carry out the treatment to those participants who had no or less knowledge about passive voice. Therefore, he removed students who scored more than 8 out of 20 from the research process. It should be noted that the pre-test and the post-tests had the same format.

4.4.Data Analysis

In order to find out which approach caused positive long-term effects on students' retention of English passive voice, an analysis of post-tests scores between the deductive and inductive group was carried out. What we considered as the hypothesis of this analysis was as follows: the deductive group is expected to gain better results in the post-tests compared to the inductive group. The repeated measure ANOVA was conducted to analyze the raw scores of the post-tests and verify the proposed hypothesis.

There were also a placement test and a pre-test conducted before the beginning of the study in order to measure the level of participants' homogeneity in terms of English proficiency and to check out how much background knowledge they had on English passive voice before the research process had begun. The t-test computational tool was conducted to analyze the raw scores of the placement test and the pre-test.

5. Results

To analyze the collected raw data from these tests, SPSS software (version 23) was used to compare the results of the inductive and deductive groups. The computational tool for comparing the mean scores of pre-tests was Independent Samples t-test. The researcher also conducted the repeated measure ANOVA to analyze the obtained mean scores from the three posttests.

The homogeneity of the Groups

To ensure to homogeneity of the groups in terms of English proficiency level, we conducted a placement test. Table 1 represents the descriptive statistics of the test.

Table 1
Group Statistics for Comparison of Inductive Group and Deductive Group

		N	Mean	Std. Deviation	Std. Error Mean
Pre-test	Inductive	32	18.31	2.66	.471
	Deductive	33	18.12	1.763	.306

The results of the analysis of the data are shown in Table 2.

Table 2

Independent Samples Test for Comparison of Inductive Group and Deductive Group in the Placement Test

		Levene's Test for Equality of variances		t-test for Equality of Means						
P.test		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. Error Differences	95% Confidence Interval of the Difference	
									Lower	Upper
P.test	Equal variances assumed	1.78	.187	.342	63	.734	.191	.559	-.926	1.309
	Equal variances not assumed			.340	53.509	.735	.191	.562	-.937	1.320

						(2-tailed)	difference	Differences	Confidence Interval of the Difference	
									Lower	Upper
Pretest2	Equal variances assumed	.121	.729	-.420	63	.676	-.134	.320	-.774	.505
	Equal variances not assumed			-.420	62.208	.676	-.134	.320	-.775	.506

According to the findings, the significance of Levene's test is 0.729. This value is higher than the significant level of 0.05. Therefore, H_0 (equality of variances) is accepted. H_0 claims that the participants of both groups had little or no background knowledge about passive voice. The acceptance of H_0 means that the two means are equal, and they are not significantly different at the level of 0.05.

5.1. Results Related to the First Research Question

In order to provide an answer to the first research question, a comparison of the means of the scores obtained by inductive and deductive groups in the pre-test and three post-tests should be made. The most appropriate analysis tool to make such comparison is repeated measures ANOVA. This computational tool will first be applied to the mean scores of the inductive group and then to the mean scores of the deductive group to check out if both approaches make significant long-term effects on the acquisition of passive voice. Tables 5, 6, and 7 present the results of the analysis for the mean scores obtained by the inductive group.

Table 5*Mauchly's Test of Sphericity in the Inductive Group*

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Tests	.670	11.890	5	.036	.817	.893	.333

Table 6*Tests of Within Subjects Effects in the Inductive Group*

Source		Type III Sum of Squares	df	Mean squares	F	Sig.
Tests	Sphericity Assumed	2443.211	3	814.404	72.268	.000
	Greenhouse-Geisser	2443.211	2.604	996.445	72.268	.000
	Huynh-Feldt	2443.211	2.678	912.208	72.268	.000
	Lower-bound	2443.211	1.000	2443.211	72.268	.000
Error (tests)	Sphericity Assumed	1048.039	93	11.269		
	Greenhouse-Geisser	1048.039	76.010	13.788		
	Huynh-Feldt	1048.039	83.029	12.623		
	Lower-bound	1048.039	31.000	33.808		

