



Evaluating the Effectiveness of Deductive and Inductive Form-Focused Instruction on Iranian EFL Learners' Implicit and Explicit Knowledge of Non-Generic Definite Article

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Abstract

This study investigated the relative effects of deductive and inductive form-focused instruction (FFI) on the acquisition of 4 non-generic definite article uses (*cultural, situational, structural, and textual*) as assessed by explicit and implicit outcome measures. The tests utilized to assess EFL learners' acquisition of definite article uses were timed and untimed grammaticality judgment tests. A pretest and two posttests were conducted immediately and four weeks after the instructional interventions. Durable effects of FFI on intermediate Iranian learners' acquisition were found for different uses of definite article. In particular, the present study found that deductive and inductive FFI positively facilitates the development of explicit and implicit knowledge of non-generic definite article, both immediately after the instruction and, marginally decreasing, over time. Moreover, the findings indicated different difficulty levels for the 4 uses of definite article, with cultural use being the most difficult one followed in the order by situational, structural, and textual uses. This study's findings contribute to our understanding of the efficacy of deductive and inductive FFI on EFL learners' controlled (explicit) and spontaneous (implicit) use of a non-salient language forms at intermediate stages of L2 acquisition.

Keywords: Deductive/inductive FFI; Non-generic definite article; Explicit/implicit knowledge

1. Introduction

The power of comprehensible input to bring about the acquisition of different language forms has been hotly debated for more than three decades (see R. Ellis, 2008; Krashen, 1985). But there has been evidence that certain morphosyntactic forms cannot be acquired solely on the basis of mere exposure to the language alone (White, 1987). Non-salient language forms such as English articles are not easily acquired and/or readily produced by being exposed to comprehensible input. The difficulty of acquiring these non-salient language features has led SLA researchers to approach theories on grammar instruction in various ways (see Hinkel & Fotos,

2002), with the assumption that difficult and non-salient forms/features may require explicit interventions of some kind.

For these difficult language features, various forms of intervention have been researched. More than a decade after Norris and Ortega's (2000) meta-analysis of 49 studies investigating the efficacy of L2 instruction, studies probing L2 acquisition through some means of intervention remain extensive. But the fundamental issue regarding the role of form-focused instruction (FFI) in developing these 'hard to acquire' forms continues to be debated (DeKeyser, 2005; R. Ellis, 2002, 2008). Some evidence suggests that a number of morphosyntactic forms appear to resist L2 instruction (e.g., Macaro & Masterman, 2006).

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In part, the uncertainty over the effectiveness of different types of FFI is due to the problem of operationalizing implicit and explicit language knowledge (R. Ellis, 2005). Most studies so far have evaluated L2 acquisition employing explicit rather than implicit measures of L2 knowledge (Norris & Ortega, 2000) and this measurement problem according to Hulstijn (2005) has made the efficacy of L2 type-of-instruction research more controversial. However, some recent developments have provided evidence that it may be possible to measure explicit and implicit language knowledge as two relatively independent constructs (R. Ellis, 2005, R. Ellis et al., 2009), but there is a paucity of research (Akakura, 2011) evaluating L2 acquisition in terms of these new measures. Hence the significance of studies that undertake to investigate the potential effects of type of instruction on SLA with regard to both explicit and implicit types of knowledge is greatly emphasized.

Background

Deductive and Inductive FFI

While various ways for providing FFI are existent, there is substantial evidence to report an advantage for FFI involving an explicit focus on the rule-governed nature of L2 forms in comparison to implicit types of FFI (e.g., DeKeyser, 2003; Norris & Ortega, 2000). Explicit FFI can be of two main types: deductive and inductive. Deduction is characterized as a process that moves from the general to the specific but induction is a process which moves from the specific to the general. In deductive FFI students are provided with an explanation of the target form(s) which they practice in one way or another and in inductive FFI students are provided with L2 examples that illustrate the target form(s) and are asked to attempt to reach metalinguistic generalizations on their own (R. Ellis, 2008). Both deductive and inductive methods of FFI fit along what Norris and Ortega (2000) depicted as a continuum of explicitness that varies from the more explicit (deductive) to the less explicit (inductive). For the purposes of this study, both inductive and deductive methods of FFI were considered as examples of explicit FFI and as clearly differentiated from Norris and Ortega's definition of implicit FFI as instruction for which there are neither rule explanations nor directions to attend to particular language forms/features. Of the 77 studies that Norris and Ortega (2000) employed as the base for their research synthesis, only 3

studies probed the relative effectiveness of deductive and inductive instruction (i.e., Herron & Tomasello, 1992; Robinson, 1996; Shaffer, 1989). The lack of recent studies also suggests that this line of inquiry is an underresearched area within the field of instructed SLA research. Conclusions from the results of a few studies that have contrasted the effectiveness of inductive and deductive FFI are as follows:

1. There is mixed empirical evidence as to the efficacy of these two types of instructional approaches. Herron and Tomasello (1992) detected an overall advantage for inductive FFI, and Robinson (1996), Seliger (1975), and Erlam (2003) found an advantage for deductive FFI. Abraham (1985), Rosa and O'Neill (1999), and Shaffer (1989) reported no significant difference between the two approaches, but Shaffer uncovered a trend in favor of the inductive approach.

2. No study used measures of both explicit and implicit language knowledge. Hulstijn and de Graaff (1994), however, suggested that explicit FFI may have a differential effect on these two types of language knowledge.

Different types of L2 knowledge

The potential effects of deductive and inductive FFI on SLA can be investigated in terms of different types of L2 knowledge that L2 learners may develop as a result of these types of instruction. The most common distinction about the different types of L2 knowledge is between explicit and implicit knowledge. Explicit knowledge is defined as declarative and conscious form of knowledge about language that is potentially verbalizable and generally accessible through controlled processing in planned language performance (R. Ellis, 2004). In contrast, implicit knowledge is characterized as intuitive and procedural knowledge of language that is automatic and thus available for employment in unplanned, fluent language performance (R. Ellis, 2004, 2008).

