

## **Proceduralization and Skill-specificity of English Modals as a Result of Input Form-focused Practice**

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### **Abstract**

This study aims to investigate the effect of input form-focused practice on the proceduralization of English modals. It also addresses the possibility of skills becoming specific to the context of practice. A pre-test, post-test and delayed post-test design was used where the procedural knowledge was specifically operationalized through the groups' performance on a timed dual-task JG test, and skill-specificity through a timed dual-task completion test. Two intact classes of intermediate EFL learners were randomly assigned to an input and a control-group. The input-group received explicit grammar instruction and a combination of three input tasks. The control-group was just exposed to the identical texts followed by some questions irrelevant to the target structure. Results showed that on the post-test, the input-group outperformed the control group in both measures of procedural knowledge, and skill-specificity. The group was capable of comprehension as well as production of the target structure.

*Keywords:* ACT theory, skill-acquisition, input practice, proceduralization, skill-specificity.

### **Introduction**

A major goal of teaching in real-world setting, apart from knowledge acquisition, is to enable the learners to generalize the instructed items to related and altered contexts (DeKeyser, 2007; Schmidt & Bjork, 1992). However, while the goals may be relatively easy to agree on, the question of means is far more complicated. To address the optimal ways to achieve the goals of language instruction, in general, and those in foreign language teaching in particular, researchers have focused on various aspects of instruction; some have emphasized on developing instructional method and materials (Van Patten, 1996), and others have discussed the effect of setting, natural or classroom settings (Gass & Selinker, 1994; Krashen, 1985), and yet others concerned themselves with the nature of practice (Muranoi, 2007).

As a result of the complexities and problems faced by those involved in the field, teachers and researchers have resorted to different theories to understand how second language is acquired. One currently popular approach to learning is Adaptive Control of Thought (ACT) family of theories (Anderson, 1983; Anderson & Lebiere, 1998), which viewed language learning as a special case of complex skill-acquisition. In this strand, multiple presentations of practice and its effect are justified by the well-known distinction between declarative and procedural knowledge. In most forms of skill-acquisition, people are first presented with information (e.g., rules about how to perform something). Then, through initial practice they incorporate this information into behavioral routines, i.e. “production rules,” or “procedural knowledge” (DeKeyser, 2007, p. 3).

Another issue which surrounds the duality of knowledge in ACT model is skill-specificity. The skill-specificity issue is probably the one that has drawn the most attention in applied linguistics lately (DeKeyser, Salaberry, Robinson, & Harrington, 2002; Izumi, 2002, 2003; Muranoi, 2007; Qin, 2008). Skill-specificity refers to the effect of practice on the proceduralization of declarative knowledge. The practice effect is said to be specific since after the initial practice of declarative knowledge, learners incorporate the knowledge into behavioral routines, which are very specific rules and can be used fast with low rate of error (DeKeyser, 2007), in the contexts which are very similar to the context of practice. Therefore, the declarative knowledge practiced in input context through comprehension practice cannot be transferred to a different context such as production (Anderson & Lebiere, 1998; DeKeyser, 2007). Given that it is procedural knowledge that underlies the fluent communication ability of language learners, it is this type of knowledge that should be the ultimate goal of instructional programs. Yet, evidence exists, for example, from studies in immersion settings, which shows that at least some aspects of language, especially some formal features, are not used accurately and fluently by the learners (Swain, 1988). This most probably applies to those features which are either semantically redundant or difficult to map their formal/functional relationships (Ellis, 2006), like modal verbs, which are the target structure of the present study.

Considering the significance of knowledge proceduralization, which allows fast access to the acquired knowledge, and also in view of generalizable knowledge importance as a goal of teaching, the present study aims to investigate the extent to which input form-focused practice might lead into proceduralization and generalizability of grammatical knowledge into dissimilar contexts.

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## **Literature Review**

Being a central concept in skill-acquisition theories, practice and its contribution to learning have been the subjects of many influential studies in cognitive as well as educational psychology (Anderson, 1993; Carlson, 2003; Schmidt & Bjork, 1992). Yet, due to the popularity of communicative language teaching (CLT) and its emphasis on meaningfulness of class activities, practice has been overlooked by the second language teachers and researchers for decades (DeKeyser 2007; Dornyei, 2009).

