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Note-taking Strategies and Academic Achievement

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Abstract

The purpose of the present article is two fold. That is, revealing the significance, underlying theory and findings concerning note-taking in the literature related and exploring, through a survey study, the Iranian professors' and students' attitudes towards the effect of teaching note-taking strategies on the students' academic achievement. To this end, many previous studies were reviewed and we knew that many scholars, conducting empirical studies, surveys and interviews, have highlighted the important function note-taking strategies play in the life of those who, in one way or another, deal with teaching or learning. Moreover, the data collected via questionnaires were fed into SPSS software to be analyzed using t-test. The results showed that the respondents including professors and students whether male or female have had high positive attitudes towards the effect of note-taking strategy instruction on the students' learning.

Keywords: Note-taking Strategies, Academic Achievement, Cognition, Metacognition

1. Introduction

Not-taking implies comprehending either a writing document or a lecture and recording information by writing it down (Piolat, Annie, Olive, Thierry & Kellogg, Ronald T., 2005).Due to its significance for different groups dealing with learning, teaching and researching, research on note-taking has both theoretically and practically generated debates since C.C. Crawford began his studies in 1920s. Initially the 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 as materials for review (Ladas, 1980). However, the end has not come yet and the researchers have always recommended further studies hoping to reveal more benefits of note-taking.

To further investigate the theme the present article aims to analyze the related literature focusing on the significance of note-taking, the theory underlying it and the results obtained by previous studies, on the one hand, and measuring the attitudes of the Iranian professors and students concerning the effect of note-taking strategy instruction on the academic achievement, on the other hand.

According to Castello and Monereo (2005) not-taking is the hegemonic study activity at university and, in many cases, the main ground for education interaction between teacher and students. This observation has given rise to an increasing interest in studying students' note-taking and its impact on learning. In broad terms, three lines of research have been developed in the last 40 years: the effects of note-taking and note-rewriting on some cognitive variable (attention, memory, comprehension, and so on); the relationship between quality of notes and significance of learning ; and the changes in the teaching methodology which may enhance note-taking.

1.1. Research questions

1) How is note-taking significant?
2) What is/are theory/theories underlying it?
3) What are the results of some previous studies concerning note-taking?
4) Do note-taking strategies positively affect academic achievement from respondents' point of view?
5) Is there any difference between the males' and females' attitude towards the theme?
6) Do the professors' and students' view the topic differently?

1.2. The significance o f the study

Note-taking is something sine qua non (quite essential) for all those who deal with study as food, water and air are for humans' lives. The necessity of conducting such a study originates from the uses, advantages and importance of note-taking for those who, in one way or another, deal with learning, teaching and researching.

People take notes to study for examinations, to prepare a technical talk and to record the minutes of work meetings. All note taking entails recording information collected from one or more sources. Such a record constitutes a stable external memory that is intended to help to plan future activities, to learn, to think or to create. Thus, it is important to understand this common activity for both theoretical and practical reasons (Piolat et al, 2005).

Note taking is recognized as a critical activity which enhances learning in learning contexts. Notes are essential for recalling what has been heard or seen, and can promote reflection after wards (Nguyen, 2006).

Two potential benefits of Note-taking are encoding and artifact. The encoding hypothesis is the idea that the act of Note-taking facilitates learning. Note-taking requires students to identify important material, which they then transcribe into their own notes. This increases processing of the material, augmenting learning. The external artifact hypothesis states that having notes for review facilitates learning: notes aid students most when they can be reviewed (Baur & Koedinger, 2004).

According to Ward and Tatsukawa (2003) note-taking has two functions. First, the notes produced are useful when reviewing. Second, the process of note-taking itself helps students learn the material. This is usually explained in terms of encoding: the student's mind receives some inputs from the instructor, both verbal and written on the blackboard, and the task is to assimilate them. In the process of taking notes, the student has to re-express those inputs, and while doing so, it is claimed, the ideas get mentally rehearsed and integrated at a deeper level, or even re-encoded mentally in a form that is easier for him to think about, apply, and remember.

According to Allen and Reeson (2008) note taking is one of the strategies students can cultivate to increase academic achievement. As students encounter unfamiliar text, they are equipped with the means to extract the most important information while staying engaged with the text.

Documenting some previous studies, (i.e., Rowntree, 1976:112; kesselman-Turkel and Peterson, 1982:2-6) *Department of Lifelong Learning: study skills series* (2009), provides a few reasons why note taking is an important activity: taking notes will help you to 1)extend your attention span, 2) keep you focused on your subject area and the task at hand, 3) remember what you have heard or read, 4) make you an active learner and 5) organize the ideas you are learning about. The notes you produce are your own work and are a visible reminder of the effort you have put into the course. This in itself can be a motivational factor for your study! Note taking helps you to organize the ideas you are learning about.

Learning Assistance Center (2009) has offered the following six reasons why note-taking is important.

- Professors share information not available in textbooks, and they make connections.

Notes are a storehouse of information for later use, e.g., when you take more advanced courses.

We remember more when we write things down.

Taking notes helps you to listen attentively and to think critically.

Note-taking is a skill required in many jobs.

