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The Effect of Note-taking Strategy Instruction on the Students' Academic Achievement

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In the present study, attempt has been made to investigate the effect of note-taking strategy instruction individually and its interaction with gender on the students' academic achievement. To double check the hypotheses, a true experimental method and a survey were employed. The experimental-side data were fed into SPSS and analyzed using ANCOVA. The results revealed that note-taking strategy instruction, but not its interaction with gender, had significant effects on the student achievement. Using t-test, the survey data results indicated that Iranian professors and students had high positive attitudes toward the benefits of note-taking; also, mean differences between male and female respondents were not significant. The findings both theoretically and practically provide hints for teachers, students and future researchers.

Key words: note-taking strategy instruction, academic achievement, gender, attitude

INTRODUCTION

Every job in the world needs its own specific tools. In the tool box of students, teachers and researchers the most important tool may appear to be *note-taking*. By definition taking notes implies comprehending either a written document or a lecture and recording information by writing it down (Kellogg, Olive & Piolat, 2005). It has also been defined by Larsen-Freeman and Long (1991: 202) as "writing down the main ideas, important points, outline or summary of information presented orally or in writing". In the present study, attempt has been made to investigate the theoretical and practical aspects of note-taking instruction as well as its relationship with gender. The problem is that in Iranian educational system, from primary school to university, note-taking strategies are not taught to the students formally. The students take notes based on their own taste and/or some teachers' informal guidance. That is why undergraduate students are not well-experienced in using note-taking strategies and the notes they produce are poor (omission of main points, word-for-word transcript, lack of abbreviation etc.). Thus, to compensate for such a defect interventions such as teaching note-taking strategies to the students to employ an effective note-taking procedure seems to be contributive. To the end, in the present study attempt is made to see whether we can enhance the students' academic achievement through the instruction of note-taking strategies, and simultaneously we want to know what effect the students' gender may incur. Since note-taking strategies have their root in cognitive and metacognitive theories, it is important to investigate the extent of the effect of instructing the note-taking strategies on the students' academic achievement.

REVIEW OF LITERATURE

Beecher (1988) reports that research on note-taking has generated debates since Crawford (1925) began his studies in the 1920s. Initially debates

centered on whether note-taking resulted in improved student performance on tests. Over the years, researchers have tried to verify that note-taking helps students "encode" the information involved and that notes are valuable resources.

Beecher (1988) claimed that findings on whether note-taking promotes encoding have been mixed. Previous studies also support the claim. Hult and colleagues (1984), for example, found that note-taking does involve semantic encoding; but Henk and Stahl (1985) found that the process of note-taking in itself does little to enhance recall. They found, however, that reviewing notes clearly results in superior recall. However, their conclusions were dramatically different from those of Barnett, Di Vesta, and Rogozinski (1981), who found "strong support" for the encoding function of note-taking but not for the value of using notes to review material. Some experimental studies (Boyle & Weishaar, 2001; Bretzing, Kulhavy & Caterino, 1987; Meyer, 2002; Peck & Hannafin, 1983) on student achievement have been inconclusive regarding the benefits of note-taking training. However, these studies have had serious methodological weaknesses and have not consistently involved meaningful training sessions that incorporate practice and evaluation of the note-taking skills. For example, Boyle & Weishaar (2001) did not counterbalance the training and test videos. Counterbalancing the training and treatment variables might have reduced any treatment effects from practice. A study by Bretzing and colleagues (1987) involved 15-minute training sessions before the test and provided only general note-taking tips. Meyer's (2002) study was also inadequate concerning the number of strategies taught and the length of time. The students took notes using only Cornell system for four days in a nine-day period, including the day they were taught the Cornell method. Peck and Hannafin's (1983) study involved a brief videotaped session on note-taking and accompanying worksheet as the training. They did not train the students using specific note-taking strategies rather the instruction consisted of general tools such as videotape to show the importance of note-taking.