Ellis (1992, 1993) and VanPatten (1996, 2003) believe that input practice leads to acquisition, but output practice merely serves to improve fluency. On the other hand, studies such as those by DeKeyser (1997), DeKeyser and Sokalski (1996), and Izumi (2002) clearly show a lack of transfer between receptive and productive skills (skill-specificity) at the level of proceduralized knowledge but not declarative knowledge. A number of studies (Benati, 2005; Cadierno, 1995; Erlam, Loewen & Philp 2009; Farley 2004; Van Patten & Sanz, 1995) compared the effect of input-based practice with that of output-based. Except for the study conducted by Erlam et al. (2009) other studies found that input-based practice has an impact at least as great as that of the output-based practice.

Erlam et al. (2009) compared the effect of an input-based and output-based approach to teaching indefinite article for expressing generic meaning. The input-group received explicit instruction and structured input practice, while the output group received explicit instruction, two types of output practice. It was shown that, using measures of implicit and explicit knowledge, both input and output practice benefited both types of knowledge; however, the output group outperformed the input-group. The output group received feedback which was different in the nature from what the input-group received. Moreover, this group, unlike the input-group, received two types of production practice, which provided two environments with relatively different conditions for proceduralization of the explicit knowledge they received, which might have contributed to their outperformance. The input-group's performance on production test was significantly better than that on the pre-test. However, they did not administer any test to see if the output group was also capable of transferring the skill to comprehension context.

A wealth of studies has addressed the role of attention by investigating the role of input tasks in L2 language classrooms in the

language acquisition. While all these studies commonly exposed the learners to manipulated L2 input, few of them had skill-acquisition as their theoretical framework (DeKeyser, 1995; De Graaff 1997). Based on the distinction made between declarative and procedural knowledge, the studies addressed the interface between explicit and implicit learning. Although not situated within the CLT, De Graaff (1997) investigated the effect of explicit and implicit learning in a relatively long duration of 15 hours, on acquiring morphological and syntactic structures. The conditions were different in the provision /non-provision of explicit rules at the instruction stage. He found that the participants in the explicit group scored higher on timed grammaticality judgment test, gap-filling task, and correction task. However, according to DeKeyser (2007), there was no indication of how practice might contribute to automatization of knowledge.

In comparison to other areas related to ACT model and its contribution to SLA, skill-specificity has remained less touched. Even those researchers, who have endeavored to find answers to transfer-of-knowledge- questions which are related to skill-specificity, came up with controversial conclusions. Apart from DeKeyser (1997, 2007), who believed in skill-specificity of knowledge, and Van Patten (1996, 2003), who viewed comprehension activities as sufficient for taking care of both comprehension and production skills, Qin (2008) tried the effect of output and input exposure type, and concluded that both groups improved in both skills.

Despite large body of data supporting the effect of form-focused tasks on acquiring grammatical structures, research on this topic suffers from some methodological shortcomings. First, research under laboratory settings is difficult to have implications for ecologically realistic conditions. Most of the studies which addressed the effect of practice type on the acquisition of linguistic elements sufficed with a relatively short period of practice phase. Even those studies within the skill-acquisition strand have failed to provide practice for a relatively long time to allow the declarative knowledge to become automatized. (DeKeyser, 2007).

Even fewer studies have attempted to investigate if the skill-specificity is apt to be surmounted by intentional integration or variation of tasks. On the other hand, in spite of having a relatively rich literature on how different tasks might affect language acquisition, there is not much consensus as to the nature, amount, and type of tasks to be used as practice. Moreover most of the studies use short retention period, for example one week, 10 days or three weeks at most. Short retention time might make the implementation and generalization of the result

troublesome if we consider the conclusion by Driskell, Willis, and Cooper (1992) that for a cognitive task that has been learnt, retention tends to dissipate after 5 to 6 weeks. This time span seems so long that few educators would consider it of any practical value.

Aiming to contribute to filling the gap in empirical research on providing declarative knowledge as conducive to the development of proceduralized grammatical knowledge, the present study intended to examine the effect of input form-focused practice when the metalinguistic information on linguistic targets is presented and accompanied by a variety of form focused tasks to establish proceduralization.

The research questions addressed in this study were the following:

1. To what extent does input practice result in proceduralization and retention of comprehension skill on English modal verbs?
2. To what extent does input practice result in skill-specificity of knowledge on English modal verbs?

## **Method**

### **Design**

For the design of the current study a pre-test/post-test/delayed post-test intact group design was employed to investigate the effectiveness of input form-focused practice on the proceduralization, and skill-specificity of procedural knowledge on English modal verbs.

