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A Comparative Study of the Effectiveness of Input-based Activities And Output-based Activities on the Acquisition of Chinese Language

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A comparative study of the effectiveness of input-based activities and output-based activities on the acquisition of Chinese language

A Thesis Presented

by

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ABSTRACT

A COMPARATIVE STUDY OF THE EFFECTIVENESS OF INPUT-BASED
ACTIVITIES AND OUTPUT-BASED ACTIVITIES ON THE ACQUISITION OF
CHINESE LANGUAGE

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This paper describes an experiment that compares the effectiveness of input-based activities and the effectiveness of meaning-focused output-based activities on L2 Chinese learners' ability to comprehend and to produce the Chinese adverb “才 cai”. Input-based activities provide learners with the opportunity to be exposed and work with the target language input. During input-based activities, learners are expected to turn the target language they read or hear into the linguistic data they understand. With the assistance of such input-based activities, L2 learners are likely to develop an implicit language system to internalize the target language and further acquire the language. Output-based activities provide L2 learners with the opportunity to produce the target language, in both writing and speaking. With the assistance of output-based activities, learners are able to find the gap between their language and the target language. During output-based activities, learners are also able to test their hypothesis, to reinforce positive evidence and

revise negative evidence in their language. In the present study, participants ($N=41$) were assigned to three groups: input-based group (participants were engaged in input-based activities after the teacher's lecture to practice the target form), output-based group (participants were engaged in output-based activities after the teacher's lecture to practice the target form), and control group (participants were not engaged in any interactive activities after the teacher's lecture). Participants' performances were measured by reading comprehension, listening comprehension, writing production, and translation. A pre-test, an immediate post-test, and a delayed post-test were used to assess participants' progresses. Results suggested that input-based activities and output-based activities led to similar amount of progress on participants' comprehension. Meaning-focused output-based activities (activities that require learners to produce language output in a meaningful context with a communicative intent) led to greater gains than input-based activities on participants' production.

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CHAPTER I

INTRODUCTION

A great deal of research has indicated that explicit instruction alone does not promote second language acquisition (SLA), unless equipped with substantial amount of practice (Krashen, 1982, Lee and VanPatten, 2003, and Long, 1983). The controversial issue is what type of practice should be adopted in order to promote the process of SLA in L2 learners.

The purpose of the present study is to examine and compare the effectiveness of two types of L2 practice – input-based activities and output-based activities – on SLA. Specifically, the present study aims at comparing the effectiveness of input-based activities and output-based activities on the acquisition of the Chinese adverb “才 cai” by L2 learners of Chinese.

A. Cognitive process in SLA

The acquisition of second language is a complex but structured cognitive process. It involves the creation of an implicit linguistic system. According to Lee and VanPatten (2003), the process of SLA follows such order: input processing, accommodation, restructuring, and output processing.

Input processing is the process of turning input (the linguistic data that learners read and hear) into intake (the linguistic data in input that learners attend to for the sake of comprehending). After input processing, learners move to the next process which involves accommodation and restructuring. During this process, learners are able to

internalize the linguistic data and therefore build a developing system (Lee and VanPatten, 2003).

The last process of SLA is output processing, in which learners produce language output in speaking and writing. The whole process of SLA can be depicted in Figure 1 (Lee and VanPatten, 2003).



Figure 1: Outline of processes in SLA.

My personal language learning and teaching experience makes me believe that this cognitive process accords with the process of second language acquisition. A novice L2 learner first needs to be exposed to the target language through both listening and reading. The learner will not understand all the linguistic data he/she hears and reads. The linguistic data that he/she understands is the intake that will be further processed. The learner will then accommodate and restructure the linguistic data he/she understands to build his/her own system to internalize the target language. At last, the learner will be able to resort to his/her internalized language system to produce the target language in both speaking and writing.

Now the issue is how teachers should assist learners to promote the whole process of SLA. To be more specific, during which process (I, II, or III, Figure 1), learners should be assisted with more to promote SLA. As a matter of fact, whether learners should work more with input (process I, Figure 1) or output (process III, Figure 1) has been a

controversial issue in the field of SLA (Lee and VanPatten, 2003; Krashen, 1985; Swain, 1995; Swain and Lapkin, 1995).

B. Input processing in SLA and its implication in teaching

In the field of SLA, there is a mimic metaphor about language input proposed by Lee and VanPatten (2003, p26): “input is to language acquisition what gas is to a car... an engine needs gas to run; without gas, the car would not move an inch... likewise, input in language learning is what gets the ‘engine’ of acquisition going...without it, acquisition simply doesn't happen.” There is language input that is better than other input, just like there is high-octane gas that is better than other low-octane gas. The “better input” here is input that is both comprehensible and meaning-bearing.

Providing L2 learners with comprehensible language input simply means providing them with linguistic data (in speaking and in writing) that they are able to understand. Better input also needs to be meaning-bearing to L2 learners. This means the target language that learners hear and read has to carry a communicative intent.

Like mentioned above, input processing is the process of turning input into intake. It is about how learners perceive and process linguistic data they read and hear. The more comprehensible and meaning-bearing the input is, the more likely it will be turned into intake, and thus makes a contribution to learners' SLA.

Receiving language input is the premise of acquiring any second language. The famous Input Hypothesis, proposed by Krashen (1985), indicates that language is acquired only through receiving comprehensible input. Also, producing language output is a result of SLA, not the cause of it. Comparing to language output, input is the critical

environmental ingredient to SLA, and therefore, should be provided and worked with the most during instruction in any second language classrooms. Learners will not be able to internalize the target language unless enough comprehensible language input is provided.

Due to such theories, language instruction should aim at providing learners with enough comprehensible input to work with, turning as much input into intake, and therefore building the developing system in L2 learners. Such instruction can be depicted as Figure 2 (Lee and VanPatten, 2003).

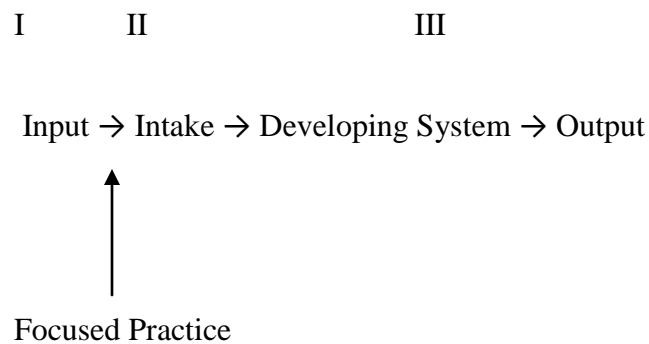


Figure 2: Input-based second language instruction.

In a second language class, a qualified teacher would provide learners with comprehensible input to work with. At the beginning and intermediate levels, a qualified teacher would not speak colloquially in the target language to learners or assign advanced level reading material for learners to read. The teacher also would not give learners random and meaningless input to work with. “High quality” input also serves as positive evidence for learners to imitate. The more comprehensible and meaning-bearing the input is, the more likely it will be turned into intake that learners are able to internalize into their cognitive system. Providing L2 learners with sufficient comprehensible and meaning-bearing input is, thus, the premise of their second language acquisition.

C. Output processing in SLA and its implication in teaching

Although input is responsible for the occurrence of SLA, it is not sufficient.

Language output is needed to promote fluency and accuracy. According to Swain (1995), besides promoting fluency, language output has other functions that relate to accuracy in second language learning: noticing/triggering function and hypothesis-testing function.

The “noticing/triggering” function of output is also referred to as “consciousness-raising” function. By producing (speaking and writing) the target language, learners will be able to notice the gap between their language and the target language and the gap in their linguistic knowledge. They will be able to raise the awareness of what they do not know or know only partially. The process of noticing gaps can trigger cognitive process in L2 learners and therefore helps internalizing the target language and promoting the process of SLA (Swain, 1995).

The “hypothesis testing” function of output takes place in L2 learners’ cognitive system when learners try to test their linguistic knowledge in speaking and writing. To be more specific, learners have hypothesis of how the target language works. By producing the language, learners will be able to test such hypothesis, and therefore receive modification or confirmation. The process of “hypothesis testing”, modification, and confirmation can contribute to the development of L2 learners’ internal linguistic system, and therefore promote the process of SLA (Swain, 1995; Swain and Lapkin, 1995).