Studies concerning note-taking may be categorized based on the nature of

their results although this demarcation is elusive and the results obtained by some studies may overlap and/or blur those obtained by still others. *Theoretically*, there is a strong relationship between note-taking and cognition and/or metacognition. On the cognitive side, note-taking implies comprehension and production. Making mnemonic and non-mnemonic notations by pupils is another evidence for the relationship between cognition and note-taking. Metacognition, on the other hand, helps learners become active participants in the learning process. Metacognitive strategies are techniques which make use of knowledge about cognitive processes and constitute an attempt to regulate language learning by means of planning, monitoring, and evaluating. They have an executive function. Examples are "Directed attention" and "self-management". Metacognitive strategies are sequential processes which control cognitive activities and ensure that a cognitive goal is achieved (Bialystock & Codd, 1996; Ellis, 1994; Eskritt & Lee, 2002; Eskritt & Mcleod, 2008; Kiewra, 1988; Piolat, Oliver & Kellog, 2005; Stefanou, Hoffman & Vielee, 2008; Wang et al., 2009 & White, 1996).

Also, Castello and Monereo (2005) refer to different *eras* when the topic, note-taking, has been dealt with. A dominant approach in the sixties and seventies focused on the effects of note-taking and note-writing on some cognitive variables, such as attention, memory, comprehension, and so on. In the eighties and nineties, interest was focused on the relationship between quality of notes and significance of learning. More specifically, these studies analyzed whether the use of different note-taking procedures improved the learning of some information. More recently, the interest of research has shifted to what really happens in the classrooms when teachers aim at prompting certain note-taking forms.

There are researchers who consider note-taking as a *strategy* or *tool*. Lee and colleagues (2008) have taken note-taking into account as effective strategies to improve students' learning. Many students believe in the positive effect of note-taking process itself on the learning performance (Kobayashi, 2005). According to Van Meter, Yokoi, and Pressley (1994), college students shared beliefs that the act of taking notes facilitates attending

to the lecture, comprehension of the material to be learned and the subsequent recall. Chularut and DeBacker's (2004) findings clearly demonstrate that concept mapping, as a strategy, can benefit ESL students across a range of levels of English proficiency, including those who were most advanced in English acquisition. "Note-taking is a valuable tool that can help increase the retention of information" (Carrier & Titus, 1981, p. 385, cited in Meyer, 2002, p. 4). Stahl and colleagues (1991) state that the Cornell Method, the Palmatier's Unified Note-Taking System, and the Split Page Method are all effective and time-honored tactics (p. 615). Spires and Stone (1989) and Bakunas and Holley (2001) specifically recommend the Split Page Method. These methods are referred to concisely and precisely below.

In **Cornell Method,** which was developed by Walter Pauk, **a** loose-leaf notebook is recommended to allow one to insert handouts into his or her notes. A vertical line is drawn down the notebook about two inches from the left margin. Only one side of the page is used. A formal outline is avoided, but a style appropriate to the lecturer's style may be used. The note-taker should use short telegraphic sentences and phrases. Most things should be phrased in one's own words. The left hand column is used as a recall column. The students should edit their notes and write key words or questions in the margin and use these key words as a study aid to test their knowledge. Information is summarized at the bottom of the page. Six steps of the Cornell Method are *Recording, Reducing, Reciting, Reflecting, Reviewing* and *Recapitulating* (Pauk, 2001).

Palmatier's Unified Note-Taking System (PUNS), as a research-based note-taking system, urges students to review their lecture notes immediately after class or lecture and supplement them with text information. The note-taking format also provides a built-in study system by separating key words from the body of notes. The students are asked to 1) record lecture notes on the right side of their notebook paper with a three-inch margin on the left side, use outline to isolate main topics and leave space where information seems to be missing; 2) organize , soon after lecture, by placing *labels* or *key words* inside the left margin and 3) study, that is, the students should key words as

memory cues to recite the information on the right side of their note sheets (Manzo & Manzo, 1990).

Split Page Method …is a note-taking strategy in which the student divides his or her paper into two columns, takes lecture notes on the right-hand side, and uses the left margin to write questions or annotations. This method is effective because it incorporates an element of self-testing. When students think about the lecture material by forming and then answering the questions, their performance improves because the process of self-questioning forces students to monitor their learning and comprehension. Additionally, self-testing …encourages students to review on a regular basis rather than writing until just before an exam (Pardini, Domizi, Forbes & Pettis, 2005).