Table 7

Pairwise Comparisons of the Mean Scores Obtained by the Inductive Group

(I) tests	(J) tests	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference	
					Lower bound	Upper bound
Pre-test	post-test 1	-10.750	.910	.000	-13.315	-8.185
	post-test 2	-10.250	.835	.000	-12.604	-7.896
	post-test 3	-8.906	.703	.000	-10.888	-6.924
Post-test 1	Pre-test	10.750	.910	.000	8.185	13.315
	Post-test 2	.500	.948	1.00	-2.172	3.172
	post-test 3	1.844	.597	.189	-.903	3.025
Post-test 2	Pre-test	10.250	.835	.000	7.896	12.604
	Post-test 1	-.500	.948	1.00	-3.172	2.172
	Post-test 3	1.344	.597	.189	-.338	3.025
Post-test 3	Pre-test	8.906	.703	.000	6.924	10.888
	Post-test 1	-1.844	.975	.407	-4.590	.903
	Post-test 2	-1.344	.597	.189	-3.025	.338

Repeated measures ANOVA requires sphericity which is evaluated by Mauchly's test of sphericity. Sphericity in the analysis of the data obtained by the inductive group is not assumed since the p-value is .036 and it is less than .05. Therefore, results in the tests of within-subjects effects in which sphericity is assumed will not count. Since sphericity is not assumed in the data obtained by the inductive group, we should use either Greenhouse-Geisser results or Hyunh-Feldt results. According to Rules of thumb proposed by Howell (2002), and Field (2013), when p-value is less than .05, we should check out Greenhouse-Geisser epsilon. If it is greater than 0.75, we use Greenhouse-Geisser results and if it is less than .75, we use Hyunh-Feldt results. According to Table 4.16, the Greenhouse-Geisser

epsilon is .817 which is greater than .75. Therefore, we will use Greenhouse-Geisser results. As Table 4.17 shows, the difference between the means in Greenhouse-Geisser row is statistically significant: "F (2.604, 76.010) = 72.268, p= 0.000". This statistical significance is also confirmed in the pairwise comparison. According to table 4.18, the significance of the pre-test comparison with each delayed posttest is .0, hence the following null hypothesis is rejected: The inductive teaching methodology has no significant long-term effect on the acquisition of passive voice among twelfth-grade high-school students.

Tables 8, 9 and 10 present the results of the analysis for the mean scores obtained by the deductive group.

Table 8

Mauchly's Test of Sphericity in the Deductive Group

Within Subject s Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Tests	.717	10.229	5	.069	.819	.892	.333

Table 9

Tests of Within Subjects Effects in the Deductive Group

Source		Type III Sum of Squares	df	Mean squares	F	Sig.
Tests	Sphericity Assumed	2406.750	3	802.250	101.005	.000
	Greenhouse-Geisser	2406.750	2.456	979.859	101.005	.000
	Huynh-Feldt	2406.750	2.676	899.428	101.005	.000
	Lower-bound	2406.750	1.000	2406.750	101.005	.000
Error (tests)	Sphericity Assumed	762.500	96	7.943		

Greenhouse-Geisser	762.500	78.599	9.701
Huynh-Feldt	762.500	85.628	8.905
Lower-bound	762.500	32.000	23.828

Table 10

Pairwise Comparisons of the Mean Scores Obtained by the Deductive Group

(I) tests	(J) tests	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference	
					Lower bound	Upper bound
Pre-test	post-test 1	-8.212	.657	.000	-10.059	-6.365
	post-test 2	-9.667	.840	.000	-12.029	-7.304
	post-test 3	-10.939	.731	.000	-12.994	-8.884
Post-test 1	Pre-test	8.212	.657	.000	6.365	10.059
	Post-test 2	-1.455	.743	.353	-3.543	.634
	post-test 3	-2.727	.616	.001	-4.459	-.995
Post-test 2	Pre-test	9.667	.840	.000	7.304	12.029
	Post-test 1	1.455	.743	.353	-.634	3.543
	Post-test 3	-1.273	.535	.141	-2.778	.233
Post-test 3	Pre-test	10.939	.731	.000	8.884	12.994
	Post-test 1	2.727	.616	.001	.995	4.459
	Post-test 2	1.273	.535	.141	-.233	2.788

Table 9 shows that the difference between the means where sphericity is assumed is statistically significant: "F (3, 96) = 101.005, p= 0.000". Therefore, the null hypothesis for the control group is rejected. The rejection of the following null hypothesis when comparing the pre-test with each post-test (see Table 10) is also confirmed: The deductive teaching methodology has no significant long-term effect on the acquisition of passive voice among twelfth-grade high-school students.

Due to the rejection of null hypothesis for the first research question, the alternative hypothesis is accepted and provides answer for the first question: Both inductive teaching methodology and deductive teaching methodology have a significant long-term effect on

the acquisition of passive voice among twelfth-grade high-school students.

5.2. Results Related to the Second Research Question

To provide an answer to the second research question, we need to make a comparison between the mean scores of three post-tests which both groups took. To do so, an independent t-test was conducted. The results of the analysis are presented in Table 11.