Considering all the significant functions of output, it is essential for L2 instructors to assist L2 learners with producing language output to promote the process of SLA.

Such instruction can be depicted in Figure 3 (Lee and VanPatten, 2003).

experimental studies with results supporting the “sufficient function” of input, and the unnecessary of producing language output in L2 teaching and learning.

In VanPattern and Cadierno’s (1993) study, they compared the effectiveness of the traditional form-focused instruction with the effectiveness of the input processing instruction in L2 Spanish learning. There were 129 L2 learners of Spanish participated in their study. There were three treatment groups: the control group which received no instruction, the traditional instruction group, and the input processing instruction group. The target structure of their study was the Spanish object pronouns. The result of their research indicated that input processing instruction led to greater gains in learners’ comprehension and production than traditional form-focused instruction. And therefore, in order to promote second language acquisition in learners, instead of forcing learners to produce grammar forms immediately after explanation, language instructors might want to help learners work with sufficient input first. In this way, learners are given opportunities to convert as much input into intake as possible, and therefore naturally acquire the target language.

The result of VanPattern and Cadierno’s (1993) study was ground-breaking in the field of SLA. However, there were limitations and restrictions of their study that could significantly affect their research result. For example, test items that aimed at assessing participants’ comprehension ability were quite similar to the activities used during the instruction of input processing. Participants from the control group and the traditional instruction group were not familiar with the format of such test items. Therefore, the unfamiliarity of test items might negatively affect participants’ performance. Besides this limitation, activities employed in the traditional instruction group were rather mechanical

drills than meaning-focused tasks. Such drills are unlikely to promote L2 learners' ability on either comprehending or producing the target language. And therefore, the conclusion of VanPattern and Cadierno's (1993) study was not quite clear in terms of whether participants' relatively poor performance was due to output-based instruction or mechanical drills.

After VanPattern and Cadierno's (1993) study, many researchers duplicated and carried out more comparative studies that proved the validity of "input hypothesis". In Shintani's (2011) study, 36 Japanese children were divided into three groups – input-based, control, and production-based group – to receive English vocabulary instruction. Results of the pre-test and two post-tests, each including four types of vocabulary test items, indicated that children from both input-based and production-based groups gained productive vocabulary knowledge. But the input-based group performed better than the production-based and the control groups on the task-based comprehension tasks.

In Cadierno's (1995) study, 61 L2 learners of Spanish were assigned to three treatment groups: traditional instruction (grammar explanation and output-based practice) group, processing instruction (grammar explanation and input-based practice) group, and control (no instruction) group. Participants' performance was measured by a pre-test and a post-test, both of which consisted of one comprehension task and one production task. Results of Cadierno's study demonstrated that the processing instruction group made significant progress on both comprehension task and production task; whereas the traditional instruction group only made progress on the production task.

Similar studies include Tanaka's (1996) and Hazzard's (1999) studies, which all demonstrated that input-based instruction and practice led to better gains than output-based instruction and practice. But all these studies share the same limitation that the output-based groups were all, to some extent, given mechanical drills instead of meaning-focused tasks. Whether and to what extent the output-based groups were given meaning-focused tasks can significantly affect the effectiveness of the output-based instruction and practice, and therefore affect and even change results of those studies.

Although there has been substantial research supports "input hypothesis" and indicates that in order to promote SLA in L2 learners, providing them with abundant and comprehensible input, and letting them work with input is sufficient enough, there has been considerable research shows that allowing and stimulating L2 learners to produce language output leads better gains in their SLA than allowing them to work only with input (Erlam, 2003; Nagata, 1998; Tanaka, 2001; Toth, 1997; Kim, 2001).

As a matter of fact, there has been research indicates that producing output plays a significant role in promoting SLA in L2 learners. In Erlam's (2003) study, she evaluated the relative effectiveness of structured-input instruction and out-put based instruction in L2 French learning. There were 66 L2 learners of French, around the age of 14, participated in her study. Participants were divided into three treatment groups: structured-input group, output-based group, and control group. The target structure of Erlam's study was the French direct object pronouns. The result of Erlam's research indicated that meaning-oriented, output-based instruction led to better performance on both comprehension tests and production tests than structured-input tests. And therefore,

it might not be necessary for instructors to delay output activities, if output-based activities are designed to be considerably meaning-oriented.

The result of Erlam's (2003) study showed evident differences among treatment groups. However, there were limitations of her study that might negatively affect the legitimacy of the result. For example, the output-based group was given sentences in which the target form was underlined. This type of activity can be identified as "enhanced input" activity. According to Sharwood Smith (1993), "enhanced input" activity, also referred to as "input enhancement", is a type of input manipulation with the intention of making certain features more evident in input to draw L2 learners attention on the target form. And therefore, there were input-based activities done by the output-based group, which makes the conclusion that output-based instruction is superior to input-based instruction less convincing. Also, participants of the output-based group were asked to perform oral pair work. By doing this, there was a possibility that participants gained input from listening to others' speaking. In conclusion, there were limitations in the design of output-based activities in Erlam's study that makes it difficult to examine whether it was the output-based activities that led to better gains in participants' language ability or the input-like-based activities that were taken place in the output-based group that assisted participants to achieve better.

Besides Erlam's study, there have been many experimental studies indicate similar results. In Nagata's (1998) study, participants were assigned to three treatment groups: computer-based structured-input group, control group, and output group. The target form of Nagata's study was the Japanese honorific system. Results of this study

showed that the output group achieved more than the other treatment groups, especially on the production tests.

Later in Tanaka's (2001) study, the researcher compared input-based instruction with more meaning-focused output-based instruction. 65 participants were assigned to three different treatment groups: output-based group, combined input-output group, and control (input-based) group. The target form of Tanaka's study was the English psychological verbs. Results of this study demonstrated that the combined input-output group and the output-based group revealed better gains than the input-based group on production tests.

Similar studies also include Toth's (1997) and Kim's (2001) studies, which compared input-based instruction and practice with output-based instruction and practice. Results of such studies showed that output-based instruction and practice had more effectiveness than input-based instruction and practice.

However, all these studies share a common limitation which could negatively affect the reliability of the results. The output-based groups were all, to some degree, exposed to certain forms of language input. This fact makes the conclusion, that it was the output-based instruction and practice that led to better gains in participants' language performance, less convincing.

E. The potential improvements and contributions of the present study

Different from previous research and literature, in which participants were usually L2 learners of English, Spanish, and French, participants of the present study were L2

learners of Chinese. In the United States, currently, Chinese is a less commonly taught language, and not much research has been done to study the acquisition of Chinese.

Shifting away from “big” grammar structures, such as word order and tenses, the present study focused on the acquisition of more specific language form, the Chinese adverb “才 cai”. The adverb “才 cai” was chosen as the target form in this study is due to several factors. First of all, “才 cai” has multiple meanings in Chinese; and for each meaning, the usage is quite complex. Second of all, the researcher’s own teaching experience shows that L2 learners of Chinese normally have difficulty comprehending and producing this form.

Mechanical drills were completely avoided during instruction and practice in the present study. For the output-based group, all activities were designed as meaning-focused activities.

In VanPattern and Cadierno’s (1993) study, participants of the structured-input group were more familiar with the format of test items than participants from other treatment groups. In order to avoid such unfamiliarity, all question formats were explained to all participants in advance.

In previous studies (Erlam, 2003; Nagata, 1998; Tanaka, 2001; Toth, 1997; Kim, 2001), participants from the output-based groups were almost all exposed to certain amount of language input. And therefore, it makes the conclusion that output-based instruction and practice led to better gains in participants’ language performance, less convincing. In the present study, interactions were largely limited among participants to avoid incidental language input in the output-based group. In addition, production test

items were always given to the participants before comprehension test items to avoid getting language input during production tests.

CHAPTER II

THE PRESENT STUDY

The present study employed experimental research method to examine and compare the different effectiveness of input-based activities and output-based activities in terms of whether these two types of activities lead to different gains in L2 Chinese learners' performance on comprehension and production tests.