However, some commentators have emphasized the function of *reviewing* notes. The benefit of note taking appeared to be derived from the review rather than from the act of note-taking itself (Carter & van Matre, 1975). Kiewra (1985b) endorsed the value of review, but not of the student notes. According to Mee (1991), note-taking serves as an external storage function because its value is the product that is externally stored and reviewed. Kiewra (1985a) concluded that listening to a lecture and subsequently reviewing the instructor's notes prior to a delayed exam leads to relatively higher achievement. According to Slotte and Lonka (1999), reviewing the notes during essay-writing resulted in good performance in an exam calling for deep-level text comprehension.

Not surprisingly, researchers have not ignored the effect of note-taking with another skill *accompaniment* on the students' performance. Peverly and colleagues (2003), for example, indicated that note-taking and background knowledge were generally better predictors of test performance than self-regulation. Moreover, Kiewra and colleagues (1995) investigated how different note-taking formats in combination with review activities affect recall and relational learning. Other scholars (referred to below) have directed their attention towards the *quality* of notes. Research on the quality dimension and completeness of notes indicate that the number of idea units in lecture notes is positively related to test performance (Kiewra et al., 1995).

Benton and colleagues (1993) also present data consistent with the conclusion that the length of lecture notes is related to both qualitative measures of essay writing. Slotte and Lonka (1999) also found that taking extensive and high-quality notes is related to success in tasks calling for deep-level discourse processing. Boyle and Weishaar (2001) concluded that improved note-taking skills contributed to students' comprehension, as well as their short-term and long-term recall.

In still other studies, attention has been paid to the *encoding* and the *external storage* dimensions of note-taking. Rickards and Friedman (1978) concluded that note-taking seemed to serve as both an encoding device and as external storage mechanism, with latter being the more important function. The external storage function not only led to enhanced recall of the notes, but also facilitated the reconstruction of other parts of the passage. According to Kobayashi (2005), the proponents of the encoding hypothesis (e.g., Bretzing et al., 1987; Di Vesta & Gray, 1972; Peper & Mayer, 1978; Peper & Mayer, 1986) state that note-taking enhances learning by stimulating the note-takers to actively process the material and to relate it to their existing knowledge. Finally, some educators have contended that note-taking strategies should be *taught*. According to Meyer (2002), note-taking is to be explicitly taught in school. Ornstein (1994) emphasizes note-taking as part of the curriculum. Bakunas and Holley (2001) argue that note-taking skills should be taught to students in the same manner that they are taught writing or computer skills.

Based on the literature reviewed, we come to the conclusion that note-taking has been the common theme of many studies and it can still be the core of further research. Although the present study is on the same line with the previous ones, its methodology makes it distinct from others. For instance, to double check the research hypotheses both an experiment and a survey were conducted. Moreover, the time duration (16 sessions each 90 minutes) of teaching note-taking strategies and the amount of guided practice provided for the experimental group may be taken as another peculiarity of this study. Detailed Tables of course specifications based on which the pretest and the posttest were made can be added to the merits of the study too.

THE STUDY

Two research hypotheses were the backbone of this mixed methods (survey and experimental) study.

1) Teaching note-taking (strategies) to the students mainly enhances their academic achievement.
2) The interaction of gender (male and female) and note-taking seems to be effective in the students' academic achievement.

Participants

In the Experiment

To select the sample subjects, we considered our statistical population to be all those undergraduate students (120 people) whose major was Translation and had registered for the course "*Theoretical Principles and Fundamentals of Translation*" in Islamic Azad University of Hamedan in the second semester of the academic years 2008-2009. Through systematic random sampling, 60 male and female juniors, ranging from 18 to 24 years old and not so proficient in English were selected and randomly assigned to experimental and control groups (each 30 students). To get 60 students, as our sample, from a larger population, N = 120, first we listed the name of all members of the population randomly and every name was given a number (1 – 120). Using the formula:

$$K = \frac{N}{n}$$

where K is sampling interval,

We divided the number of population (N =120) by the number of our intended sample (n = 60). Then between numbers 1 and 2 we randomly chose number 1 resulting in selecting all odd numbers, that is, 60 people in our list

(Best & Kahn, 2006; Cochran, 1977).

In the Survey

The population, including instructors and students, numbered 400. The instructors, both male and female, were teaching in Bu Ali Sina University, Islamic Azad University, Teacher Training Center, all three in Hamedan, Iran. Their age varied from 28 to 55 years old. Some of them majored in TEFL, some in linguistics and some others in educational psychology. Following their age, their teaching experience differed from 7 to 25 years. The students being participated in the survey possessed all those characteristics mentioned for the students in the experiment part (above). The only difference was that they majored in different academic disciplines, that is, Translation, TEFL and English literature. Of 193 respondents, being selected based on Kerjcis & Morgan's (1970) Table and acting as our sample, 72 were male, 121 were female, 20 were instructors, and 171 were students.