### **Context and Participants of the Study**

The study was conducted at university of Sheikhabaee in Isfahan, Iran. Two intact classes were involved. At the time of the study all the participants had just enrolled in the second semester. All the participants were, then, freshmen studying English literature, translation or TEFL. They were between 18-25 years of age (average 21), and shared basic demographic characteristics, such as L1, age and field of study.

Since the study addressed the intermediate population of foreign language learners, the researcher was required to ensure that the participants were homogeneous. To this end, a 60 item Oxford Placement Test, (OPT) (2001) was administered in the intact classes. Out of 58 participants in two classes, 6 were elementary and 2 were advanced. The remaining 50 intermediate participants' scores ranged from 35 to 41. Being an intact study, therefore, the elementary and advanced learners also received the treatment. In all the processes of the study, the data related to advanced and elementary level learners were excluded from

the final results. The total number of participants involved in the study was, then, 50. They were both male ( $N=15$ ) and female ( $N=35$ ). The number of participants in each group was 25.

### **Target Structure**

The target structure in the present study was English modal verbs. A brief review of literature showed that English modals are linguistic features which are cross-linguistically problematic to EFL learners; in terms of developmental properties of L2 acquisition, proposed by Piennemann (1989), modals are acquired early. In terms of when they are introduced to English as a second language courses, modals appear in various levels of pedagogical grading (Ellis, 2009). Although English modal verbs are frequently used in oral and written text, they are non-salient features in that, they tend to be unstressed, hence difficult to notice in the discourse, and their form-meaning mapping is also problematic (Ellis, 2009).

### **Instructional Materials**

The input practices which served the goal of the present study were:

1. *Focused Reading comprehension task*: a form-focused task, introduced by Ellis (2003), for which the input was contrived to include noticing of predetermined forms, followed by questions that could only be answered if the participants had successfully processed the target structure. (See Appendix A for a sample of Focused reading comprehension task).
2. *Focused Listening comprehension task*: a form-focused task, introduced by Ellis (2003), for which the participants listened to a text designed to focus attention on the structure, followed by questions that could only be answered if they had successfully processed the target structure. (See Appendix A for a sample of Focused listening comprehension task).
3. *Error recognition task*: a version of contextualized grammar editing task, proposed by Imao (2001, as cited in Brown, 2003), where participants were required to read a text and only detect the errors by underlying them. (See Appendix A for a sample of error recognition task).

### **Testing Materials**

Practice effect on proceduralization was operationalized through measuring subjects' performance on a comprehension test: Timed Dual task Grammaticality Judgment Test (TDGJT). Skill-specificity was measured through a production test: Timed Dual task Completion Test



(TDCT). Apart from the timed feature of the test, which provided limited time for answering each item, and task duality feature, which required them to write the number of beep sounds while answering each item, both of the tests had structurally irrelevant items to be answered. Timed feature and inclusion of irrelevant items were decided after Ellis (2009), proposing Time and Focus of attention as two criteria which are basic to operationalizing the measurement of different types of knowledge, procedural and declarative. Dual task was adopted from DeKeyser (1997), for measuring procedural knowledge which partly guarantees that the learners are deprived of the opportunity to draw upon their controlled processing.

The TDGJT was a pen & paper test consisting of 84 items, grammatical and ungrammatical. 28 of the sentences were related to the target structure. The remaining 56 items were irrelevant to the target structure so as to minimize the items being form focused. To lower the probability of the test instruction interference with their performance they were given freedom to indicate grammaticality or ungrammaticality of the items in a way they were convenient with. They were asked to underline the wrong part of ungrammatical items. The number of irrelevant items was decided to be about two times of the related items, by consulting the related literature.

The time limit for each sentence was established on the basis of native English speakers' average response time, to which was added an additional 20% of the time to allow for the slower processing speed of L2 learners (Ellis 2009). The mean time spent by the native speakers to answer all the items of TDGJT was 17.5 minutes. Three and a half minutes were added to this figure ( $17.5 \times 0.2 = 3.5$ ). The total time of answering the items was 21 minutes. The average time allocation for each item was, then, about 15 seconds. However, the items were not of equal length, therefore, for short items, they were given about 10 seconds to read and mark them as grammatical/ungrammatical. For longer items they had about 20 seconds to mark the sentences. The participants were given the allocated time for each item by the researcher asking them to move to the next item as soon as the time for answering one item was up. As for the duality of tasks, they were also to write the number of beep sounds while answering each item.

The TDCT was a 42-item test. It intended to measure production of the target structure. There were 14 items related to the target structure. The remaining 28 items were irrelevant so that the participants' attention would be deviated from the target structures. The time limitation and the

irrelevant fillers were to make the test a measure of procedural knowledge.