Table 11

Independent Samples Test of Inductive and Deductive Groups in the Delayed Post-tests

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Dif.	Std. Error Dif.	95 % Confidence Interval of the Difference	
								Lower		Upper
Post-test1	Equal variances assumed	6.32	.015	2.191	63	.032	2.403	1.096	.211	4.59
	Equal variances not assumed			2.18	58.96	.033	2.403	1.100	.200	4.60
Post-test2	Equal variances assumed	.544	.464	.364	63	.717	.448	1.231	-2.01	2.91
	Equal variances not assumed			.364	62.997	.717	.448	1.231	-2.01	2.91
Post-test3	Equal variances assumed	.462	.499	-2.114	63	.038	-2.167	1.025	-4.21	-.119
	Equal variances not assumed			-2.117	62.822	.038	-2.167	1.023	-4.21	-.121

The first row of this table compares the groups' performance in the first delayed

post-test. Since $\text{Sig.} < 0.05$, we conclude that the assumption of equal variances does not hold. Thus, we report the second line of t-test results. Two-tailed significance in that line is less than 0.05. It means that the null hypothesis, which states that there is no difference in the effectiveness of the inductive methodology compared to the effectiveness of the deductive methodology, is rejected and the alternative hypothesis is supported: There is a significant difference in the effectiveness of the inductive methodology compared to the effectiveness of the deductive methodology. Since $t(58.96) = 2.18$, $p = .033$, we conclude that the inductive group performed better in the first delayed post-test.

The second row of Table 11 compares the results gained by both groups in the second delayed post-test. Since $\text{Sig.} > 0.05$, we assume the equality of variances. Two-tailed significance in that line is greater than 0.05 which means the null hypothesis in the second delayed post-test is not rejected and as a result, we can conclude that the difference between the mean scores of both groups in the second delayed post-test is not significant.

In the third row, the results of the groups in the third delayed post-test are compared. The equality of variances is assumed in this row because $\text{Sig.} > 0.05$. Two-tailed significance, which is less than 0.05, indicates that the null hypothesis in the third delayed post-test is rejected and there is a significant difference between the effectiveness of aforementioned methodologies. Since $t(63) = -2.114$, $p = .038$, we conclude that the deductive group performed better in the third delayed post-test.

6. Discussion

The findings of this study are consistent with the results of studies advocating for both approaches. Considering short-term effects, it is consistent with the results of studies such as Herron and Tomasello (1992), Haight et al. (2007) and Vogel et al. (2011) which advocated for inductive approaches. Considering long-term effects, this study is consistent with studies supporting deductive approaches such as Mohammad and Jaber (2008), Erlam (2003) and Robinson (1996).

Considering the study conducted by Mohammad and Jaber (2008), the current study shares some characteristics with it. This may explain why these two studies ended up supporting deductive approaches. Both studies shared passive voice as the target content of teaching and students' target language was English. The main difference between these two studies is that the participants in Mohammad and Jaber (2008) were university students, and the participants of this study were high-school students.

Another reason which may affect the reason why the current study ended up supporting deductive approaches is that the participants who were Iranian twelfth-grade high school students had been taught deductively in their previous English courses, hence expect the teacher to present the rules at the beginning of the teaching.

The studies which supported the efficacy of inductive approaches shared some characteristics. The three studies advocating for inductive approaches (Herron and Tomasello, 1992; Haight et al., 2007; Vogel et al., 2011) used the same inductive approach. Their participants were all college students of a quite similar age, they were all native speakers of English, the target language in these studies were French and they all investigated the short-term effects. Some of these characteristics are also observed in the current study. As the previously mentioned studies used the guided induction to present the rules, this study also used the same approach to present the rules to the inductive group. Not only did these studies share the same inductive approach, but also they advocated for the efficacy of inductive approaches in a short range of time.

7. Conclusion

Although both approaches were proved to be effective in a long range of time, it was still unclear if the grammatical achievements of the participants of both groups were significantly different. That is why the second research question was raised. To provide answer to the second research question, an independent samples test was conducted to compare the proliferation in performance of both groups in a course of time. The results

revealed that in the first post-test, the inductive group's performance was better than the performance of the deductive group. In the second post-test, the difference between the mean scores of both groups was not proved to be significant and they performed quite equally. In the third post-test, however, the analysis of the data showed that the performance of the deductive group got better than the performance of the inductive group. To sum up, although the inductively-taught learners started with better performance, the deductively-taught learners ended up performing better than them.

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