INSTRUMENTS

Two types of instruments were used to collect the data. One of them has been a test package– a pretest and a posttest – each containing 40 multiple-choice items. The second was a questionnaire containing 20 items. These instruments were piloted for their practicality, reliability and validity (see Procedures). The tests were norm-referenced since they compared the performances of different groups. Another tool has been a questionnaire for comparing a variety of means used in qualitative research to collect data, which contained 20 closed-ended items. The choice of such a tool was theoretically motivated, i.e. we had two purposes in mind: 1) to ensure that all subjects had the same frame of reference in responding, and 2) to code the responses directly as data and feedback them into SPSS for analysis.

MATERIALS

Materials consisted of two parts. The first part of the materials or course taught to the subjects was a book entitled "*The Theoretical Fundamentals and Principles of Translation*" which previously had been compiled by Karimi (2004) based on the syllabus designed by the ministry of higher education of Iran. The book contains *an introduction* and seven chapters, including wide variety of topics such as *syllabus, teachers, seminars, extensive study* of others' works, history of translation in Iran and in the West, different types of translation, types of meaning, equivalence in translation as far as phonological, morphological, syntactic, semantic, cultural and religious systems are concerned; discourse analysis (cohesion, coherence, top-down and bottom-up hypotheses, and theme versus rheme) and its pedagogical implications in translation; theories or models of translation, as well as translation criticism.

The second part of the materials consisted of note-taking strategies such as Cornell's system, charting, outlining, highlighting, paraphrasing, abstract writing, underlining, sentence method, split page method, group notes, using color etc.

PROCEDURES

For the purposes of the study, a quantitative research (including experiment and survey) was used. First, 60 subjects (male and female) were randomly selected, as it were, from among the students majoring in translation in Islamic Azad University of Hamedan and were randomly assigned to experimental and control groups. As far as some extraneous variables, such as the range of age, background knowledge, situation of education and Hawthorne effect (… the positive impact that may occur simply because participants know that they are part of an experiment and, therefore, 'different" from others) (Mackey & Gass, 2005, p. 114; Best &

Kahn, 2006, p. 166) (Best & Kahn, 2006, p. 166; Mackey & Gass, 2005, p. 114) were concerned, the subjects were kept homogeneous.

In the second phase, a Table indicating the course (*The Theoretical Fundamentals and Principles of Translation*) and/or test specifications was developed. Based on this Table a 40-item multiple-choice pretest was made. Each item in both pre-test and posttest was supposed to test a specific component of the mentioned course. To pilot this test, it was administered to 87 students majoring in Translation in Islamic Azad University of Hamedan, Iran. Practically, the test was applicable to our particular situation. That is, it was administered easily due to the clear directions the testees were provided with and the time it took (50 minutes). As a result of item analysis (Item Facility, Item Discrimination and Choice Distribution), some items were revised. Moreover, using Spearman-Brown Prophecy formula, the reliability of the test was estimated and it turned out to be 0.792 / 0.80 (which is an acceptable range according to Nunally's Table cited in Sharifi, 2002, p. 202). The test was also validated in two ways. First, it was made based on the Table of specifications. Second, viewing the test from different angles of vision (e.g., structure, content and purpose), some experts approved it. Hence, the pretest was developed.

In the third phase, both groups were taught the course for 16 sessions. In a separate class, only the experimental group received the treatment. That is, they were taught note-taking strategies such as mapping, outlining, charting, paraphrasing, summarizing in one's own words, grouping main ideas together, quoting directly, writing in color, using abbreviation, underlining, highlighting, abbreviated note-taking format, Cornell or 6R method (Record, Reduce, Recite, Reflect, Review and Recapitulate), and PARR method (Prepare, Abbreviate, Revise and Review) for 16 sessions (90 minutes each). In each instructional session two or three strategies, accompanied by sample examples, were introduced. Then they were assigned some texts, including their textbook, to take notes accordingly both in the class under the instructor's supervision and at home. Their notes were checked for their quality (e.g., neatness, being to the point, date, title, separation of main ideas

from the secondary ones, legibility etc.) and the subjects received feedback if it was felt necessary.