The procedure to set the time limit for each sentence was identical to that of the TDGJT. The time allocation for each item was, then, about 20 seconds. The participants were given the allocated time for each item by the researcher asking them to move to the next item as soon as the time for answering one item was up. As for the duality of tasks, they were also to write the number of beep sounds while answering each item.

In both tests, apart from being asked to read the instruction of the test, on receiving the papers, the participants were also orally explained about what they were expected to do. Although it took quite some time to distribute the papers among the participants, the beginning of the test time was when all the test papers were distributed. On the first page, the test included just some practice items and five irrelevant fillers. The inclusion of only irrelevant items on the first page prevented the learners, who received the tests earlier, to start answering the items related to target structures. The participants were given the allocated time for each item by the researcher asking them to move to the next item as soon as the time for answering one item was up. There was a 3 space distance between the items, making control over those who would probably provide the answers in a shorter time and possibly move to the next item. In the completion test, the irrelevant items tested various aspects related to verbs of the sentences. This was done since the instruction of the test could not indicate the focuses of the measure. Hence, the participants were required to provide the appropriate form of the verb plus another linguistic item where necessary. For example, some verbs of irrelevant items required the use of preposition; others needed to be presented with appropriate form of *to be* or *to have* and still others depended on providing the appropriate passive structure.

Reliability of the measures, were calculated, using internal consistency of the items in each test over three phases of testing. Cronbach's alpha values for the TDGJT in the pre, post and delayed post-test were 0.63, 0.79, and 0.81, respectively. The values for the TDCT were 0.6, 0.8, and 0.89, in pre, post and delayed post-tests, respectively.

The groups' mean scores on the TDGJ and TDC pre-tests were subject to two independent-samples t-tests. The results revealed that there were no significant difference between the groups' at the initial stage of the study: TDGJT:  $t(48) = 0.9, p = 0.3$ ; TDCT:  $t(48) = -0.6, p = 0.5$ . This indicated that both groups were equivalent in terms of their ability to comprehend and produce the target structure before the instruction and practice; any difference in the result of post and delayed post-test, then, could be attributed to the effect that instruction and practice might make.



## **Procedures**

After the administration of the OPT and pre-tests, the classes were randomly assigned to one experimental and one control group. Both classes were taught by the same teacher, who was the researcher. In the second week of the study, the participants received the pre-test. In the third week of the study the treatment group received the explicit instruction on the target structure, after that, they received their input practice which lasted for 12 weeks. The post tests were administered in the sixteenth week of the study. And the delayed post-tests were received five weeks after the administration of the post-tests. Table 1 summarizes the design of the study.

Table 1. Procedure of the study

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Week 1: OPT ( two groups)	
Week 2-Pre-tests (two groups)	
Week 3- Explicit instruction (Input-Group)	
Week 4 to15- Input-Group	Error recognition, focused reading, focused listening
Week 4 to 15- Control-Croup	Reading comprehension, listening comprehension
Week 16- Post-tests ( two groups)	
Week 21- Delayed post-tests ( two groups)	

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As for the explicit instruction the present research adopted the preemptive explicit focus-on-form for instruction of grammar (Ellis, 2004). This type of explicit form-focused instruction is realized by means of metalinguistic explanations. For the present study, these typically consisted of information about the property of the target linguistic forms, and mapping of form, meaning and function, received by the participants on a handout and explained by the teacher. Further examples followed the oral instruction by the instructor, immediately after the properties were instructed. The explicit instruction took place over one whole session of 90 minutes. The instructor presented the instruction in English and recapped the same material in Persian to ensure understanding. The task sessions were held two times a week. When the explicit instruction was completed, the participants received the form-focused practices in the 4<sup>th</sup> week up to the 15<sup>th</sup> week. Each session lasted approximately 30 minutes. The participants received a random combination of tasks in each session.

In the input-group the participants were also asked to compare their performances with the original texts where the correct answers were

provided. They were also asked to mark their mistakes. The researcher then explained briefly about the target structures used within the texts, and collected all the texts, task papers and the original texts.

The control group was exposed to the same texts, used for the input-group, yet the questions following texts were comprehension questions not requiring their focus on the target structure. A week after the last treatment session, the post-tests were administered. In the post and delayed post-tests the TDCT was administered prior to the TDGJT. The same tests were used over all three testing phases, pre, post and delayed post-tests. However, the order of the items of the tests was different for each test administration.