However, some researchers (e.g., Norris & Ortega, 2000; Doughty, 2003, Akakura, 2011) highlighted the fact that most research probing the effectiveness of type of instruction to date has used language measures that require the application of explicit L2 knowledge under controlled conditions and not the use of unplanned and fluent (implicit) L2 knowledge. Also, as Norris and Ortega (2000) cautioned, there is little doubt that there is a significant relationship between the observed effectiveness of type L2 instruction provided and type of L2

measures used.

But some recent developments have provided evidence that it may be possible to measure implicit and explicit types of knowledge as independent constructs. R. Ellis (2005; R. Ellis et al., 2009) created a battery of tests designed to tap explicit and implicit knowledge of learners. Nevertheless, no studies have been done to examine the potential effects of deductive and inductive FFI on implicit and explicit types of knowledge in terms of these new measures and hence the necessity of undertaking studies with regard to these new developments in the field is clearly felt.

Acquisition of English articles

The teaching of the English articles is a somewhat controversial undertaking as they are considered to be a language form that conveys "highly abstract notions that are extremely hard to infer, implicitly or explicitly, from the input" (DeKeyser, 2005, p.5).

Some believe instruction in the article system will have no useful long-term effect (Dulay, Burt, & Krashen, 1982), but others think that there are usually more egregious errors that require attention (e.g., Master, 1997).

There have been many studies focusing on instruction of English article system. FFI of articles typically covers the use of definite and indefinite articles among adult learners and most of these studies show some effects of FFI. Some studies have found statistically significant effects (e.g., R. Ellis et al., 2008), while other studies have reported limited gains (e.g., Shimamune & Jitsumori, 1999). Moreover, the extreme complexity of the English article system has caused most article studies to investigate only one aspect of this system and the current study in line with previous research attempts to examine only one aspect of its acquisition—namely, the various non-generic functions of the definite article *the*. The definite article "*the*" was chosen due to its wide range of usage and its greater frequency of use than the indefinite article "*a*" or "*an*" (Master, 1997). Other uses of *the* are considered generic which have been found to be very rare (Tarone & Parish, 1988). Furthermore, the generic use of definite article *the* in most cases can be replaced by the indefinite article *a(n)* if the noun is singular or substituted by the zero article if the noun is plural. The non-generic use of *the*, on the contrary, cannot be replaced or substituted. Additionally, the non-generic use of *the* is much more

complex and hence more problematic for L2 learners than the generic use.

Quite a few researchers (e.g., Celce-Murcia & Larsen-Freeman, 1999; Christophersen, 1939; Hawkins, 1978) have grappled with the difficult task of classifying the complex uses of *the*. Hawkins's work deserves our special attention for the purpose of this study.

Drawing on the work of Christophersen (1939), Hawkins (1978) developed a comprehensive categorizational rubric known as Location Theory to explain the various uses of the non-generic *the*. He identified the following eight types of non-generic use (pp. 106–149):

1. Anaphoric use: use of *the* when something is mentioned a second time and subsequently (e.g., John was working at a lathe the other day. All of a sudden the machine stopped running)

2. Visible situation use: use of *the* with a noun mentioned the first time to refer to something that both the speaker and the listener can see (e.g., Pass me the bucket)

3. Immediate situation use: very similar to type 2, the only difference being that the thing referred to may not be visible (e.g., Don't go in there, chum. The dog will bite you. [Hawkins, p. 112])

4. Larger situation use relying on specific knowledge: use of *the* with a first-mention noun because it is known in the community (e.g., people from the same village talking about the church, the pub, and so forth)

5. Larger situation use relying on general knowledge: use of *the* with something that one can assume people from a country or around the world should know (e.g., The White House referring to the U.S. government, the moon)

6. Associative anaphoric use: basically the same as type 1, the only difference being that the first-mention *the* is used with a noun that is related to a previously mentioned noun, rather than being the same noun (e.g., We went to a wedding. The bride was very tall.)

7. Unfamiliar use in NPs with explanatory modifiers: use of *the* with a first-mention noun that has an explanatory or identifying modifier in the form of a clause, prepositional phrase, or noun (e.g., The movies that are shown here now are all rated R; There was a funny story on the front page of the Guardian this morning; I hate the name Algernon. [Hawkins, pp. 139 and 147])

8. Unfamiliar use in NPs with nonexplanatory modifiers: similar to type 7, the only difference

being that the modifier does not provide explanatory information (e.g., My wife and I share the same secrets, where the modifier same does not inform us as to what the secrets are but “only points to an identity between the two sets of secrets, my wife’s and my own” [Hawkins, p. 148]). Here same is used as a unique adjective that always requires the. There are a few adjectives that can be used this way, such as only and sole.

Through previous examples, Hawkins (1978) demonstrated how his Location Theory works. Liu and Gleason (2002), further, proposed a shortened form of Hawkins' comprehensive theory. They categorized the above-mentioned eight types according to four types, each with a different level of difficulty. Liu and Gleason rationalized their new categorization as follows:

Basically, when an individual uses the, he or she invites the listener or reader to locate the referent by using provided or assumed known cultural, situation, structural, or textual information ... Based on this theory, we believe that we can combine some of his categories and classify the nongeneric use of the into four major types. The first is cultural use, where the is used with a noun that is a unique and well-known referent in a speech community. The second is situation use, where the is used when the referent of a first-mention noun can be sensed directly or indirectly by the interlocutors or the referent is known by the members in a local community. The third is structural use, where the is used with a first-mention noun that has a modifier. The fourth is textual use, where the is used with a noun that has been previously referred to or is related to a previously mentioned noun. (p.7)

To examine the difficulty level of these four types of article use (cultural, situational, structural, and textual), Liu and Gleason (2002) developed a test instrument for measuring L2 learners' knowledge of definite article. In this study, the researchers also undertook to analyze their data along the same line as Liu and Gleason as their classification of the was considered to be both complete and concise. Their instrument was further adapted in this study to measure the implicit and explicit knowledge of the EFL learners as very few studies (e.g., Akakura, 2011) have employed both implicit and explicit outcome measures in their data collection.