A. Research questions

The following research questions were intended to be answered in the present study:

a. Do input-based instructional activities and output-based activities lead to better gains in L2 Chinese learners' performances on comprehension and production tests than lecture only class?

b. Is there a difference in comprehension performance between L2 learners of Chinese who conduct input-based instructional activities and L2 learners of Chinese who conduct output-based activities?

c. Is there a difference in production performance between L2 learners of Chinese who conduct input-based instructional activities and L2 learners of Chinese who conduct output-based activities?

B. Participants

Participants were 41 undergraduate students at a state university in New England Area in the United States. It was the participants' first semester of their Chinese study at the university. They were all enrolled in an elementary level Chinese course.

The course aimed at learners with no prior exposure to the Chinese language. The course was divided into two sections, lecture section and discussion section. Students came to the lecture section on every Tuesday and Thursday for 75 minutes each day. They came to the discussion section on Monday, Wednesday, and Friday for 50 minutes each day. Students were divided into two groups on Tuesday and Thursday to meet with two different lecturers for vocabulary and grammar learning. They were divided into three groups on Monday, Wednesday, and Friday to meet with three different teaching assistants for language practice. So in the course, each student had two instructors through the semester.

There were 54 students enrolled in the course, including seven heritage students. But 13 of them were eliminated as participants during the study, since five of them were absent for the immediate post-test, three of them were absent for the delayed post-test, and five of them demonstrated previous knowledge of the target form in the pre-test. Students who agreed to participate in the present study, did not demonstrate previous knowledge of the target form, and were present for the pre-test and two post-tests were selected as participants of the study. The final number of participants is 41, 15 from discussion section one, 13 from discussion section two, and 13 from discussion section three.

C. Target form

The target form of the present study is the Chinese adverb “才 cai”. “才 cai” has many meanings and usages under different contexts. But in the present study, only its meaning as “not...until” was adopted. It indicates that an action or state occurs later than might have been expected. When indicating this meaning, “才 cai” is placed after a time phrase (我昨天十一点才睡觉: I didn't sleep until 11 o'clock yesterday; 我: I; 昨天: yesterday; 十一点: 11 o'clock; 睡觉: to sleep). The researcher's teaching experience shows that L2 learners of Chinese have difficulties comprehending and correctly producing this form.

The target form “才 cai” was originally scheduled to be introduced on Tuesday, the 8th week of the semester, at the lecture section. But due to the need of the present study, it was put off until the Wednesday of the same week.

D. Procedure

Discussion section one and three were the experimental groups, and discussion section two was the control group. To be more specific, discussion section one was the input-based experimental group, and discussion section three was the output-based experimental group (Table 1).

Table 1: Number of participants, and treatment of each discussion section.

Discussion section	Number of participants	Treatments
Discussion 1	15	Experimental group: input-based activities
Discussion 2	13	Control group: lecture only
Discussion 3	13	Experimental group: output-based activities

At the beginning of the semester, participants of the study all took the Placement Test and scored as novice level to be assigned to this elementary level Chinese course. On the 7th week of the semester, all participants took the same pre-test at the same day (Table 2).

The experimental instructions of the present study were taken place on Wednesday, the 8th week of the semester, at the discussion section. All participants of the three groups were taught by the researcher, who was also one of the three instructors of the discussion section.

Right after the instruction, participants took the same immediate post-test in class. On the 9th week of the semester, all participants took the same delayed post-test at the same day (Table 2).

Table 2: Overview of the experiment design.

Time	Input-based group	Control group	Output-based group
Week 1	Placement test	Placement test	Placement test
Week 7, Friday	Pre-test	Pre-test	Pre-test
Week 8, Wednesday	1. Demonstration and explanation of “才 cai” 2. Input-based activities 3. Immediate post-test	1. Demonstration and explanation of “才 cai” 2. Immediate post-test	1. Demonstration and explanation of “才 cai” 2. Output-based activities 3. Immediate post-test
Week 9, Wednesday	Delayed post-test	Delayed post-test	Delayed post-test

E. Instructional treatments

The explicit demonstration and explanation of the meaning and usage of the Chinese adverb “才 cai” was given to all three treatment groups for five minutes in the beginning of each class (see Appendix A for samples). For all three groups, the demonstration and explanation of the target grammar was conducted the same (same instructor, same amount of time, same vocabularies, same steps, and same visual aids, etc.).

The instructor employed the first two steps of Processing Instruction (VanPattern, 1996) to deliver the grammar explanation. The first step is to give learners information about the target form. In this case, the target form “才 cai” was introduced to learners with explanation of the meaning and information about its position in a sentence.

The second step of Processing Instruction (VanPattern, 1996) is to inform learners of the particular processing strategies that they might have. Such strategies normally will negatively affect the acquisition of the target form. In this case, since the direct English translation of “才 cai” is “not...until”, L2 learners of Chinese, whose native language is English, are likely to try to first look for linguistic items that refers to “not” when it comes to comprehending; and try to use “不” or “没”, which can both be translated as “not”, in producing. And therefore, the instructor clearly explained that “才 cai” is simply an adverb that should precede verbs. It indicates that an action or state occurs later than might have been expected. It is not necessary to locate linguistic data that relates to the meaning “not...until” when it comes to comprehending or producing “才 cai”.

The control group was not engaged in any interactive activities after the demonstration and explanation, before the immediate post-test; whereas the two experimental groups were engaged in different types of language practice activities (Table 2). For discussion section one, the input-based experimental group, demonstration and explanation was followed immediately by input-based activities.

In the first activity, learners were first given a statement or dialogue to read, and then asked to answer a question. An example of this activity is the following (see Appendix B for more examples):

王朋昨天晚上九点才去打球。(Translation: Wang Peng did not play ball until 9 o'clock last night.)

Q: What time do you think Wang Peng usually plays balls?

- A. 9pm B. 8:50pm C. 9:05pm

In the second activity, learners first listened to a statement, and then were asked to answer a question. An example of this activity is the following (see Appendix B for more examples):

(Transcription read by the instructor: 他昨天晚上十一点才睡觉。)

(Translation: He did not go to bed until 11 o'clock last night.)

Which of the following could be his regular bedtime?

- A. 11pm B. 10pm C. 11:30pm

In the third activity, learners were given Chinese statements in writing, and then asked to translate them in to English. An example of this activity is the following (see Appendix B for more examples):

我今天八点才起床。(起床: to get up)

(Translation: I did not get up until 8 o'clock today.)

For discussion section three, the output-based experimental group, demonstration and explanation was followed immediately by output-based activities. Descriptions of each activity are provided in the following paragraphs.

In the first activity, learners were first given a context, and then asked to complete the dialogue using the target form “才 cai”. An example of this activity is the following (see Appendix C for more details):

Wang Peng and Li You were supposed to have dinner together at 7pm yesterday. But they didn't eat until 8pm. Today, they met their friend Gao Wenzhong...

高文中：你们昨天几点吃晚饭？(Translation: What time did you have dinner yesterday?)

王朋和李友：_____。

(Translation: Wang Peng and Li You: _____.)

In the second activity, learners were first provided with a context, and then asked to make a statement based on the context. An example of this activity is the following (see Appendix C for more details):

Imagine you are a very disciplined and time-conscious person. You do everything according to a set schedule. Your roommate, on the other hand, is a slow mover. Now you are comparing your daily routine with your roommate's, and you have found s/he does everything later than you do.



9:00 vs. 10:00

Statement: _____

In the third activity, learners were first given English statements in writing, and then asked to translate them in to Chinese. An example of this activity is the following (see Appendix C for more details):

My dad didn't go home until 8pm last night.

In summary, all groups received demonstration and explanation of the target form. The control group was not engaged in any interactive activities. Participants of the input-based group worked with language input and paid attention to the target form. But at no stage, were they required to produce the target form. Participants of the output-based group, on the other hand, were not given activities to work with language input, but were required to produce the target form in meaning-focused activities.