### **Scoring and Analysis**

For the TDGJT each item was allocated a score of either 1, if recognized correctly, or 0, if incorrectly recognized, as grammatical or ungrammatical. The items with no indication of correct/ incorrect, received 0.

The mean percentage and standard deviation of each group on pre, post and delayed post-tests were calculated. A total score, and separate scores for grammatical and ungrammatical items of the TDGJT were computed. The decision to calculate the participant's performance on grammatical and ungrammatical items was made based on the results of previous research (Ellis, 2009 ; Loewen, 2009 ), which suggested that grammatical and ungrammatical items measure different types of knowledge. The participants were expected to perform more accurately on the grammatical items than on the ungrammatical ones, since there was a **50%** chance of marking the item grammatical correctly. On the other hand, the ungrammatical items were more difficult since the participants were asked to mark which part of the item was grammatically wrong and considering the time pressure, and duality of tasks they would probably require relying more on procedural knowledge.

Responses to the items of TDCT were scored according to three criteria. When they succeeded to provide the appropriate modal together with the correct form of the verb they were scored 1 on the item. When they succeeded in providing the appropriate modal, but failed to provide the correct form of the verb they were scored 0.5 on the item. This was done because the response indicated that, at least the participants could recognize which category of modal, for example probability, and not ability, should be used. Items with missing and wrong responses were scored 0.

To answer the first research question an independent samples t-test was run to compare the groups' performance on the comprehension test of TDGJT. The second research question was investigated by running another independent samples t-test which intended to compare the group's performance on the production test of TDCT. Two repeated measure ANOVAs were run to compare the input-group's performance on TDCT and TDGJ over time.

## Results

### Proceduralization of Knowledge

The first research question addressed the proceduralization of comprehension skill. The groups' mean scores and standard deviations on the TDGJ pre-test, post-test and delayed post-test together with the mean scores on the grammatical and the ungrammatical items are presented in Table 2.

Table 2. Descriptive statistics of the groups on the TDGJT

Groups	Pre-test		Post-test		Delayed post-test	
	M	SD	M	SD	M	SD
<b>Control</b>						
Total	45.7	10.3	49.2	8.9	43.1	12.7
Grammatical	57.4	16.9	58	14	56.6	20
Ungrammatical	34.1	17.8	40.6	13	29.7	18
<b>Input</b>						
Total	43.1	8.1	72.7	8.5	49.5	7.6
Grammatical	56.9	14.1	92.2	8	58.2	14.7
Ungrammatical	28.1	13	53.1	14	40.8	9

As shown in Table 2, the total mean percentage score of the input-group on the TDGJ post-test exceeded that of the control group. The scores also increased on the grammatical and ungrammatical items of the test in comparison to the same scores on pre-test and in comparison to those of the control group. The figures also indicate that the input-group's

performance on the delayed post-test was still better than that on the pre-test but worse than the post-test.

To see whether the difference between the total mean scores of the control group and the input-group was significant on post-test, an independent samples t-test was run. The result showed that there was a significant difference between the performances of the groups on the TDGJ post-test:  $t(48) = -9.5, p < 0.05$ . The effect size was relatively large (eta squared = 0.7), indicating that the magnitude of the difference was meaningful.

Two more independent-samples t-tests were run to compare the input and the control-groups' performance on the grammatical and ungrammatical items of the TDGJ post-test. The results of the comparisons revealed that the input-group significantly outperformed the control group on both the grammatical and ungrammatical items in the post-test: for grammatical items  $t(48) = -10.2, p < 0.05$  and for ungrammatical items  $t(48) = -3.2, p < 0.05$ . The effect size for the grammatical items was relatively large (0.68) and for the ungrammatical items was small (0.2).

A one-way repeated measures ANOVA was run to compare the total scores on pre, post and delayed post-tests of TDGJ. The results revealed that there was a significant difference for time of measuring the participants' comprehension skill, Wilks' Lambda= 0.12,  $F(2, 23) = 84.4, p < 0.05$ , multivariate eta squared = 0.9. Post hoc comparison using Bonferroni test indicated that the mean score for the pre-test ( $M = 43.1, SD = 8.1$ ) was significantly different from the post-test ( $M = 72.7, SD = 8.5$ ). The group's performance on the post-test was also significantly different from that on the delayed post-test: ( $M = 49.5, SD = 7.6$ ), showing that the group failed to maintain the comprehension skill over time. However, they performed still significantly better on the delayed post-test than on the pre-test.