This study expands the previous research by investigating the effectiveness of the type of instruction in relation to the type of L2 knowledge

developed. Previous research has found mixed empirical evidence as to the efficacy of deductive and inductive FFI and no study has investigated the acquisition of non-generic definite article through measures of both explicit and implicit language knowledge. Hence, the significance of this study which attempts to probe these dimensions in the same direction (theoretical and methodological) established by Liu and Gleason (2002) and Ellis et al. (2009) is clearly understood. The research questions motivating this study are as follows:

1) Are there any effects of deductive and inductive FFI on the development of non-generic definite article uses in L2 English, as measured by explicit and implicit knowledge tests?

2) Do the effects of deductive and inductive FFI on L2 learners' explicit and implicit knowledge vary with the four types of article uses (cultural, situational, structural, and textual)?

Method

Participants

Ninety-eight participants took part in this study; 44% were male and 56% were female. They were all undergraduate students majoring in English at Islamic Azad University (30 juniors, and 68 seniors). The participants' proficiency levels fell within the range of intermediate mid to intermediate high sublevels of ACTFL Proficiency Guidelines as determined by a test of IELTS administered by the researchers in the sampling phase of the study. The Participants were randomly assigned to the deductive, inductive, and control groups. A One-Way ANOVA did not show any significant differences in the performance of the three groups on the pretest indicating that the Control and Experimental Groups performed similarly at the beginning of the study without differences in prior knowledge of non-generic definite article.

Instrumentation

The participants completed a pretest a week prior to the immediate posttest. Immediate post-testing occurred the week following the treatments, and delayed post-testing took place in the fourth week following FFI. The outcome tests (detailed below) were originally developed by Liu and Gleason (2002) but were further adapted here in the same theoretical and methodological directions established by R. Ellis (2005).

The outcome tests were designed in accord-

ance with four of R. Ellis' (2005) criteria for distinguishing implicit and explicit knowledge (i.e. degree of awareness, time available, focus of attention, and metalinguage). That is, it was predicted that each outcome test would provide a relatively distinct measure of either implicit or explicit knowledge according to how it mapped out on these distinguishing criteria. The timed grammaticality judgment test (TGJT) was hypothesized to measure primarily implicit L2 knowledge because it encouraged the employment of 'feel' under time pressure so that there was little chance or need to access metalinguistic knowledge. However, the untimed GJT was predicted to measure primarily explicit L2 knowledge because it encouraged a high degree of awareness, was under no time pressure, directed attention on form, and required the use of metalinguistic explanations (R. Ellis, 2005).

Timed GJT

This instrument was a computer-delivered test made up of 5 sentences (see Appendix). There were a total of 48 obligatory uses of *the* (12 per category) which were divided into grammatical and ungrammatical sentences. They were presented to participants in a written form on a computer. The participants were required to indicate whether a sentence is well-formed (grammatical) or deviant (ungrammatical) by pushing response buttons within a limited amount of time. The amount of response time for each sentence was determined based on previous research. Previous studies have ranged from allowing 3 or 3.5 seconds (e.g., Han, 2000) to 10 seconds (Mandell, 1999) for participants to respond to each sentence. Thus, the time permitted for judging the grammaticality of each sentence in this study ranged from 5 to 8 seconds due to the slower processing speed of our EFL learners and also taking into account the length and complexity of each sentence. Test items were scored in a dichotomous manner as correct/incorrect and items without any response were considered as incorrect. Finally, a percentage accuracy score was computed based on the given responses.

Untimed GJT

This was a paper-based test which had the same content as the timed version of GJT. Following R. Ellis (2005), participants were given as much time as they needed to judge the grammaticality of the sentences. Participants were asked to a)

indicate whether each sentence was ungrammatical or grammatical, b) underline the ungrammatical part of each sentence, and c) indicate the article rule (use) that explains why the sentence is ungrammatical for each sentence. Finally, a total percentage accuracy score was calculated based on the participants' responses.

Reliability of the tests was estimated by means of internal consistency of responses to every item in each of the tests. Cronbach's alpha coefficient was calculated for the pre-tests of the timed GJT ($\alpha=.86$) and untimed GJT ($\alpha=.88$). The reliability coefficients for both tests were above the .80 level considered to be acceptable by Davies et al. (1999).

The validity of the test instruments is supported by a principal component factor analysis revealing factors underlying the test scores. An initial principal component analysis extracted two components with an initial Eigenvalue of 2.014 and a second component with an Eigenvalue of 1.121, which together comprised 66.3% of the variance. As reported by previous studies (e.g., Akakura, 2011, R. Ellis, 2005) the timed GJT loaded at 0.7 or higher on one factor (implicit knowledge) and the untimed GJT loaded strongly (i.e., higher than 0.7) on factor 2 (explicit knowledge). These results present evidence of the separateness of the two types of knowledge.

The tests were completed in the following order: 1. Timed GJT 2. Untimed GJT

Both tests included a number of training examples for participants to practice on. The timed GJT was completed individually on a computer and then the untimed GJT was provided in paper in a private office.

Procedure: treatments

All three groups received an equal amount of instruction (five lessons, each one lasting 45 minutes and spread over the period of 1 week) with the same instructor, who was also one of the researchers. The teaching sessions were audiotaped for all classes. In the deductive FFI group the instructor explained the different non-generic uses of the definite article based on Hawkins' (1978) Location Theory and then several example sentences for each type were presented to the students. The students subsequently completed a number of exercises that required them to identify the different non-generic uses of *the*. The inductive FFI group was first presented with several example sentences relating to each non-generic

use of *the* (the relevant articles were bolded) and were then required to work out the given usage (e.g., *Anaphoric use, Associative anaphoric use*) from examples presented to them. The students of this group were additionally provided with some feedback (metalinguistic clues) the purpose of which was to help them arrive at the form-function mapping of each article usage. The Control group received instructional treatment that differed with respect to the target structure from that given to the other two classes. They received FFI that targeted dative alternation with verbs like *give* and *sell*. They thus had no exposure to the target form outside the testing episodes.