F. Test items

Participants took three tests in total through the present study: pre-test, immediate post-test, and delayed post-test. The pre-test and the delayed post-test were the same. The immediate post-test shared the same format as the pre-test and delayed post-test. The difficulty level of the immediate post-test was the same as the pre-test and the delayed post-test. All three tests consisted of two sections: comprehension section and production section. Each section consisted of three types of questions. Each type had two test items. Simply put, there were 12 test items on each test, six for testing learners' language comprehension, six for testing learners' language production. In order to avoid getting language input from the test, participants were not given the comprehension test items until they finished the production test items.

Test items of the comprehension section can be categorized as listening comprehension items, reading comprehension items, and translation items. Test items of the production section can be categorized as completing dialogues, forming statements, and translations (see Appendix D and E for more details).

G. Methods of scoring

For both the comprehension section and the production section, raw scores of all three tests for each participant were calculated at the same time by the researcher (Appendix F). For both the comprehension section and the production section, the total score for each section is 100. Since there are 6 test items in each section, a score of 17 was given to a correct response for the total 100 for each section. Each incorrect response received a score of 0.

With respect to the production section, a response was considered correct when the target form “才 cai” was used grammatically correctly and delivered an appropriate meaning. This means, the target form was placed between a time phrase and a verbal phrase; it also carried a meaningful message based on the given context.

CHAPTER III

RESULTS AND ANALYSIS

Descriptive statistics from the pre-test and two post-tests were calculated by EXCEL. Participants' raw scores from all three tests were submitted to the one way ANOVA to examine and determine the effectiveness of the three different treatments (input-based activities, output-based activities, and lecture only class).

Descriptive statistics analysis was conducted for each test and each section. The raw scores from all tests and sections were submitted to a one way ANOVA. Due to the small size of the sample in the present study, the significance level was set at .1 for all statistical tests.

A. Results and analysis on the pre-test

In terms of the comprehension of the target form, the one way ANOVA performed on all participants' pre-test scores demonstrated that the input-based group scored better than the output-based group and the control group. And the output-based group scored slightly better than the control group. Descriptive statistics for the comprehension section on the pre-test were reported in Table 3. According to the results of the one way ANOVA, $F(2, 38) = 1.53, p = .23$.

Table 3: Descriptive statistics for comprehension section on the pre-test.

Group	No.	Mean	Std. Dev.
Input-based	15	28.33	17.79
Control	13	17	17
Output-based	13	19.62	19.44

As for the production of the target form, the one way ANOVA performed on all participants' pre-test scores also revealed no significant differences among groups.

Descriptive statistics for the production section on the pre-test were reported in Table 4.

According to the results of the one way ANOVA, $F(2, 38) = 1.41, p = .253$.

Table 4: Descriptive statistics for production section on the pre-test.

Group	No.	Mean	Std. Dev.
Input-based	15	36.27	16.84
Control	13	26.15	27.43
Output-based	13	23.54	19.06

B. Results and analysis on the immediate post-test

Descriptive statistics for the comprehension section on the immediate post-test were reported in Table 5. According to the results of the one way ANOVA, $F(2, 38) = 2.29, p = .115$.

Table 5: Descriptive statistics for comprehension section on immediate post-test.

Group	No.	Mean	Std. Dev.
Input-based	15	90.73	13.26
Control	13	65.62	44.86
Output-based	13	80	28.75

With respect to participants' performances in the comprehension section on the immediate post-test, the one way ANOVA did not demonstrate significant differences among groups. The comparison of participants' performance in the comprehension section on the immediate post-test was reported in Figure 4. The input-based group outperformed the output-based group by 10.73 points out of 100 points. The input-based group outperformed the control group by 25.11 points. The output-based group outperformed the control group by 14.38 points out of 100 points.

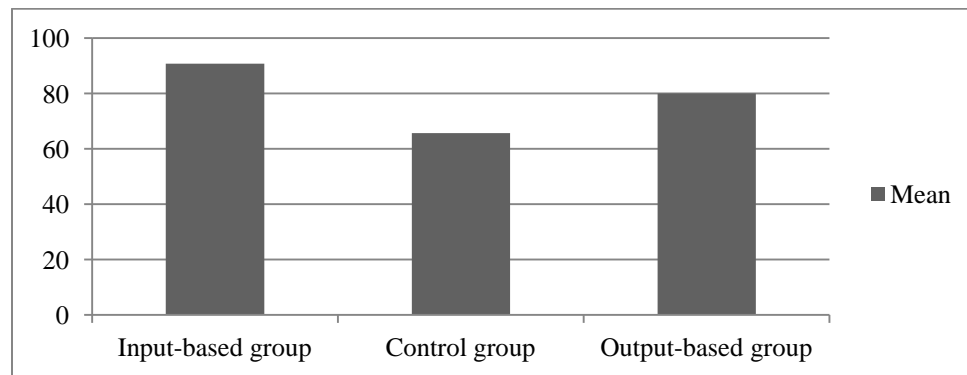


Figure 4: Comparison of comprehension section on immediate post-test among groups.

Descriptive statistics for the production section on the immediate post-test were reported in Table 6. According to the results of the one way ANOVA, $F(2, 38) = 1.43$, $p = .251$.

Table 6: Descriptive statistics for production section on immediate post-test.

Group	No.	Mean	Std. Dev.
Input-based	15	90.6	13.15
Control	13	75.23	29.37
Output-based	13	82.77	27.52

Regarding participants' performances in the production section on the immediate post-test, the one way ANOVA didn't show significant differences among groups. The comparison of participants' performance in the production section on the immediate post-test was reported in Figure 5. The input-based group outperformed the output-based group by 7.83 points out of 100 points. The input-based group outperformed the control group by 15.37 points. The output-based group outperformed the control group by 7.54 points out of 100 points.

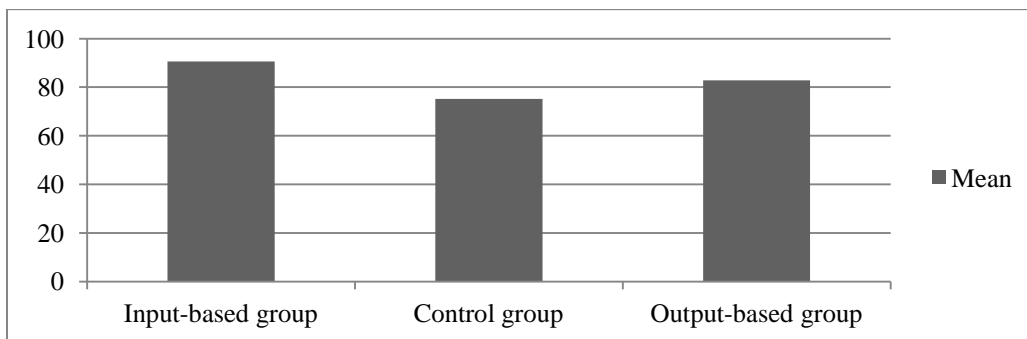


Figure 5: Comparison of production section on immediate post-test among groups.

C. Results and analysis on the delayed post-test

Descriptive statistics for the comprehension section on the delayed post-test were reported in Table 7. According to the results of the one way ANOVA, $F(2, 38) = 1.1, p = .342$.

Table 7: Descriptive statistics for comprehension section on delayed post-test.

Group	No.	Mean	Std. Dev.
Input-based	15	94.73	11.52
Control	13	83.62	31.77
Output-based	13	92.77	14.13

With respect to participants' performances towards the comprehension section on the delayed post-test, the one way ANOVA did not show significant differences between the input-based group and the output-based group. It did show significant differences between the input-based group and the control group, and the output-based group and the control group. The comparison of participants' performance in the comprehension section on the immediate post-test was reported in Figure 6. The input-based group outperformed the output-based group by 1.96 points out of 100 points. The input-based group outperformed the control group by 11.12 points. The output-based group outperformed the control group by 9.15 points out of 100 points.