In the fourth stage, a 40-item multiple-choice posttest, parallel to the pretest, was made, and piloted for its practicality, reliability and validity, and was administered to both groups. To pilot the posttest, we followed the same procedure as we used for the pretest. However, this time the test was administered to 39 students, again quite similar to those who were to take part in the revised posttest; the estimated reliability came up to be 0.618. As a result of item analysis, some items were deleted and some others were revised leading to the final posttest. In the fifth stage, the collected data ─ the scores obtained from the pretest and posttest administrations ─ were fed into SPSS and were analyzed using analysis of covariance (ANCOVA).

Also, a 20-item attitudes questionnaire was made. To estimate the reliability of the questionnaire, it was first administered to 30 participants (5 professors and 25 students). Assuming the internal homogeneity of the items in the questionnaire, Cronbach's Alpha was used and the calculated reliability turned out to be 0.84. The result of Pearson's correlation coefficient showed that there is a positive meaningful correlation between the score of each item and the total score of the questionnaire ($p<0.01$). Therefore, we may claim that all the items of the questionnaire measure a single trait, i.e. the attitude about the effectiveness of note-taking strategies on the students' academic achievement (see Appendix B). The administration of the questionnaire did not take more than 20 minutes. Moreover, being written in their native tongue (Persian), its instruction as well as items were easily and clearly understood by the respondents. Hence, the practicality of this instrument may not be questioned. To be sure about the validity of the questionnaire, it was given to scholars to see whether it suits the purposes of the study or not. Endorsing the questionnaire, they approved it with some corrections. This piloted questionnaire was distributed among 193 respondents including students of English Translation and their professors, where the obtained data were fed into SPSS for analysis.

RESULTS

The present study was an attempt to investigate the effectiveness of note-taking strategy instruction on the students' academic achievement, and its potential interaction with gender. The results revealed that note-taking strategy instruction, but not its interaction with gender, had significant effects on the student achievement. Below, we'll have a closer look at the results. Before moving to the analytical results, you may check the descriptive data in sum.

TABLE 1
The Levels of Between-Subjects Factors

		Value Label	N
Group	1	Experimental	30
	2	Control	30
Gender	1	Male	11
	2	female	49

Table 1 presents the frequency of subjects in terms of number and gender in both experimental and control groups. The number of participants in each group is 30, but the number of female participants in each group is more than that of the male ones. This is due to the fact that the female students are more than the male ones throughout the country (Iran) generally and in Islamic Azad university of Hamedan particularly.

TABLE 2
Descriptive Statistics (pre-test)

Group	Gender	Mean	SD	N
Experimental	male	5.5000	.77460	6
	female	5.6875	1.85222	24
	Total	5.6500	1.68231	30
Control	male	6.0000	1.00000	5
	female	5.0600	1.19304	25
	Total	5.2167	1.20117	30
Total	male	5.7273	.87646	11
	female	5.3673	1.56716	49
	Total	5.4333	1.46561	60

Table 2 describes the groups' achievement regarding the course (*The Theoretical Fundamentals and Principles of Translation*) in the pre-test. The experimental group's mean (5.6500) and the standard deviation (1.68231) differ a little from those (5.2167 and 1.20117) of the control group respectively.

TABLE 3
Descriptive Statistics (post-test)

Group	Gender	Mean	SD	N
Experimental	male	17.5833	0.66458	6
	female	15.9479	1.70673	24
	Total	16.2750	1.68199	30
Control	male	11.7000	4.11704	5
	female	11.2600	2.54182	25
	Total	11.3333	2.77716	30
Total	male	14.9091	4.05474	11
	female	13.5561	3.19882	49
	Total	13.8042	3.37491	60

The data in Table 3 shows the groups' achievement in course (*The Theoretical Fundamentals and Principles of Translation*) in the posttest. As it is evident, the mean and the standard deviation of the experimental group are 16.2750 and 1.68199 respectively; while those of the control group are 11.3333 and 2.77716. This comparison shows that the experimental group has outperformed the control group in the pretest.