Design

The study used a quasi-experimental design involving intact classes serving as two experimental groups – deductive FFI ($n = 35$), inductive FFI ($n = 34$) – and a control group ($n = 30$). All three groups completed a pre-test, an immediate post-test and a delayed post-test (four weeks after the treatment), where the tests adapted criteria set by Ellis et al. (2009). The measure of implicit L2 knowledge was a timed grammaticality judgment test (GJT). This measure had a focus of attention on meaning, and was administered under time pressure (Appendix). The measure of explicit L2 knowledge was an untimed GJT which had a primary focus on form and was conducted under no time constraints.

Results

First Research Question

Research question one of the current study exam

ined possible effects of deductive and inductive FFI on L2 learners' implicit and explicit knowledge of definite article uses. To probe the corresponding null hypothesis, first descriptive and then inferential statistics for the deductive FFI, inductive FFI, and control groups are reported for each of the following tests.

Timed GJT

To assess the effects of deductive and inductive FFI on implicit knowledge of L2 learners the timed GJT was utilized. As the results of descriptive statistics for timed GJT in Table 1 depict, there is around 20% accuracy levels on the pre-test scores. These accuracy scores considerably increased for both FFI groups over the immediate and delayed posttests after receiving the treatments. The deductive FFI group received the highest score in the immediate posttest ($M=75.97$) and the second rank belongs to inductive FFI group ($M=68.53$). The lowest score in the immediate posttests belongs to the control group ($M=19.91$) with a large mean difference compared with the two experimental groups.

Additionally, the long-term impact of the treatments is also reported in Table 1 based on the delayed posttest scores. Here again the highest score goes to the deductive FFI group ($M=73.69$) and after that with a marginal decrease stands the inductive FFI group ($M=66.52$). Finally the control group with the lowest score ($M=20.51$) holds the third position.

Table 1.

Descriptive Statistics for the Effect of FFI on Implicit Knowledge Test

| Treatment | Test type | Time | Mean | SD | n |
|---------------|-----------|------------|-------|------|----|
| Deductive FFI | Implicit | Pretest | 18.95 | 2.46 | 35 |
| | | Posttest 1 | 75.97 | 3.12 | |
| | | Posttest 2 | 73.69 | 2.56 | |
| Inductive FFI | Implicit | Pretest | 20.22 | 2.26 | 34 |
| | | Posttest 1 | 68.53 | 3.45 | |
| | | Posttest 2 | 66.52 | 3.51 | |
| Control | Implicit | Pretest | 20.35 | 2.16 | 30 |
| | | Posttest 1 | 19.91 | 2.88 | |
| | | Posttest 2 | 20.51 | 2.43 | |

ANOVA results for the effects of the treatments on L2 students' implicit knowledge are reported in Table 2. According to these results, there was not a significant difference in the im

PLICIT knowledge of learners' pretests for the experimental and control groups as indicated by the F and P values ($F=.066$, $P=.936$). This indicates that any differences between groups on immedi-

ate and delayed posttests cannot be attributed to the differential prior knowledge of L2 students.

Table 2
ANOVA for the Effects of Instructional Treatments on Implicit Knowledge Test

| Time | df | F | P | h_{2p} |
|------------|----|--------|------|----------|
| Pretest | 2 | .066 | .936 | .002 |
| | 95 | | | |
| Posttest 1 | 2 | 102.70 | .000 | .798 |
| | 95 | | | |
| Posttest 2 | 2 | 92.25 | .000 | .764 |
| | 95 | | | |

By contrast, there was a statistically significant difference at $p < .05$ level in the implicit knowledge of students' posttests for the three groups: ($F_1=102.70$, $F_2=92.25$, $P_{1\&2}=.000$).

Table 3.
Post-hoc Comparisons Between Experimental and Control Groups' Mean Scores

| Test type | Time | (I) Treatment | (J) Treatment | Mean Difference (I-J) | Sig. | |
|-----------|-----------|---------------|---------------|-----------------------|---------|------|
| Implicit | pretest | deductive | inductive | -1.267 | .767 | |
| | | | control | -1.400 | .743 | |
| | | inductive | control | -.133 | .975 | |
| | posttest1 | deductive | inductive | 7.448 | .085 | |
| | | | control | 56.063* | .000 | |
| | | inductive | control | 48.615* | .000 | |
| | | | deductive | 7.175 | .097 | |
| | | posttest2 | deductive | control | 53.180* | .000 |
| | | | inductive | control | 46.005* | .000 |

*. The mean difference is significant at the .05 level.

Untimed GJT

To assess the effect of deductive and inductive FFI on explicit knowledge of L2 learners the untimed GJT was utilized. As the results of descriptive statistics for explicit knowledge in Table 4 show, there is well above 20% accuracy levels on the pretest scores. However, after receiving treatments, the two experimental groups considerably outperformed the control group. The deductive FFI group received the highest score in the immediate and delayed posttests and the second rank in the both posttests belongs to inductive FFI group. The lowest score in the first and second posttests belongs to the control group with large mean difference compared with the two experimental groups.

The actual difference in the first and second posttests between the groups is very large. The effect sizes, calculated using partial eta squared (h_{2p}), are .79 and .76 respectively, which mean that almost eighty percent of the variance in the posttests is accounted for by the effect of the FFI (According to Cohen's (1988) guidelines, the values more than .14 are considered to be large effects). Post-hoc comparisons conducted through Bonferoni test (see Table 3) indicated that the mean scores for deductive and inductive groups (in both posttests) are significantly different from the control group's mean score. Moreover, there is not any significant difference between the means of inductive and deductive FFI groups.