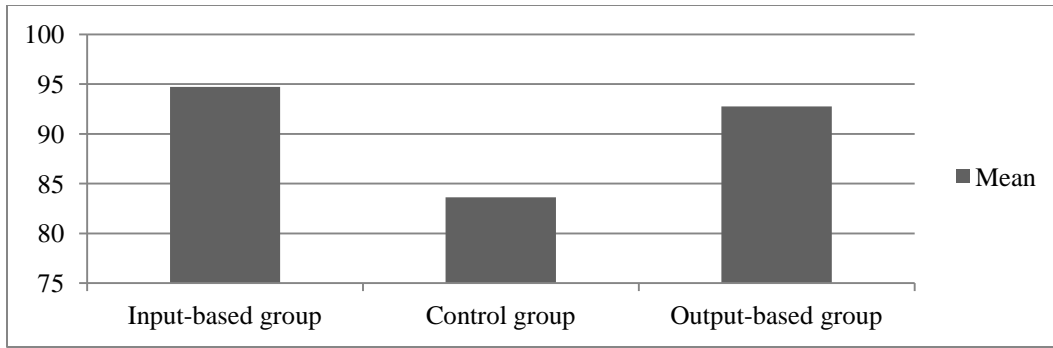


Figure 6: Comparison of comprehension section on delayed post-test among groups.

Descriptive statistics for the production section on the delayed post-test were reported in Table 8. According to the results of the one way ANOVA, $F(2, 38) = 0.6, p = .554$.

Table 8: Descriptive statistics for production section on delayed post-test.

Group	No.	Mean	Std. Dev.
Input-based	15	89.47	18.16
Control	13	78.85	30.63
Output-based	13	86.23	28.59

Regarding participants' performances towards the production section on the delayed post-test, the one way ANOVA did not show significant differences between the input-based group and the output-based group; but significant differences between the input-based group and the control group, and between the output-based group and the control group. The comparison of participants' performance in the production section on the immediate post-test was reported in Figure 7. The input-based group outperformed

the output-based group by 3.24 points out of 100 points. The input-based group outperformed the control group by 10.62 points. The output-based group outperformed the control group by 7.38 points out of 100 points.

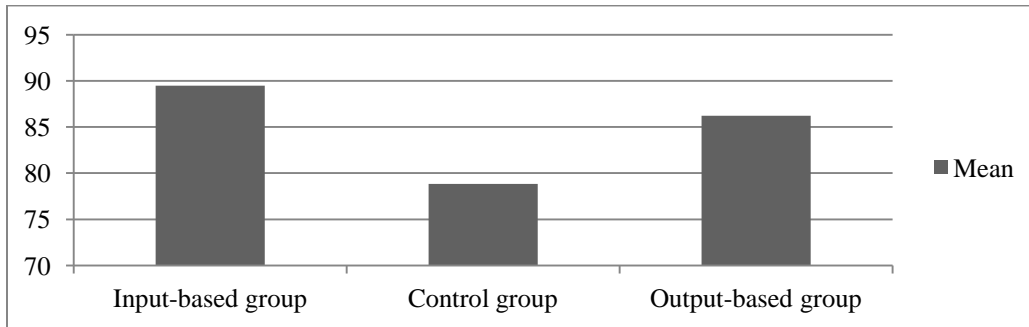


Figure 7: Comparison of production section on delayed post-test among groups.

D. Trend through pre-test, immediate post-test, and delayed post-test

All three treatment groups' mean scores on the comprehension section from the pre-test, immediate post-test, and delayed post-test were depicted in Figure 4. From pre-test to immediate post-test, the line representing the input-based group almost paralleled with the line representing the output-based group, which indicated that the input-based group and the output-based group made similar progress from the pre-test to the immediate post-test. The line representing the output-based group almost met the input-based group line, who started with the highest point, on the delayed post-test. Such trend indicated that the output-based group made more progress than the input-based group from the immediate post-test to the delayed post-test. As for the line representing the control group, its starting point almost overlapped with the one of the output-based group line, but it went under the other two lines through all stages of the experiment, indicating

that the control group made the least progress in the study.

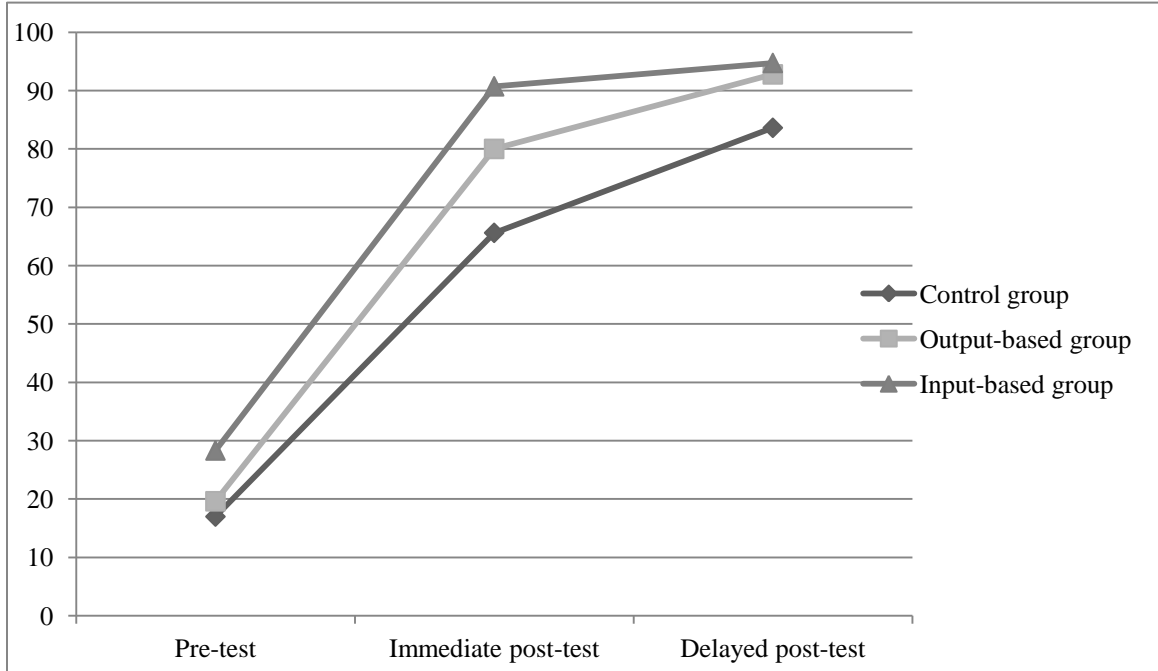


Figure 8: Trend graph for treatment groups' mean scores on the comprehension section.

All three treatment groups' mean scores on the production section from the pre-test, immediate post-test, and delayed post-test were depicted in Figure 5. The input-based group started with a higher point, and the output-based group started with the lowest point. But from pre-test to immediate post-test, the line representing the output-based group went steeper than the two other lines, which indicated that the output-based group achieved more progress than the other two treatment groups. The output-based group eventually outperformed the input-based group, who started with the highest point, on the delayed post-test. As for the line representing the control group, its starting point almost overlapped with the one of the output-based group line, but it went under the other two lines through all stages of the experiment, indicating that the control group made the least progress in the study.