Studies show that people may forget 50% of a lecture within 24 hours, 80% in two weeks, and 95% within one month if they do not take notes.

In the same vein Cottrell (1999) has provided the following list of reasons which imply why the researchers should bother themselves to deal with note-taking.

A. useful record

1. of important points for lecture use
2. of where the information comes from

B. helps writing

1. Helps ideas flow.
2. Helps planning—you can see what information you have.
3. Assists organization – you can rearrange and remember notes in a different order.
4. Helps you get started.

C. Helps understanding

1. If you focus on selecting information to note.
2. If you think through where everything fits.

D. Helps memory

1. Summing things up briefly helps long-term memory.
2. The act of writing helps motor memory.
3. Pattern notes can be more memorable visually.

Investigating the encoding effect of note-taking is important at least in two ways (Kobayashi, 2005). First, note-taking is generally considered as an effective learning strategy. To support this idea, Kobayashi refers to a study (Van Meter, Yokoi, and Pressley, 1994) according to which college students shared beliefs that the act of taking notes facilitates attending to lecture, comprehension of the material to be learned and the subsequent recall. Second, note-taking is one of the commonest study activities in school settings.

The proponents of the encoding hypothesis (e.g., Enstein, Morris, and Smith, 1985; Peper & Mayer, 1978, 1986) claim that note-taking increases learning by stimulating note-takers to

actively process the material and to relate it to their present knowledge.

Note-taking is significant for the students with learning disabilities. First it allows for active engagement during lectures. Reviewing some previous studies (Di Vesta and Gray 1972; Peper and Mayer1986; Ruhl and Suristky 1995), Weishaar and Boyle (1999) report that students with learning disabilities are often "passive" learners and taking notes actively engages the student in the learning process, thus improving comprehension. Second, note taking encourages clarification of confusing information and aids encoding during long-term storage. Third, there is a positive correlation between the amount of notes taken and test scores, that is, comprehension.

White (1996) implicitly signifies such a study by referring to three hypotheses concerning the effects of note-taking on learning. Firstly, the view that the process of recording notes facilitates learning is known as the encoding hypothesis. According to this view note-taking itself is seen as effective independent of review since it increases attention and helps with the encoding of material. The second view is that notes serve principally as a means of recording information for later review. This is known as the external storage hypothesis and emphasizes the product functions of note-taking. In this view, it is the review of notes stored in a written form which facilitates performance. Several researchers comparing the process and product functions of note-taking have concluded that the product function has the larger effect on achievement (Kiewra 1987). The third hypothesis, the generative hypothesis, put forward by Peper and Mayer (1978) states that note-taking facilitates the selection of important information. Note-taking is viewed as a generative activity that encourages students to build connections between what is presented and what they know.

2. Literature review

2.1. Theoretical bases

The underlying bases of the study are cognitive (i.e., repetition, grouping, note-taking, key words, imagery…) and metacognitive (i.e., self-management, advance preparation, self-monitoring, self-evaluation, self-reinforcement, general preview …) theories (Doughty and Long, 2003; Ellis, 1994; Larsen-Freeman and Long, 1991).

Although a large body of studies had investigated the different techniques that note takers use and their effectiveness, surprisingly few have focused on the cognitive processes underlying note-taking. As a complex activity, note-taking requires comprehension and selection of information and written production processes. The time urgency of selecting key points and recording them while comprehending new information at the same time places

significant demands on the central executive and other components of working memory (Piolat et al, 2005).

> For cognitive psychologists, it is important to study the mental operations that underlie note taking in addition to studying the product itself.… A cognitive analysis is even more critical to understanding when it is recognized that note taking cannot be equated to simply copying what is heard, observed or thought. On the contrary, in a large majority of cases, note taking implies comprehension and written production. Note takers, as readers, must comprehend information and, as learners, try to store information in long-term memory by writing it down. As writers, note takers must select the information to record and format it in ways that differs from the source material. ... Accordingly, the goal of a cognitive analysis is to specify the processes, knowledge, and working memory resources that note takers activate when they produce this unique kind of written product (Ibid).

Second language acquisition has been viewed as a complex cognitive skill. Studies suggest that language learners employ certain ways to learn a language and are capable of becoming aware of their mental processes, which are their metacognitive knowledge (Imtiaz, 2004). Flavel (1979; quoted in Goh, 1997:362), who invented the term 'metacognition', defines metacognitive knowledge as "consisting primarily of understanding or perception of the ways in which different factors act and interact to affect the course and outcome of cognitive enterprise".

How do cognitivists account for the learning of language? The answer to this question lies in the reviewing of three approaches: the *perceptual saliency* approach, *connectionism* and *information processing* approach.

Slobin (1985) argues that the similarity in linguistic development across children and across languages is due to the fact that human beings are programmed to perceive and organize information in certain ways. It is this perceptual saliency which drives the learning process rather than an innate language-specific module.

A distinctive feature of connectionism or parallel distributed processing models (PDP) resides in the links it attempts to build with neurology and even neurobiology. Connectionists believe that we have to study learning within the actual architecture of the brain, and make use of neurological information (Mitchell and Myles, 1998: 78-84).