Table 4
Descriptive Statistics for the Effect of FFI on Explicit Knowledge Test

| Treatment | Test type | Time | Mean | SD | n |
|---------------|-----------|------------|-------|------|----|
| Deductive FFI | Explicit | Pretest | 21.68 | 2.46 | |
| | | Posttest 1 | 77.97 | 3.12 | 35 |
| | | Posttest 2 | 75.96 | 2.56 | |
| Inductive FFI | Explicit | Pretest | 21.80 | 2.26 | |
| | | Posttest 1 | 71.33 | 3.25 | 34 |
| | | Posttest 2 | 69.18 | 2.51 | |
| Control | Explicit | Pretest | 21.37 | 2.16 | |
| | | Posttest 1 | 22.76 | 3.88 | 30 |
| | | Posttest 2 | 21.59 | 2.43 | |

ANOVA results for the effects of the treatments on L2 students' explicit knowledge are reported in Table 5. There was not a significant difference in the explicit knowledge of students' pretest scores for the experimental and control groups as indicated by the F and P values ($F=.006$, $P=.994$). By contrast, there was a significant difference at $p<.05$ level in the explicit knowledge of learners' immediate and delayed posttests for the three groups (experimental and control groups): $F_1=100.64$; $F_2=97.26$; $P_{1\&2}=.000$. The actual difference in both posttests between the groups is very large. The effect sizes, calculated using partial eta squared, are .78 and .77 which mean that around eighty percent of the variance in the immediate and delayed posttests are accounted for by the effects of the FFI.

Table 5
ANOVA for the Effects of Instructional Treatments on Explicit Knowledge Test

| Time | df | F | P | h_{2p} |
|------------|----|--------|------|----------|
| Pretest | 2 | .006 | .994 | .001 |
| | 95 | | | |
| Posttest 1 | 2 | 100.64 | .000 | .789 |
| | 95 | | | |
| Posttest 2 | 2 | 97.26 | .000 | .771 |
| | 95 | | | |

Post-hoc comparisons conducted through Bonferoni test in both posttests (see Table 6) indicate that the mean scores for deductive and inductive FFI groups were significantly different from the control group's mean score. Additionally, there was no significant difference between deductive and inductive FFI groups' means.

Table 6.
Post-hoc Comparisons between Experimental and Control Groups' Mean Scores

| Test type | Time | (I) Treatment | (J) Treatment | Mean Difference (I-J) | Sig. |
|-----------|-----------|---------------|---------------|-----------------------|------|
| Explicit | pretest | deductive | inductive | -.120 | .978 |
| | | | control | .317 | .941 |
| | | inductive | control | .437 | .918 |
| | posttest1 | deductive | inductive | 6.640 | .124 |
| | | | control | 55.205* | .000 |
| | | inductive | control | 48.565* | .000 |
| posttest2 | deductive | inductive | 6.780 | .116 | |
| | | control | 54.373* | .000 | |
| | inductive | control | 47.593* | .000 | |

*. The mean difference is significant at the .05 level.

Second Research Question

The second research question examined possible effects of deductive and inductive FFI on L2 learners' implicit and explicit knowledge of four types of article use (cultural, situation, structural, and textual) and whether the effects of FFI lead to similar types of knowledge for these four types or not. To probe the corresponding null hypothesis, first descriptive and then inferential statistics for the deductive and inductive FFI groups are reported for each of the following tests.

Timed GJT

The results of descriptive statistics for timed GJT in Table 7 show that there is around 20% accuracy levels on the pretest scores. These accuracy

scores generally increased for both FFI groups over both immediate and delayed posttests based on the type of the four non-generic uses.

Immediate and delayed posttests of students in the deductive FFI group show that the highest mean score belongs to the *textual use* category ($M_1=86.67$, $M_2=84.80$) and the lowest score to the *cultural use* category ($M_1=67.33$, $M_2=64.17$) and in between stand the *situational use* ($M_1=77.33$, $M_2=75.65$) and *structural use* ($M_1=72.58$, $M_2=70.17$) categories. Both posttests of students in the inductive FFI group also indicate the same hierarchy of ease-difficulty (i.e., *textual*, *situational*, *structural*, and *cultural*) as the deductive FFI group with marginal decrease in mean scores (see Table 7).

Table 7.
Descriptive Statistics for the Effects of FFI on the Four Non-Generic Uses

| Treatment | Use category | Time | M | SD | n |
|---------------|--------------|------------|-------|------|----|
| Deductive FFI | cultural | pretest | 18.65 | 2.55 | 35 |
| | | posttest 1 | 67.33 | 2.12 | |
| | | posttest 2 | 64.17 | 3.25 | |
| | situational | pretest | 19.56 | 2.23 | 35 |
| | | posttest 1 | 77.33 | 3.49 | |
| | | posttest 2 | 75.65 | 2.34 | |
| | structural | pretest | 16.95 | 2.33 | 35 |
| | | posttest 1 | 72.58 | 3.51 | |
| | | posttest 2 | 70.17 | 1.43 | |
| | textual | pretest | 20.65 | 2.56 | 35 |
| | | posttest 1 | 86.67 | 3.45 | |
| | | posttest 2 | 84.80 | 3.76 | |
| Inductive FFI | cultural | pretest | 19.71 | 2.23 | 34 |
| | | posttest 1 | 57.21 | 3.27 | |
| | | posttest 2 | 56.81 | 2.43 | |
| | situational | pretest | 20.98 | 2.38 | 34 |
| | | posttest 1 | 72.82 | 3.43 | |
| | | posttest 2 | 69.42 | 2.85 | |
| | structural | pretest | 17.36 | 2.13 | 34 |
| | | posttest 1 | 63.17 | 3.58 | |
| | | posttest 2 | 61.66 | 3.93 | |
| | textual | pretest | 22.83 | 2.31 | 34 |
| | | posttest 1 | 80.92 | 2.56 | |
| | | posttest 2 | 78.20 | 3.28 | |

To probe the null hypothesis corresponding to the first part of the second research question one-way ANOVA was conducted. As the ANOVA results summarized in Table 8 illustrate, there are significant differences at $p < .05$ level in the first posttest scores of the four non-generic uses: $F_{\text{deductive}} = 39.59$, $p = .000$; $F_{\text{inductive}} = 36.05$, $p = .000$. The actual differences between the four non-generic uses are very large. The effect sizes, calculated using partial eta-squared, are .76 and .74 for deductive and inductive FFI groups respectively.