The result of one more one-way repeated measures ANOVA, comparing the performance of the input-group on the ungrammatical items of the TDGJ showed that there was a significant difference for time of measurement, Wilks' Lambda= 0.34,  $F(2, 23) = 21.8, p < 0.05$ , multivariate eta squared = 0.65. Post hoc comparison using Bonferroni test indicated that the mean score for the ungrammatical items on the pre-test ( $M = 28.1, SD = 13$ ) was significantly different from the post-test ( $M = 53.1, SD = 14$ ), and delayed post-test ( $M = 40.8, SD = 9$ ). There was also a significant difference between the performance on the ungrammatical items of the post-test and delayed post-test, indicating that the group failed to maintain their level of performance over time.

The result of the third one-way repeated measures ANOVA on the grammatical items of the TDGJ revealed that there was a significant difference for time, Wilk's Lambda = 0.1,  $F(2,23) = 99$ ,  $p < 0.05$ , multivariate eta squared = 0.9. Post hoc comparison using Bonferroni test revealed that the mean score for the grammatical items on the pre-test ( $M = 56.9$ ,  $SD = 14.1$ ) was significantly different from the post-test ( $M = 92.2.1$ ,  $SD = 8$ ), but not from the delayed post-test ( $M = 58.2$ ,  $SD = 14.7$ ). There was also a significant difference between the performance on the grammatical items of the post-test and delayed post-test, indicating that the group failed to maintain their level of performance over time.

### Skill-specificity

The second research question was to investigate whether the participants' knowledge was specific to the comprehension context or it can be generalized to production context.

The two groups' mean scores and standard deviations on the TDC pre-test, post-test and delayed post-test are presented in Table 3.

Table 3. Descriptive statistics of the groups on the TDCT

Groups	Pre-test		Post-test		Delayed post-test	
	M	SD	M	SD	M	SD
Control	21.9	7.8	22.3	8.1	24.6	7.4
Input	20.4	7.7	52.8	16	55.8	19

As shown in Table 3, the mean percentage score of the input-group on the TDC post-test was better than that of the control group. The figures in the table also indicate that the experimental group's performance on the delayed post-test was better than that on the pre-test, and even better than the post-test.

To see whether the difference between the mean scores of the input-group and the control group on the completion post-test was significant an independent samples t-test was run. The result showed that the difference was significant:  $t(48) = -.8.2$ ,  $p < 0.05$ . The effect size was medium (eta squared = 0.61), indicating that the magnitude of the difference is meaningful.

To investigate whether the probable effect of practice on producing the target structure is retained over time a one-way repeated measures ANOVA was computed. The results indicated that there was a significant difference for time of measurement, Wilks' Lambda = 0.2,  $F(2, 23) = 44$ ,  $p < 0.05$ , multivariate eta squared = 0.8. Post hoc comparison using

Bonferroni test indicated that the mean score for the TDC items on the pre-test ( $M = 20.4$ ,  $SD = 7.7$ ) was significantly different from the post-test ( $M = 52$ ,  $SD = 16$ ), and delayed post-test ( $M = 55.8$ ,  $SD = 19$ ). There was, however, no significant difference between the performance on the post-test and delayed post-test, indicating that the group succeeded in maintaining their level of performance over time.

## **Discussion**

The result of pre-tests of comprehension and production suggested that both groups had initially limited procedural knowledge on English modals. The descriptive statistics in Table 2 and 3 and the results of inferential statistics revealed that input practice of different type enabled the participants to integrate the declarative knowledge into their interlanguage system. The results indicate that on both measures of proceduralized knowledge, where the participants' attention is deviated merely from form through time pressure, task duality and irrelevant items, the treatment group was able to process and produce the target structure. As far as the comprehension/recognition skill is concerned the experimental group's improvement in their comprehension skill on the post-test was no surprise, since the main purpose of input practice is for the learners to acquire and proceduralize the knowledge through comprehension skill. Considering the large magnitude of the practice effect, it is indicated that providing the participants with explicit instruction on the rules and function of English modals, followed by a variety of input practice, have significant impact on their developing language by helping them attend to the target structure and proceduralize the knowledge. The cognitive hypothesis of task-based learning also place a heavy responsibility for learning on the necessity of attention and noticing to the L2 structure (Schmidt, 1983, 2001). In accordance with this, the entrance ticket for the knowledge into the developing linguistic system of the learners is attending and noticing the forms. As Schmidt (2010, p. 4) aptly puts it: "Learning, establishing new or modified knowledge, memory, skill, and routines is therefore, largely, and perhaps exclusively, a side effect of attended processing".