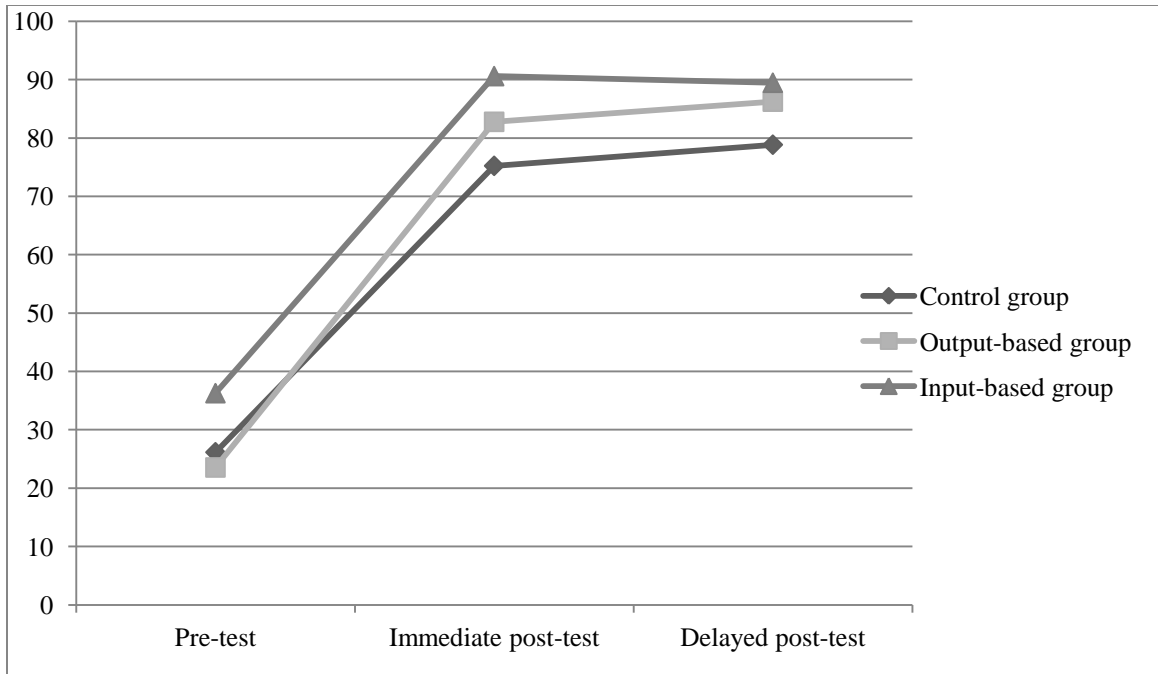


Figure 9: Trend graph for treatment groups' mean scores on the production section.

E. Differences within each treatment group

The one way ANOVA performed on all participants' pre-test scores demonstrated that the input-based group performed better than the output-based group and the control group on both the comprehension section and the production section on the pre-test. And therefore, in order to draw more valid and reliable conclusion, a one way ANOVA was performed to give descriptive statistics for the differences, between the pre-test and the immediate post-test, on both comprehension and production sections within each treatment group.

Descriptive statistics for difference, between the pre-test and the immediate post-test, on the comprehension section within each group were reported in Table 9.

According to the one way ANOVA, $F(2, 38) = 0.7, p = .502$. As demonstrated by the

descriptive statistics, the input-based group and the output-based group achieved almost the same amount of progress on comprehension from the pre-test to the immediate post-test. The input-based group gained the most among all three treatment groups: 62.4 points out of 100 points. The output-based group gained almost the same as the input-based group: 60.38 points. And the control group gained the least: only 48.62 points out of 100 points.

Table 9: Descriptive statistics for difference on comprehension within groups (between the pre-test and immediate post-test).

Group	No.	Mean	Std. Dev.
Input-based	15	62.4	14.87
Control	13	48.62	45.98
Output-based	13	60.38	31.54

The comparison of the difference on comprehension within each group, from the pre-test to the immediate post-test, was reported in Table 14. The input-based group and the output-based group made similar amount of progress on comprehension from the pre-test to the immediate post-test. The input-based group made a little more gains than the output-based group: 2.02 points out of 100 points. The control group made the least gains among all treatment groups: 11.76 points less than the output-based group, and 13.78 points less than the input-based group.

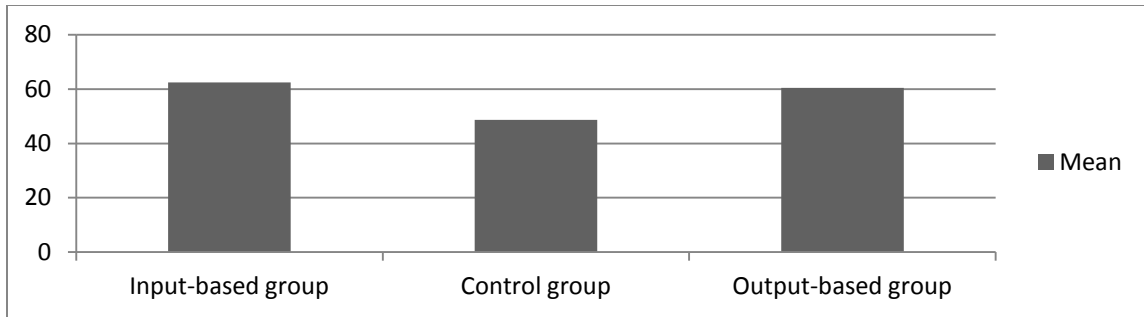


Figure 10: Comparison of the difference on comprehension within groups (between the pre-test and immediate post-test).

Descriptive statistics for difference, between the pre-test and the immediate post-test, on the production section within each group were reported in Table 10. According to the one way ANOVA, $F(2, 38) = 0.47, p = .629$. As demonstrated by the descriptive statistics, the output-based group gained the most on production among all three treatment groups: 59.23 points out of 100 points. The input-based group gained 54.33 points. And the control group gained the least amount of progress: only 49.08 points out of 100 points.

Table 10: Descriptive statistics for difference on production within groups (between the pre-test and immediate post-test).

Group	No.	Mean	Std. Dev.
Input-based	15	54.33	22.91
Control	13	49.08	32.53
Output-based	13	59.23	24.35

The comparison of the difference on production within each group, from the pre-test to the immediate post-test, was reported in Table 16. The output-based group made

the most gains among all three treatment groups on production: 4.9 points more than the input-based group, and 10.15 points more than the control group. The control group made the least gains on production among all groups: 5.25 points less than the input-based group.

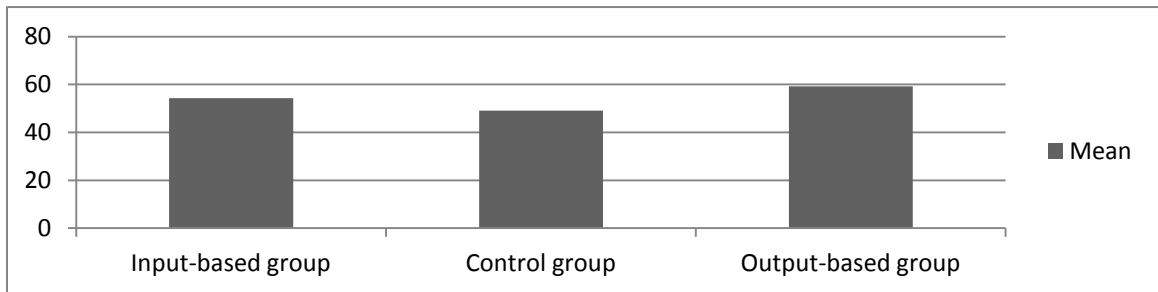


Figure 11: Comparison of the difference on production within groups (between the pre-test and immediate post-test).

CHAPTER IV

DISCUSSION

A. Research question 1

Results of the present study answered research question one: whether input-based activities and output-based activities lead to better gains in L2 Chinese learners' performances on comprehension and production tests than lecture only class. The answer to this question is yes.

For both the comprehension section and the production section, the input-based group and the output-based group outperformed the control group on both the immediate post-test and the delayed post-test. Within each treatment group, both the input-based group and the output-based group made better gains than the control group, from the pre-test to the immediate post-test, on both the comprehension section and the production section. And therefore, although the *p*-value did not show significant differences among groups, the trend graph for treatment groups' mean scores supports the fact that input-based activities and output-based activities do lead to better gains in L2 Chinese learners' performances on comprehension and production tests than lecture only class.

B. Research question 2

Results of the present study also answered research question two: whether there is a difference in comprehension performance between L2 learners of Chinese who conduct input-based instructional activities and L2 learners of Chinese who conduct output-based activities. The answer to this question is no.

Although the input-based group outperformed the output-based group on the comprehension section of the immediate post-test, the input-based group did not make considerably more gains than the output-based group from the pre-test to the immediate post-test. After receiving different treatments, the input-based group and the output-based group made similar amount of progress on comprehension. And therefore, there is no significant difference in comprehension performance between L2 learners of Chinese who conduct input-based instructional activities and L2 learners of Chinese who conduct output-based activities.

C. Research question 3

Results of the present study also answered research question three: whether there is a difference in production performance between L2 learners of Chinese who conduct input-based instructional activities and L2 learners of Chinese who conduct output-based activities. The answer to this question is yes.