To run ANCOVA, preliminary checks were conducted to ensure that there is no violation of the assumptions of the homogeneity of slopes of regression lines, linearity, normality and reliable measurement of the covariate. One of the important assumptions to conduct ANCOVA is the homogeneity of the slope of regression lines. That is, the relationship between dependent and covariate variables should be the same for all the groups in the experiment, so that the regression lines are all parallel (Pallant, 2005). The data in Table 4 indicate that this assumption holds [$F (1, 54) = 2.493$, $p = 0.12 > \alpha = 0.05$] and [$F (1, 54) = 2.587$, $p = 0.114 > \alpha = 0.05$]. Also, Table 5 indicates linearity [F (1,

55 = 4.471, $p = 0.039 < \alpha = 0.05$]. Normality is evident in Appendix C [$p = 0.323$] and the reliability of the pretest is 0. 84 as reported above.

TABLE 4
The Slope Homogeneity of Regression Lines

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.
Corrected Model	416.329[a]	5	83.266	17.586	0.000
Intercept	185.243	1	185.243	39.123	0.000
G	57.767	1	57.767	12.200	0.001
Pretest	0.152	1	0.152	0.032	0.859
G*pretest	11.802	1	11.802	2.493	0.120
Gender	14.478	1	14.478	3.058	0.086
Gender*pretest	12.248	1	12.248	2.587	0.114
Error	255.683	54	4.735		
Total	12105.313	60			
Corrected total	672.011	59			

a. R squared=0.620

Based on the data in Table 5, the first research hypothesis is accepted [($F(1, 55) = 50.217$), $p<0.0005$]. In other words, the main effect of the between-subjects factor (i.e. group) on the dependent variable (academic achievement) is significant.

Table 5 also indicates that the main effect of the between-subjects factor (i.e. gender) on the dependent variable (academic achievement) is not significant [(F (1.55)=1.382, p=0.245]. This, however, is a marginal finding in the study. In other words, the effect of interaction of the between-subjects factor, *gender* and *note-taking instruction*, on the dependent variable, *academic achievement,* is not significant [F (1, 55)=1.249, p=0.269].

TABLE 5
Tests of Between-Subjects Effects

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.
Corrected model	401.902	4	100.476	20.459	0.000
Intercept	482.838	1	482.838	98.316	0.000

Pretest	21.957	1	21.957	4.471	0.039
Group	246.620	1	246.620	50.217	0.000
Gender	6.788	1	6.788	1.382	0.245
G*gender	6.132	1	6.132	1.249	0.269
Error	270.109	55	4.911		
Total	12105.313	60			
Corrected total	672.011	59			

Further analysis of data in Table 5 showed that the main effect of the between-subjects factor (i.e. group) is significant. Now the question "in which group is the academic achievement higher?" arises. To answer this question, we adjusted the means to statistically remove the effect of the covariate. Taking into account the data in Table 5, we see that the adjusted mean score of subjects in the experimental group is 16.697, which is higher than that (11.439) of those in the control group. Therefore, it is concluded that teaching note-taking strategies affects and improves academic achievement.

TABLE 6
The Adjusted Means of Independent Variable (Group) Levels

			95% Confidence Interval	
Group	Mean	Std error	Lower bound	Upper bound
Experimental	16.697	0.507	15.681	17.713
Control	11.439	0.543	10.350	12.527

Focusing on Table 6, we see that the experimental group's mean confidence interval with 95% coefficient equals (15.68 17.713) concerning achievement in *Theoretical Principles and Fundamentals of Translation*, while that of the control group equals (10.35 12.527).

TABLE 7
Comparing the Mean of the Respondents' Opinions with that of the Questionnaire

Variable	$\bar{X}$	S	*df*	*t*	*p*
attitude	79.40	8.08	190	33.17	0.000

P<0.01, N=191

Based on Table 7 the results of one-sample t-test show that a meaningful difference is observed between the mean of the respondents' opinions and that of the attitude questionnaire concerning the effect of note-taking on the students' academic achievement (t_{190}=33.17, P<0.01). The mean (79.40) of the respondents' opinions is higher than that (60) of the attitudes questionnaire. The mean (60) of the attitude questionnaire has been calculated through the following formula (Sharifi, 2002):

$$M = \frac{5K + 1K}{2}$$

where M is *mean* and K is *number of items in the questionnaire.*

TABLE 8
Comparing the Mean of the Male Respondents' Attitudes with that of the Females'

Gender	N	$\bar{X}$	S	*df*	*t*	*p*
Male	71	78.37	9.27			
				120.802	-1.28	0.201
Female	120	80.02	7.27			

N=191

In Table 8 the results of t-test for independent groups show that a meaningful difference is not observed between the mean of males' attitudes and that of the females as far as the effect of note-taking strategies on the students' academic achievement is concerned $t_{(120.802)}$= -1.28, (NS).