As to the retention of procedural knowledge for comprehension of the target structure, the result revealed that with the passing of six weeks after the last session of practice, the participants still performed better than the time they had not received any practice. It was also found that on the TDC at the delayed post-test phase, the outperformance of the participants almost evaded: so that it seems they have forgotten almost all they have acquired. The positive influence of input practices,



however, is realized when the input-group's performance in the ungrammatical items of the pre-test and delayed post-test, are taken into account. The partial capability of the participants in this group to retain the knowledge they have acquired, in comparison to the time they had not received any practice, evidently signifies the effect of practice. Attending to this is also noteworthy, in that, according to Ellis (2004), locating the position of error in the ungrammatical items of the timed GJ requires some degree of conscious analysis. Although it is almost impossible to certainly claim whether the knowledge the participants drew upon was implicit or explicit, the speed of access to the knowledge benefited the participants over a time span of 6 weeks.

As to the specificity of knowledge to comprehension or its generalizability to production skill, it was found that providing the learners with a variety of input form-focused practice enables them to acquire the skill to produce the target structure. This is, in general, compatible with the findings of the processing input trend, pioneered by Van Patten (1996, 2004). Although the form-focused tasks employed in the study were characteristically different from processing input task, the explanation and elaboration of the target structure, and using tasks with the requirement of attending to the form-function relationship of the target structure, have led the learners to change their underlying developing system so much so that they could generalize their knowledge to a different context in which production was required. In fact introducing a variety of three input-based form-focused tasks as practice in the study has apparently provided opportunities to make form-meaning relationships clear enough to allow the learners to be merely focused, rather than deviated by other requirements of task completion, such as production. Previous research on the effect of input tasks on changing the language learners' underlying language system was inconclusive. This study has shown the constructive role of input practice and its variety in transferring the knowledge over context. The production test employed time pressure, duality of task and irrelevant items to minimize the possibility of the learners monitoring production merely drawing on their declarative knowledge.

Thus, the results from the TDCT demonstrate that input practice does affect the development of language system to the extent that it enables the learner to generalize the knowledge to other contexts. This generality of knowledge, which is called transfer of training, or knowledge transfer, in educational psychology, has been addressed by Schmidt and Bjork (1992). Schmidt and Bjork state that introducing some difficulties for the

learner can enhance acquisition as well as retention. Educators in general and language teachers in particular can induce variation among versions of the tasks to be practiced, with the focus on a criterion of generalizability (p: 210). Cognitive psychologists have found that for the training of a complex cognitive task, like language learning and use, to be transferred to a new situation, construction of a cognitive structure is inevitable. This enables the learners to recognize particular operations to reach a solution in the new context. Ranzijn (1991) and Shapiro and Schmidt (1982, as cited in Paas & van Merriënboer, 1994) pointed out that practice variety is beneficial to the construction of cognitive structures. It, therefore, helps transfer of acquired skill since it increases the chances that similar features be identified and that relevant features be distinguished from irrelevant ones.

Therefore, despite the ACT theory's claim on skill-specificity of procedural knowledge, i.e., its failure to be generalized to the contexts dissimilar to the context in which it has been practiced; the participants performed almost equally well in the production test. Skill-acquisition theories have provided justifications for generalizability of knowledge. To do this, the proponents of skill-acquisition refer to a principle that concerns efficient adaptation to task environment. This principle holds that if learners practice the skill in an environment which involves a variation in practice type or item type, they learn how to cope with the variation. What happens, according to this principle, is that when faced with various situations, learners probably rely on the abstraction of features that are common to many items or situations. Therefore, in a transfer situation where the task is different from those of practice phase, it is likely that the skills are sufficiently general, rather than specific, and they can cope with new context (Speelman & Kirsner, 2005).