Although the input-based group performed better than the output-based group on the production section of the immediate post-test, the output-based group made greater gains than the input-based group from the pre-test to the immediate post-test. The output-based group made more progress than the input-based group on production. And therefore, there is a difference in production performance between L2 learners of Chinese who conduct input-based instructional activities and L2 learners of Chinese who conduct output-based activities. Learners who conducted output-based activities made more progress than ones who conducted input-based activities.

As for the delayed post-test, there was one week between the immediate post-test and the delayed post-test. Since the present study was part of the regular Chinese class, during this one week, participants came to class five times, where they reviewed the target form with different teachers. At the same time, they did their homework, which gave them more opportunities to practice and reinforce the target form. And therefore, different treatments (input-based activities, output-based activities, and lecture only class) were not the only variable that determined participants' performances on the delayed post-test. And therefore, data collected on the delayed post-test could not be used to answer any research questions.

D. Implications of the results

There are a number of reasons that could explain the results of the present study. The most important reason is that all activities that were conducted for the output-based group were meaning-focused activities, instead of mechanical drills. The output-based activities in the present study required participants to produce language output in a meaningful context with a communicative intent. With meaning-focused activities, participants were forced to pay attention to the meaning of the target form and the context to comprehend first. The process of resorting to the meaning the target form conveyed gave participants the opportunity to utilize the given sentences and contexts as language input, to comprehend. This explains the fact that the output-based group made as much progress as the input-based group, in terms of comprehension.

After resorting to the meaning of the target form and the context, meaning-focused output-based activities in the present study also gave participants the opportunity

to produce the target form in a meaningful context. The input-based group, on the other hand, was not given such opportunity. And therefore, the output-based group made greater gains than the input-based group on the production.

For fundamental grammars, such as word order and conjugation, L2 learners need more opportunities to work with the language input to comprehend and internalize the target grammar. In such cases, input-based activities may have more advantages than meaning-focused output-based activities. But for more specific language forms, such as the Chinese adverb “才 cai” in the present study, input-based activities are very likely to be designed as mechanical drills. In the case of the present study, L2 learners of Chinese could easily spot the numeral concept in the given sentences, and therefore mechanically finish the tasks. But meaning-focused output-based activities don't allow such mechanical thinking process, and thus, can have better effectiveness than input-based activities. It is possible that if the target item was the “把 ba” construction or the different usages of “了 le”, results might be different.

E. Limitations

Although the researcher of the present study managed to eliminate certain weaknesses from previous studies, there are still a number of limitations of the present study that could negatively affect the reliability of the results. Readers and future researchers may want to take such limitations into account.

To begin with, since the present study was part of the participants' normal Chinese class, they continued to work with the target form after the immediate post-test.

Therefore, results of the delayed post-test failed to demonstrate whether the treatments had a retained influence on participants.

Also due to the fact that the present study was part of the participants' regular class, participants were not given sufficient time or activities to practice the target form, since there were other forms needed to be taught during the experiment. And therefore, it is reasonable to assume that results on participants' immediate post-test could have shown more significant difference if participants were given more time and opportunities to work with the target form.

Another limitation of the present study is that participants were not randomly assigned to different treatment groups. The present study was part of the participants' regular class during the regular school year, which made it impossible for random assignment, since different participants had different class schedule. And therefore, all participants stayed in their regular discussion section for the present study. Discussion section one was the input-based group, discussion section two was the control group, and discussion section three was the output-based group.

Small number of participants also limited the present study from making results that were more statistically significant. There were only 41 participants in the study. Although the significance level was set at .1 for all statistical tests, the p values of most tests were larger than .1. According to the calculated standard deviations, there was a large amount of variability in the control group. This is also due to the small samples of the present study.

Furthermore, although the format of all test items were explained to all participants before they took the immediate test, it is still quite possible that participants of the input-based experimental group were more familiar with the comprehension test items than participants of the other two groups, and participants of the output-based experimental group were more familiar with the production test items than participants of the other two groups. This possibility is due to the fact that the comprehension test items shared similarity with the input-based activities, and the production test items shared similarity with the output-based activities. Such facts could influence participants' performance on the immediate post-test and therefore negatively affected the reliability of the test scores.

For the last test item on the production section, participants were required to translate from English to Chinese. It is possible that certain participants, who did not get credits, simply did not know how to write parts of the sentence in Chinese characters, but they did acquire the knowledge and usage of the target form. If participants had been allowed to write in pinyin, the result might have been more significant.

In order to reduce or even eliminate the mentioned limitations, to make more reliable conclusions, future studies may want to use larger samples, to assign participants randomly, to give participants more time and opportunities to work with the target form, and to separate instructional activity formats from test item formats.

CHAPTER V

CONCLUSION

Although the present study has limitations due to its small sample and the fact that it took place in a regular class, which is not for the use of any research, in terms of improving L2 learners' ability of comprehending and producing the target forms, the present study still provides evidence for the value of meaning-focused output-based activities.

Results of the present study suggest that, both input-based activities and output-based activities lead to better gains in L2 learners' performances on comprehension and production than learners who receive lecture only. With respect to comprehending the target forms, meaning-focused output-based activities share the same effectiveness with input-based activities. Regarding to producing the target forms, meaning-focused output-based activities lead to greater gains in L2 learners than input-based activities. The key is to design output-based activities as meaning-focused in nature.

With such meaning-focused output-based activities, L2 learners are given the opportunity to resort to meanings and produce the target language with a communicative intent. During this process, learners are forced to pay attention to the meaning of the target form and the context to comprehend first. Such process allows learners to utilize the given contexts as language input to comprehend first. And thus, not only can meaning-focused output-based activities help L2 learners improve their production ability, such activities can help them improve their comprehension ability as well. Especially when it comes to more specific forms, meaning-focused output-based activities are more

effective than input-based activities, since the latter is likely to be designed as mechanical drills.

APPENDIX A

SAMPLE DEMONSTRATIONS OF THE TARGET FORM “才 cai”

USED IN ALL THREE TREATMENT GROUPS

1. The Adverb “才 cai” indicates that an action or state occurs later than the speaker may have expected.

eg. 昨天晚上我十一点才睡觉。

(Translation: I did not sleep until 11 o'clock last night.)

2. S TW 才 V (O)

他们常常七点吃饭。



(Translation: They often eat at 7 o'clock.)

昨天，他们八点才吃饭。



(Translation: Yesterday, they did not eat until 8 o'clock.)

3. S TW 才 V (O)

他常常很早睡觉。



(Translation: He often goes to bed early.)

昨天，他很晚才睡觉。



(Translation: Yesterday, he did not go to bed until late at night.)

APPENDIX B

SAMPLE INPUT-BASED ACTIVITIES USED IN DISCUSSION

SECTION 1, INPUT-BASED EXPERIMENTAL GROUP

Activity 1: Read the following statement or dialogue and circle the most appropriate answer.

老师今天八点才来上课。

(Translation: The teacher did not come to class until 8 o'clock today.)

Q: What time does the teacher normally go to class?

- A. 7:55 B. 8:05 C. 8:00

Activity 2: Listen to the statement and circle the most appropriate answer.

(Transcription read by the instructor: 她这个星期一晚上 8 点才去跳舞。)

(Translation: She did not go dancing until 8 o'clock this Monday evening.)

What time does she usually go dancing on Monday?

- A. 7pm B. 8pm C. 8:45pm

Activity 3: Please translate the following Chinese statements into English.

王朋十岁才去上学。(上学: to go to school)

(Translation: Wang Peng did not go to school until 10 years old.)

APPENDIX C

SAMPLE OUTPUT-BASED ACTIVITIES USED IN DISCUSSION SECTION 3, OUTPUT-BASED EXPERIMENTAL GROUP

Activity 1: Based on the given situation, complete the dialogue in Chinese, using the adverb “才”.

Wang Peng usually goes to the library at 6pm. But today, he went to the library at 7pm. He went home tonight, and his mother asked...

妈妈：你今天几点去图书馆？

王朋：_____。

(Translation: Mom: What time did you go to the library today?)