TABLE 9
Comparing the Mean of Professors' Attitudes with that of the Students'

Respondents	N	$\bar{X}$	S	*df*	*t*	*p*
Professors	20	77.90	7.47			
				189	0.878	0.381
Students	171	79.58	8.16			

N=191

In Table 9 the results of t-test for independent groups show that a

meaningful difference is **not** observed between the professors' and students' attitude regarding the effect of note-taking strategies on the students' academic achievement [$t_{(189)} = 0.878$, N.S.].

DISCUSSION

Using a randomized pretest-posttest control group design and a survey, attempt was made to understand the effect of note-taking strategy instruction by itself and its interaction with gender on the students' academic achievement. Average performance between groups differed on the posttest. That is, the experimental group outperformed the control one suggesting that the main effect of note-taking strategy instruction has been significant. Such a result is consistent with those obtained by some other studies (e.g., Kiewra & Benton, 1988; Lee, Lan, Hamman & Hendricks, 2008; Stahl, King, & Henk, 1991). Of course, disparity is also evident between the results of this study and those obtained by some others. For example, our quantitative data indicate that note-taking strategy instruction improved student achievement; while Peck & Hannafin's research (1983) did not. One reason for this may originate from the type of instruction including the length of time allotted to teaching note-taking strategies and the amount of exercises assigned to the subjects.

From a *theoretical* perspective, perhaps there is place to claim a strong bond between note-taking strategy instruction and students' academic achievement. There are several explanations to support such a theory: (1) note-taking instruction plays an important role in recalling and learning ideas (Dunkel & Davy, 1989; Kiewra,1985; Kobayashi, 2005; Lee, Lan, Hamman & Hendricks, 2008; Ornestein, 1994); (2) being practiced, note-taking strengthens our cognition power (Mee, 1991); (3) while taking notes, both short-term and long-term memories are involved, giving rise to learning (Boyle & Weishaar, 2001; Kiewra & Benton, 1988); (4) extending our attention span, it causes us to concentrate on the subject under study(Mee,

1991). and (5) it constitutes a stable external memory(Mee, 1991; Piolat, Oliver & Kellog, 2005; Rickards & Friedman, 1978; White, 1996).

However, the extension of our prediction that the interaction of gender and note-taking strategy instruction would also provide achievement was not *confirmed,* a support for some previous studies (e.g., Ahankoobnezhad, 2001; Donyavizadeh, 2001). Perhaps gender has not acted as a moderator variable or the problem may be attributed to the *limitation of the present study.* That is, the number of female participants has been more than that of the male ones in both experimental and control groups. One wonders what would have happened in this study if the male and female participants had been equal in number, hence a topic for further research.

As for the survey, we found that 1) the mean (60) of the attitude questionnaire fell below that (79.40) of the respondents' attitude (Table 7); 2) there is no a meaningful difference between the males' and females' mean (Table 8) and there is no meaningful difference between the professors' and students' mean (Table 9). These findings, while confirming those of some previous similar studies (Dunkel & Davy, 1989; Kobayashi, 2005; Mee, 1991; Meyer, 2002; van Meter, Yokoi, & Pressley, 1994), illustrate the favorable attitude of the respondents, Iranian professors and students, toward the positive effect of note-taking instruction on the students' academic achievement. Perhaps each item of the questionnaire had been able to elicit the respondents' judgment about a given aspect of note-taking. It is these similar beliefs of the male and female respondents that provide the foundation of a composite theory (participants' beliefs and notions about note-taking). Note-taking remains the professors' "Sacred cow" and the students' "pet calf" Armbruster (2000).

Practically, the findings of this study have implication for *teachers* and *students*. Teachers may enhance the knowledge level of their ESL students and the students of other disciplines by both teaching various strategies unknown to them and deeply acquainting them with the wisdom underlying note-taking (Chularut & DeBacker, 2004). Teachers may use it as a scaffold to assist their students to achieve a sound knowledge of what they are

supposed to learn. Note-taking is significant for the students in many ways. For instance, it causes comprehension and written production (Piolat et al., 2005); as a generative activity it causes the students to learn more (Armbruster, 2000); it acts as an external storage for later review (Mee, 1991) and it assists the students to retain information (Dunkel & Davy, 1989).