As to the retention of production skill over time the result, shown in Table 2, revealed that with the passing of six weeks after the last session of practice, the participants still performed better than the time they had not received any practice. The practice and the explicit instruction can explain 76% of the variance which signifies the effect of practice and giving declarative knowledge in the retention of partially procedural knowledge. In comparing the participants' performance on the TDC at the post and delayed post-test phase, the researcher found that the outperformance of the participants has not changed over time, i.e., their knowledge for producing the target structure was not subject to forgetting. Given the result of comprehension skill retention over time, this outperformance introduced a controversial issue. The justification which can be attributed to the retention of production skill and non-retention of comprehension skill over time is that the TDCT as a measure

of production skill was not as form-deviated test as the TDGJT was. The reason lies in the kind of instruction the researcher was forced to begin the test with. For the TDGJT the participants were asked to recognize the grammaticality and ungrammaticality of sentences and underline whatever part which seemed ungrammatical. This left them with the whole grammatical and morphological features in English on which they had knowledge. For the TDCT, however, the instruction asked them to fill in the blanks with the appropriate form of the verb together with some other linguistic necessary elements which are required to make English meaningful grammatical sentence. The irrelevant items varied from passive, to particle verbs and tense-related auxiliaries. Therefore, the only area they could focus their attention to was the area of English verbs, hence making it less form-focused free than the irrelevant items in the TDGJT.

### **Conclusion**

The present results confirm that comprehension practices develop comprehension production as well as skills. Although speeded availability of explicitly acquired knowledge is not the ultimate goal of language acquisition, it can be an intermediate goal on the road to spontaneous language use. The real goal of language learning is effortless automatic use of language; however, automatic use by itself does not exclude the possibility of explicit knowledge accessibility (DeKeyser, 2007). Considering the skill-specificity of knowledge in the skill-acquisition theory, availability, and speeded accessibility of explicit declarative knowledge can enable learners to generalize the knowledge to unfamiliar contexts, which seems to be a privilege to proceduralized knowledge. The pedagogical implication of the study is that besides output practice, there seems to be other options, decided in terms of institutional ecological situations, which can help learners acquire production skills along with the comprehension one. However, the generalizability of the results requires cautions, due to some limitations: First and foremost, the best way to measure procedural knowledge would have been to measure the participants' performance on more realistic on-line tasks, to be more confident about the results. Another implication is that for structures like modals, for which the mapping of form-meaning relationship is not evident, a variety of practice types is required to have a more stable effect. Moreover, empowering learners with a solid base of declarative knowledge, which is built by explicit instruction and repeated

activation of that knowledge, assists them with handling the tests which are meant to make them draw upon their declarative knowledge.

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**Appendix A: Samples of tasks in the input-group***Focused reading comprehension*

A sergeant reminded us that we must not deal with a burglar if he enters our home, because it might be dangerous. He also reminded us that according to law we are required to inform the police about key holders after a break-in. A man reported that two days ago he had been burgled in the afternoon. The thief probably entered through an open window, although at that time of the day there must have been plenty of people around who witnessed the break-in. If you saw anything, you should report it to the police.

- |  |   |   |
|--|---|---|
| 1. It is necessary to tackle a burglar yourself.   | T | F |
| 2. You can be in danger by facing a thief.   | T | F |
| 3. One does not have to give information about key-holders.                                  | T | F |
| 4. The thief must have entered through the window.   | T | F |
| 5. The writer is less than 50% sure that there were lots of people around in that afternoon. | T | F |

*Focused listening comprehension*

Making an omelet is easy. You don't have to be a great chef to do it.

Here are some basic instructions:

- First, break some eggs into a bowl. Break them carefully. You must not let any of the shell get into the omelet.
- Next, mix up the eggs. You don't have to use a special food processor- mixing them with a fork can be fun.
- Then, heat some oil in a pan. Olive oil is best, but you don't have to use olive oil. You can use ordinary corn oil if you want. You must not let the oil get too hot, or it will start to burn.
- Pour the egg mixture into the pan, and mix it a little.

*Error recognition task*

My sister lived in Montana, and when I was visiting her, we would go on weeklong backpacking trips in the mountain. Every morning we woke up to the sound singing birds. During the day, we used to hike through woods and along mountain streams. Often we saw deer. Once we used to see a bear, but it went off the opposite direction.

**Appendix B:** Timed Dual task Grammaticality Judgment Test sample of items:

1. A- Can't you find that newspaper? B- I am not sure, but, I think someone might have thrown it away. --
2. A- Has the car broken down? B- Well, we may run out of petrol. That's why it doesn't run anymore. --
3. Daughter: I sent my best friend a birthday present, but she never responded or thanked me. Mother: I guess, that must get lost in the mail. ---

Timed Dual task Sentence Completion Test sample of items

1. A: Last night. I heard someone was playing a very difficult piece on the piano. B: I ----- (not be) John.  
He does not know how to play.
2. A: Oops! I spilled coffee on my shirt. B: You ----- (wash) under hot water before the stain sets.
3. Amy's grammar book is not on her desk. Where is it?  
B: I don't know. It ----- (be) in her backpack..