Wang Peng: _____)

Activity 2: Imagine you are a very disciplined and time-conscious person. You do everything according to a set schedule. Your roommate, on the other hand, is a slow mover. Now you are comparing your daily routine with your roommate's, and you have found s/he does everything later than you do.



Example: 7:00 vs. 8:00
(咖啡)。

Statement: 我七点喝咖啡，她八点才喝

(Translation: I drink coffee at 7 o'clock, she does not drink coffee until 8 o'clock.)



8:00 vs. 9:00

Statement: _____

Activity 3: Please translate the following English statements into Chinese.

A: Why didn't you have dinner until 8pm last night?

B: Because I saw two movies.

A: _____?

B: _____.

APPENDIX D

SAMPLE TEST ITEMS USED IN PRE-TEST, IMMEDIATE POST-TEST, AND DELAYED POST-TEST

Name: _____

Discussion Section Number: _____

一. Based on the given situation, complete the dialogue in Chinese, using the adverb “才”.

1. Wang Peng has Chinese class at 11am every day. Today, he went to class at 11:30. Later, Wang Peng met Li You on campus...

李友: 你今天几点去上中文课?

王朋: _____。

2. Wang Peng usually gets home at 8pm. But yesterday, he didn't get home until 9pm. Today, his classmate Li You asked him...

李友: 你昨天几点回家?

王朋: _____。

二. Imagine you are a very disciplined and time-conscious person. You do everything according to a set schedule. Your roommate, on the other hand, is a slow mover. Now you are comparing your daily routine with your roommate's, and you have found s/he does everything later than you do.

Example:  7:00 vs. 8:00 Statement: 我七点喝咖啡, 她八点才喝(咖啡)。



1. 4:00 vs. 5:00 Statement:

_____。



2. 10:00 vs. 11:00 Statement:
_____。

三. Please translate the following English statements into Chinese.

1. We invited her to dinner at 6pm. She didn't show up until 6:30pm.

_____。

2. A: Why didn't you go to bed until 11pm?

B: Because I saw two movies.

A: _____?

B: _____。

四. Read the following statement or dialogue and circle the appropriate answer.

1. 王朋昨天晚上 9 点才去打球。

Q: What time do you think Wang Peng usually plays balls?

B. 9pm B. 8:50pm C. 9:05pm

2. 王朋: 我昨天 10 点睡觉, 你呢?

李友: 我_____才睡觉。

Q: Which of the following time can fill out the above blank?

A. 9:30 B. 10:00 C. 11:00

五. Listen to the statement and circle the appropriate answer.

Q1. Which of the following is his regular bedtime?

A. 11pm B. 10pm C. 11:30pm

Q2: What time does she usually go dancing on Monday?

- A. 7pm B. 8pm C. 8:45pm

六. Please translate the following Chinese statements into English.

1. 李友三月一号才去上课。

2. 他们四十岁才结婚。(结婚: to get married)

听力材料:

他昨天晚上 11 点才睡觉。

她星期一晚上 8 点才去跳舞。

APPENDIX E

SAMPLE TEST ITEMS USED IN PRE-TEST, IMMEDIATE POST-TEST, AND DELAYED POST-TEST (TRANSLATION)

Name: _____ Discussion Section Number: _____

一. Based on the given situation, complete the dialogue in Chinese, using the adverb “才”.

3. Wang Peng has Chinese class at 11am every day. Today, he went to class at 11:30. Later, Wang Peng met Li You on campus...

李友: 你今天几点去上中文课?

(Li You: what time did you to your Chinese class?)

王朋: _____。

(Wang Peng: _____.)

4. Wang Peng usually gets home at 8pm. But yesterday, he didn't get home until 9pm. Today, his classmate Li You asked him...

李友: 你昨天几点回家?

(Li You: what time did you go home yesterday?)

王朋: _____。

(Wang Peng: _____.)

二. Imagine you are a very disciplined and time-conscious person. You do everything according to a set schedule. Your roommate, on the other hand, is a slow mover. Now you are comparing your daily routine with your roommate's, and you have found s/he does everything later than you do.



Example: 7:00 vs. 8:00 Statement: 我七点喝咖啡, 她八点才喝
(咖啡)。

(I drink coffee at 7, she doesn't drink it until 8.)



3. 4:00 vs. 5:00 Statement:
_____。



4. 10:00 vs. 11:00 Statement:
_____。

三. Please translate the following English statements into Chinese.

3. We invited her to dinner at 6pm. She didn't show up until 6:30pm.

_____。

4. A: Why didn't you go to bed until 11pm?

B: Because I saw two movies.

A: _____?

B: _____。

四. Read the following statement or dialogue and circle the appropriate answer.

1. 王朋昨天晚上 9 点才去打球。

(Wang Peng didn't play ball until 9pm yesterday.)

Q: What time do you think Wang Peng usually plays balls?

C. 9pm B. 8:50pm C. 9:05pm

2. 王朋: 我昨天 10 点睡觉, 你呢?

(Wang Peng: I went to bed at 10 yesterday. And you?)

李友: 我_____才睡觉。

(Li You: I didn't go to bed until ____.)

Q: Which of the following time can fill out the above blank?

B. 9:30 B. 10:00 C. 11:00

五. Listen to the statement and circle the appropriate answer.

Q1. Which of the following is his regular bedtime?

- B. 11pm B. 10pm C. 11:30pm

Q2: What time does she usually go dancing on Monday?

- A. 7pm B. 8pm C. 8:45pm

六. Please translate the following Chinese statements into English.

1. 李友三月一号才去上课。
(Li You didn't go to class until March the 1st.)

2. 他们四十岁才结婚。(结婚: to get married)
(They didn't get married until they were 40.)

听力材料:

他昨天晚上 11 点才睡觉。

她星期一晚上 8 点才去跳舞。

(Listening comprehension scripts:

He didn't go to bed until 11pm yesterday.

She didn't go dancing until 8pm on Monday night.)

APPENDIX F

SCORES OF PARTICIPANTS FROM ALL THREE TREATMENT GROUPS, FOR BOTH THE COMPREHENSION SECTION AND THE PRODUCTION SECTION

Input-based group: 1_1 - 1_15; Control group: 2_1 - 2_13; Output-based group: 3_1 - 3_13

Pre: pre-test; P1: immediate post-test; P2: delayed post-test

Comp: comprehension section; Prod: production section

<u>ID</u>	<u>Pre Comp</u>	<u>Pre Prod</u>	<u>P1 Comp</u>	<u>P1 Prod</u>	<u>P2 Comp</u>	<u>P2 Prod</u>
1_1	34	0	100	100	68	85
1_2	0	34	51	68	85	85
1_3	34	34	100	100	100	100
1_4	34	34	100	85	100	85
1_5	51	51	100	68	100	100
1_6	34	51	100	100	100	100
1_7	34	0	85	100	100	100
1_8	0	34	85	100	100	85
1_9	51	51	100	100	100	100
1_10	51	51	85	100	100	100
1_11	17	51	85	100	100	100
1_12	34	51	85	85	100	100
1_13	17	34	100	68	68	34
1_14	0	34	85	85	100	68
1_15	34	34	100	100	100	100
2_1	34	0	51	0	34	0
2_2	34	34	100	100	100	100
2_3	17	34	100	68	100	100
2_4	34	0	0	85	100	68
2_5	17	68	100	100	100	100
2_6	17	34	100	85	100	85
2_7	51	85	100	68	100	100
2_8	0	34	100	85	100	100
2_9	0	0	0	68	0	34
2_10	0	34	85	100	100	85
2_11	0	0	0	34	85	100
2_12	0	17	100	85	100	68
2_13	17	0	17	100	68	85
3_1	0	17	100	100	100	85
3_2	34	0	51	0	51	0

3_3	51	51	100	100	100	100
3_4	34	34	85	85	100	100
3_5	0	0	34	68	100	68
3_6	17	34	17	68	85	100
3_7	17	17	85	100	100	68
3_8	0	51	100	100	100	100
3_9	17	0	100	85	85	100
3_10	34	34	100	100	100	100
3_11	0	34	68	85	85	100
3_12	51	0	100	85	100	100
3_13	0	34	100	100	100	100

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