These significant differences are sustained with slight changes in posttests 2 ($F_{\text{deductive}} = 37.23$, $p = .000$, $h_{2p} = .75$; $F_{\text{inductive}} = 32.86$, $p = .000$, $h_{2p} = .72$). These evidences lead us to believe that the null hypothesis is highly unlikely, so we can reject it. Thus, they support the hypothesis that the effects of FFI on EFL learners' implicit knowledge vary with the four non-generic uses of *the* and that they are not equally difficult for the both FFI groups.

Table 8.
ANOVA Results for the Effect of Category Use on Learners' Implicit Knowledge in the Deductive & Inductive FFI Groups

| Treatment | Time | df | F | Sig. | h_{2p} |
|-----------|------------|-----|-------|------|----------|
| Deductive | pretest | 1 | .24 | .862 | .054 |
| | | 66 | | | |
| | posttest 1 | 166 | 39.59 | .000 | .761 |
| | posttest 2 | 166 | 37.23 | .000 | .757 |
| Inductive | pretest | 166 | .45 | .721 | .096 |
| | posttest 1 | 166 | 36.05 | .000 | .748 |
| | posttest 2 | 166 | 32.86 | .000 | .726 |
| | | | | | |

Table 9.
Post-hoc Comparisons for the Effects of Article Use in Both FFI (Posttest1)

| Treatment | (I) use category | (J) use category | Mean Difference (I-J) | Sig. |
|-----------|------------------|------------------|-----------------------|------|
| Deductive | textual | situational | 9.255* | .001 |
| | | Structural | 14.360* | .000 |
| | | Cultural | 18.725* | .000 |
| | situational | Structural | 5.105* | .023 |
| | | Cultural | 9.470* | .000 |
| | | structural | 4.365* | .046 |
| Inductive | textual | situational | 7.250* | .003 |
| | | Structural | 15.860* | .000 |
| | | Cultural | 22.725* | .000 |
| | situational | Structural | 8.610* | .001 |
| | | Cultural | 15.475* | .000 |
| | | structural | 6.865* | .004 |

*. The mean difference is significant at the .05 level.

Table 10.
Post-hoc Comparisons for the Effects of Article Use in Both FFI(Posttest 2)

| Treatment | I(I) use category | (J) use category | Mean Difference (I-J) | Sig. |
|-----------|-------------------|------------------|-----------------------|------|
| Deductive | textual | situational | 8.450* | .001 |
| | | structural | 13.655* | .000 |
| | | cultural | 18.655* | .000 |
| | situational | structural | 5.205* | .016 |
| | | cultural | 10.205* | .000 |
| | | structural | 5.000* | .020 |
| Inductive | textual | situational | 7.805* | .001 |
| | | structural | 15.445* | .000 |
| | | cultural | 21.180* | .000 |
| | situational | structural | 7.640* | .001 |
| | | cultural | 13.375* | .000 |
| | | structural | 5.735* | .009 |

*. The mean difference is significant at the .05 level.

Untimed GJT

As the results of descriptive statistics for the untimed GJT in Table 11 depict, both deductive and inductive FFI groups performed similarly on the pretest with relatively low levels of accuracy. These accuracy scores greatly increased for both FFI groups over both posttests based on the type of the non-generic uses. The immediate and delayed posttests of learners in the deductive FFI group (reported in Table 11) show that the highest score belongs to the textual use

category ($M_1=88.45$, $M_2=85.24$) and then to situational use category ($M_1=79.28$, $M_2=77.49$). Structural use ($M_1=73.82$, $M_2=72.56$) and cultural use ($M_1=70.34$, $M_2=68.56$) categories subsequently hold the third and the fourth positions respectively.

Both posttests of students in the inductive FFI group also show the same ranking of ease-difficulty (i.e., *textual*, *situational*, *structural*, and *cultural*) as the deductive group with negligible decreases in mean scores (see Table 11).

Table 11.
Descriptive Statistics for the Effects of FFI on the Four Non-Generic Uses

| Treatment | Use category | Time | M | SD | n |
|---------------|--------------|------------|-------|------|----|
| Deductive FFI | cultural | pretest | 21.34 | 2.65 | 35 |
| | | posttest 1 | 70.34 | 2.42 | |
| | | posttest 2 | 68.56 | 3.15 | |
| | situational | pretest | 23.57 | 2.53 | 35 |
| | | posttest 1 | 79.28 | 3.19 | |
| | | posttest 2 | 77.49 | 2.54 | |
| | structural | pretest | 18.48 | 2.33 | 35 |
| | | posttest 1 | 73.82 | 3.21 | |
| | | posttest 2 | 72.56 | 2.43 | |
| | textual | pretest | 23.36 | 3.56 | 35 |
| | | posttest 1 | 88.45 | 2.45 | |
| | | posttest 2 | 85.24 | 3.26 | |
| Inductive FFI | cultural | pretest | 21.67 | 2.23 | 34 |
| | | posttest 1 | 60.12 | 3.27 | |
| | | posttest 2 | 58.75 | 2.83 | |
| | situational | pretest | 22.62 | 2.78 | 34 |
| | | posttest 1 | 75.46 | 3.23 | |
| | | posttest 2 | 72.89 | 2.75 | |
| | structural | pretest | 20.68 | 2.63 | 34 |
| | | posttest 1 | 67.89 | 3.38 | |
| | | posttest 2 | 65.37 | 3.43 | |
| | textual | pretest | 22.26 | 2.61 | 34 |
| | | posttest 1 | 81.86 | 2.86 | |
| | | posttest 2 | 79.72 | 3.18 | |

To probe the null hypothesis corresponding to the second part of the second research question one-way ANOVA was conducted. As the ANOVA results summarized in Table 12 illustrate, there are significant differences at $p < .05$ level in the first posttest scores of the four non-generic uses: $F_{\text{deductive}} = 42.59$, $p = .000$; $F_{\text{inductive}} = 38.15$, $p = .000$. The effect sizes, calculated using partial eta-squared, are .78 and .75 for deductive and inductive FFI groups respectively which indicate large differences between the four non-

generic uses. These significant differences are sustained with slight decreases in the second posttests ($F_{\text{deductive}} = 39.76$, $p = .000$, $h_{2p} = .76$; $F_{\text{inductive}} = 35.86$, $p = .000$, $h_{2p} = .74$). The weight of this evidence directs us to believe that the null hypothesis is highly improbable, so we can reject it. Thus, they support the hypothesis that the effects of FFI on EFL learners' explicit knowledge differ with the four non-generic uses of definite articles and that they do not cause equal amounts of difficulty for both FFI groups.