Future researchers may further investigate the following:

1) the relationship between the contents of notes and what is recalled by the note takers;
2) the effect of notes quality on mental representation;
3) the performance of note takers who review their notes and that of those who do not;
4) the effect of note taking on cognitive load; and
5) the test performance of trained and untrained note takers.

CONCLUSION

Reconfirming the results of some previous studies, the present study showed that teaching note-taking strategies improves students' academic achievement. We didn't know whether the interaction of note-taking and gender enhanced academic achievement. We found that such interaction does not have effect on student achievement. We didn't know whether Iranian professors and students considered note-taking favorable or not. It was found that they view it positively. Since note-taking remains sacred, the findings of this study imply the following suggestions.

1) Authorities of educational centers may provide their instructors with in-service workshops dealing with note-taking strategies.
2) While teaching a specific course, teachers should also teach the necessary note-taking strategies to their students. Privately, in the form of extraordinary classes, educational authorities may ask teachers to teach note-taking strategies to the

students interested in the task

4) Via developing and distributing written educational materials dealing with note-taking strategies, material developers may cause the students to improve their study habits.
5) In the meantime, as Bakunas & Holley (2001), Meyer (2002), Ornstein (1994) and Roueche (1995) mentioned, we also recommend policy-makers to include note-taking strategy instruction in the curriculum.

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APPENDIX A
Questionnaire used to collect data

Dear professors/ students,

This questionnaire has been developed to conduct a research concerning note-taking. Anonymously (not writing your name), please kindly read each of its items very carefully and mark only one of the ranks honestly.

No	Items	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Taking notes, while studying, causes academic achievement.					
2	Taking notes from the important points causes academic achievement.					
3	Taking notes, while teacher is teaching, causes academic achievement.					
4	Comparing our class notes with the course contents causes academic achievement.					
5	Taking notes, using a specific method, causes academic achievement.					
6	Using abbreviations, while taking notes, causes academic achievement.					
7	In taking notes, separating the main points from the peripheral ones, causes academic achievement.					
8	Asking questions, while taking notes, increases academic achievement.					
9	Underlining the important points of notes causes academic achievement.					

10	Summarizing the concepts of the notes increases academic achievement.	
11	Revising the course notes does NOT result in academic achievement.	
12	Reviewing the class notes does NOT help academic achievement.	
13	Writing the class notes expressively does NOT affect academic achievement.	
14	The legibility of course notes is NOT necessary for academic achievement.	
15	Being expert/ skilled in note-taking does NOT affect desirably academic achievement.	
16	There is NO relationship between organizing notes and academic achievement.	
17	Taking notes and writing them on the white margin of the pages of book does NOT affect academic achievement.	
18	There is NO relationship between adapting note-taking methods to different courses and academic achievement.	
19	Creating enough space between notes does NOT affect academic achievement.	
20	Comparing one's own notes with those of the classmates has NO effect on academic achievement	

APPENDIX B

The Relationship Between the Score of Each Item of the Attitude Questionnaire and its Total Score

Item	r	p
1	0.487	0.000**
2	0.427	0.000**
3	0.432	0.000**
4	0.525	0.000**
5	0.494	0.000**
6	0.484	0.000**
7	0.392	0.000**
8	0.403	0.000**
9	0.369	0.000**
10	0.358	0.000**
11	0.494	0.000**
12	0.431	0.000**
13	0.543	0.000**
14	0.510	0.000**
15	0.519	0.000**
16	0.584	0.000**
17	0.526	0.000**
18	0.512	0.000**
19	0.367	0.000**
20	0.500	0.000**

N=191

**P<0.01

APPENDIX C
One-Sample Kolmogorov-Smirnov Test

		posttest
N		60
Normal Parametersa,b	Mean	13.8042
	Std. Deviation	3.37491
Most Extreme Differences	Absolute	.123
	Positive	.065
	Negative	-.123
Kolmogorov-Smirnov Z		.954
Asymp. Sig. (2-tailed)		.323

a. Test distribution is Normal
b. Calculated from data