Table 12.
ANOVA Results for the Effect of Category Use on Learners' Implicit Knowledge in the Deductive and Inductive FFI Groups

| Treatment | Time | df | F | Sig. | h_{2p} |
|-----------|------------|-----|--------|------|----------|
| Deductive | pretest | 1 | .376 | .862 | .064 |
| | | 66 | | | |
| | posttest 1 | 166 | 42.592 | .000 | .781 |
| | posttest 2 | 166 | 39.764 | .000 | .762 |
| Inductive | pretest | 166 | .428 | .721 | .091 |
| | posttest 1 | 166 | 38.150 | .000 | .758 |
| | posttest 2 | 166 | 35.867 | .000 | .742 |
| | | | | | |

Subsequently, post hoc comparisons (Bonferoni) were applied to see where the

differences lie between the two groups in each of the categories.

The comparisons showed that each one of these four use categories is significantly differ-

ent from the rest of the group in both immediate and delayed posttests (see Tables 13 and 14).

**Table 13 ,
Post-hoc Comparisons for the Effects of Article Use in Both FFI(Posttest1)**

| Treatment | (I) use category | (J) use category | Mean Difference (I-J) | Sig. |
|-----------|------------------|------------------|-----------------------|------|
| Deductive | textual | situational | 8.245* | .002 |
| | | structural | 13.360* | .000 |
| | | cultural | 18.225* | .000 |
| | situational | structural | 5.125* | .021 |
| | | cultural | 9.470* | .000 |
| | | cultural | 4.455* | .045 |
| Inductive | textual | situational | 7.160* | .004 |
| | | structural | 15.750* | .000 |
| | | cultural | 22.725* | .000 |
| | situational | structural | 8.710* | .002 |
| | | cultural | 15.475* | .000 |
| | | cultural | 6.765* | .004 |

*. The mean difference is significant at the .05 level.

**Table 14.
Post-hoc Comparisons for the Effects of Article Use in Both FFI(Posttest2)**

| Treatment | I(I) use category | (J) use category | Mean Difference (I-J) | Sig. |
|-----------|-------------------|------------------|-----------------------|------|
| Deductive | textual | situational | 8.450* | .001 |
| | | structural | 13.865* | .000 |
| | | cultural | 18.345* | .000 |
| | situational | structural | 5.205* | .016 |
| | | cultural | 10.205* | .000 |
| | | cultural | 5.020* | .021 |
| Inductive | textual | situational | 7.705* | .001 |
| | | structural | 15.445* | .000 |
| | | cultural | 20.180* | .000 |
| | situational | structural | 7.640* | .001 |
| | | cultural | 13.475* | .000 |
| | | cultural | 5.825* | .010 |

*. The mean difference is significant at the .05 level

Results and Discussion

The objective of this research was to investigate the relative effects of deductive and inductive FFI on the acquisition of four types of article use as assessed by explicit and implicit outcome measures.

The findings of the current study regarding the first research question showed significant group differences between the experimental and control groups in their implicit and explicit knowledge of the non-generic definite article uses. The present study in line with some other studies (e.g., Erlam, 2003; Robinson, 1996; Seliger 1975) found that the most effective experimental treatment is deductive FFI which not only greatly outperformed the control group, but also showed more advantages than inductive FFI

on immediate and delayed post-experimental measures. Moreover, the magnitude of the effect sizes in both posttests indicated very large effects which did not fall within the realm of probabilistic sampling variability.

The results of this research also lends empirical support to the theoretical position taken by some prominent SLA scholars that deductive and/or inductive FFI can aid the acquisition of implicit knowledge (e.g., Ellis, N. 2002, 2005; Ellis, R. 2002, 2008). Taking performance in terms of tasks that are considered to measure the implicit knowledge of L2 learners, the findings of this study demonstrate that FFI results in the acquisition of the different usages of a non-salient target form (the) that are additionally of a durable nature. Previous trends reported by Norris and

Ortega (2000) indicate that the effect of FFI may last beyond immediate post-experimental observations but they tend to gradually deteriorate over time. This delayed effect may be due to the additional time (four weeks) needed for internal processing, which is considered by some researchers (e.g., Gass, 1997) to be necessary for input to be converted to implicit knowledge.

The findings of the study regarding the second research question indicate different difficulty levels for the four non-generic uses of *the*. The results show the following hierarchy of difficulty among the four types of use for both deductive and inductive FFI groups: Cultural > Situational > Structural > Textual

This hierarchy means that *cultural use* is more difficult than *situational use*, which is more difficult than *structural use*, all of which are more difficult than *textual use*.

The least difficult category for EFL learners to acquire according to this hierarchy is textual use and it can be accounted for by its straightforwardness as it is used with a noun that has been previously mentioned or is related to a noun previously was referred to. The second least difficult category for EFL learners to acquire is *structural use*. The existence of a modifier accompanying a first-mention noun may have made this use category more salient and hence less difficult to acquire than the two remaining categories. The second most difficult category to acquire according to the hierarchy is situational use which refers (directly or indirectly) to an object in the situation of utterance or the referent is known by the members in a local community, such as *the only cat in a family* or *the only drugstore in a town*. The finding that situation use is more difficult than structural use is somewhat surprising. Theoretically, situation use is an easier concept to understand than structural use as it “is first learned in actual situations-of-utterance with reference to entities present in the situation context” (Lyons, 1977, p.656) and our finding contradicts Liu and Gleason's(2002) study as they found situation use to be the least difficult category. The finding that cultural use is the most difficult category to acquire for EFL learners is in line with Master (1997) and Liu and Gleason (2002) which found the largest number of errors with article *the* in the cultural use category. Cultural use of *the* is to a large extent conventional. Not all names of places and diseases require the definite article. For example, definite article is used with some but

not all disease names. In a similar manner, it is placed before some geographical places (such as rivers) but not others (such as most lakes). Definite article is also used with the musical instruments we play but not with the sports we play, for we can say *play the guitar* but not *play the volleyball*. So, unlike the other use categories which can be explained by simple rules (e.g., the rule for textual use category is that the referent must have been previously mentioned directly or indirectly), the rules in cultural use category are often very complex and numerous.

Conclusion and Implications

This study has yielded two key findings. First, deductive and inductive FFI positively facilitate the development of explicit and implicit knowledge of a non-salient language form (non-generic definite article), both immediately after the instruction and, marginally decreasing, over time, and that deductive FFI is more beneficial than inductive FFI as measured by both explicit and implicit knowledge tests. Second, the four non-generic uses of definite articles present different levels of difficulty for EFL learners with cultural use being the most difficult followed in the order by situational use, structural use, and textual use.

There are also some implications of the current study. One implication is that deductive and inductive FFI can benefit implicit knowledge of EFL learners as well as their explicit knowledge. Thus, these results corroborate previous findings that have reported a positive effect for deductive and/or inductive FFI (e.g. Erlam, 2003; Herron and Tomasello, 1992). The study also demonstrates that it is possible to obtain relatively separate measures of implicit and explicit knowledge of L2 grammar. There are also pedagogical implications. First, because EFL acquisition of non-generic definite article appears to be use dependent, we should take this difficulty hierarchy into consideration in both classroom teaching practices and instructional material writings. Second, based on the results of this study about the four use categories of *the*, it is believed that a variety of learning strategies should be employed to make FFI more effective. Textual and structural types of use, for example, may need more cognitive types of learning because understanding and practicing these two uses involve the ability to analyze textual and structural information to identify the known information that would re

quire the use of *the* with the noun in question. Situation use, however, employs the five senses, hence, the use of kinesthetic, auditory, tactile, and visual learning. The cultural use of *the* would certainly require both cognitive learning and a significant amount of memorization because, as pointed out earlier, such use, though rule-governed in some ways, is often conventional and the rules are often too many and too complex to be easily acquired.

This study has of course its own limitations. The validity of the current study's findings depends heavily on the outcome tests used to measure explicit and implicit L2 knowledge. Arguments and psychometric evidence for the reliability and validity of these tests have been presented in this study and also elsewhere (see also Akakura, 2011, R. Ellis, 2005). However, further work on designing tests of these two types of knowledge is obviously necessary. Moreover, this study only shows the effectiveness of FFI in a classroom environment. Further research is needed to investigate other learning contexts such as computer-mediated environments on articles.

A possible expansion of the present investigation would be to see whether the observed hierarchy of difficulty for the four non-generic uses of *the* are the same for different ESL or EFL learners from different language backgrounds. Future research investigating effects of FFI on implicit knowledge may benefit from conducting posttests over longer periods of time to avoid making premature inferences about the role of FFI. It may then be possible to draw some firm conclusions regarding the relationship between deductive and inductive FFI and explicit and implicit knowledge of non-salient language forms.

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Appendix

Please read the following sentences carefully. Then, a) indicate whether each sentence is ungrammatical or grammatical, b) underline the ungrammatical part of each sentence, and c) indicate the article (*the*) rule use that explains why the sentence is ungrammatical.

Textual Use

1. Fred was discussing an interesting book in his class. I went to discuss * book with him afterwards.
2. Neda was working with a sewing machine the other day. All of a sudden *the* machine stopped turning.
3. A man and a woman entered a restaurant. *The* couple was received by a waiter.
4. Ali bought a car on Monday. On Wednesday, he crashed * car.
5. I ordered a pizza and salad. *The* pizza was nice but *the* salad was disgusting.
6. David bought a new car to please Mary but she didn't like * color.
7. We went to a wedding. * Bride was beautiful and * groom was handsome.
8. Bill drove past our house in a car. *The* exhaust fumes were terrible.
9. Her house was large. *The* size surprised me.
10. I went to a party last weekend. * Host was a friend of mine.

Situational Use

11. While driving in their car to work, the husband asks his wife, "Could you open *the* window please?"
12. In his office, the boss says to her secretary, "Please turn on * computer."
13. A woman, with her hands full, says to a man standing in front of the office, "Open *the* door for me, would you?"
14. A man says to his wife at the breakfast table, "Would you pass me * newspaper?"
15. In a bright sunny room, the woman asks the man "Could you close * curtains, it's too bright in here.
16. At dinner, the guest says to the host, "Could you please pass *the* salt?"
17. Don't go in there, chum. *The* dog will bite you.
18. Every year * church has a big festival in September.
19. Last night someone broke a window at *the* library.
20. I'll meet you after school in * coffee shop.

21. Happy people were throwing confetti and balloons from *the* bridge.

22. While at a zoo, the sign reads:"Don't feed * pony."

Cultural Use

23. * Mississippi river runs through Louisiana.
 24. *The* Pacific Ocean is the largest in *the* world.
 25. *The* Moon is full tonight.
 26. US Presidents live in * White House.
 27. England is part of *the* United Kingdom.
 28. *The* United Nations receives about 15, 000 to 20, 000 pieces of mail a day.
 29. *The* New York Times is a very well known paper.
 30. The* Mount Etna in Sicily is still an active volcano.
 31. Jill had the* polio (a disabling disease) when she was a little girl.
 32. John's wife died of the* cancer in 1996.
 33. Mary is not tall but she plays the* basketball very well.
- Structural Use
34. *The* handle of that cup was broken.
 35. Bill is amazed by * fact that there is so much life on Earth.
 36. *The* water in this glass is dirty.
 37. I know *the* man who runs this university.
 38. Can you turn on * light on top of that table?
 39. I remember * time when I was a little girl.
 40. *The* woman Bill went out with last night was my cousin.
 41. My husband and I love * same kind of movies.
 42. I gave you *the* only money I had.
 43. This bird is * last one of its kind.
 44. *The* first person to sail to America was an Icelander.
 45. She is * only Iranian woman to have run for presidency.