The main characteristics of Mclaughlin's *information processing model* are as follows:

1. Humans are viewed as autonomous and active.
2. Mind is a general-purpose, symbolic-processing system.
3. Complex behavior is composed of simpler processes. These processes are modular.
4. Component processes can be isolated and studied independently of other processes.
5. Processes take time; therefore, prediction about reaction time can be made.
6. The mind is a limited-capacity processor.

When applied to second language learning, this approach can be summarized as follows:

> Within this framework, second language learning is viewed as the acquisition of a complex cognitive skill. To learn a second language is to learn a *skill*, because various aspects of the *task* must be practiced and integrated into fluent performance. This requires the automatization of component sub-skills. Learning is a *cognitive* process, because it is thought to involve internal representations which regulate and guide performance. … As performance improves, there is constant restructuring as learners simplify, unify and gain increasing control over their internal representations (Karmiloff-Smith,1986a).These notions—automatization and restructuring – are central to cognitive theory (Mclaughlin, 1987: 133-4; quoted in Mitchell and Myles, 1998).

According to Ellis (1994: 37) some strategies learners use are *cognitive* (for example, relating new concepts to other information in memory), some other are *metacognitive* (for example, organizing a time table to facilitate effective study of L2).

Theoretically, we would know whether instruction is successful and we will explore the relationship between (linguistic) environment and the learner's internal processing mechanism. Formal instruction directed at cognitive goals is concerned with attempts to train learners to use effective learning strategies. This allows us to address the question: Does learner's training enhance learner's ability to learn from formal instruction? A theoretical position concerning the role of formal instruction is 'the selective attention hypothesis' according to which formal instruction acts as an aid to acquisition (Ibid, p. 656).

Metacognitive is a term used in information processing theory to indicate an "executive" function, strategies that involve planning for learning, thinking about the learning process as it is taking place, monitoring of one's production or comprehension, and evaluating learning after an activity is completed (Purpura, 1997; cited in Brown, 2000).

One type of metacognitive knowledge is *strategy* (knowledge regarding the strategies

which are likely to be effective in achieving goals and undertaking tasks) (Flavell 1979 cited in Cotterall and Murray, 2009). Wenden (2001) claims that metacognitive knowledge is essential for successful learning because students' understanding of themselves, the task they engage in and the strategies available to them directly impact on all their decisions about learning. Zimmerman (1986) notes that as metacognitively active participants in their own learning, "self-regulated learners are persons who plan, organize, self-instruct, self-monitor and self-evaluate at various stages of learning process".

Based on the literature (Atkinson and Shiffrin, 1968; Rafoth, et al, 1993; Sweller and Chandler, 1991; Katayama and Robinson, 2000) being reviewed by Lee et al. (2008) information is processed in short-term memory, which is limited in the amount of information it can process. When the short-term memory is overloaded, some materials are lost from short-term memory. Therefore, one way to help students jot down more information in their notes is to lessen their cognitive load, thereby allowing students more cognitive space to process lecture information. A primary obstacle of note-taking is the amount of cognitive overload experienced by student.

Making mnemonic and nonmnemonic notations by the children is another evidence for the relationship between cognition and note-taking. In other words**,** cognition underlies notations. One explanation for why children make nonmnemonic notations is age-related change. Children producing more functional notations may be more cognitively advanced, perhaps having more advanced symbolic understanding, but nonmnemonic note takers might not understand how to use notations to aid their memory and … might not understand that their nonmnemonic notations are not useful. Functional note takers tend to be older children than those who make nonmnemonic notes (Bialystock & Codd, 1996; Eskritt & Lee, 2002; Eskritt & Mcleod, 2008).

In a review on note-taking from lectures, Armbruster (2000 cited in Stefannou, Hoffman &Vielee, 2008) suggested that the more generative that the note-taking activity is, the more that learning is likely to occur. However, she further acknowledged that the act of note-taking is itself a cognitively complex activity: "Generative processing while taking notes is especially difficult because the task is so cognitively demanding. Students must listen to the lecture, select important ideas, hold and manipulate these ideas in working memory, interpret the information, decide what to record, and then write it down").

One type of cognitive strategy, note taking, is not generally considered to be as central to language learning as, say, inferencing, translation or association, but has been found to be among the most frequent cognitive strategies used by language learners. For example, in a study

of high school ESL students carried out by O'Malley, Chamot, Stewner-Manzanares, Kupper and Russo (1985 cited in White, 1996), repetition and note-taking were the cognitive strategies used most often by ESL learners.

Wenden (2001, 1998, 1996, cited in Cotterall and Murray, 2009) claims that metacognitivite knowledge is essential for successful learning because students' understanding of themselves, the task they engage in and the strategies available to them directly impact all their decisions about learning. She goes on to argue that metacognition consists of a knowledge element and a strategic element. She defines the latter as "general skills through which learners manage, direct, regulate, sic [and] guide their learning, i.e., planning, monitoring and evaluating".

Wang et al. (2009), reviewing some other studies (i.e., Marzano et al., 1998; Paris and Winograd, 1990; Paris et al., 1991; Paris et al., 1985), introduced several virtues of metacognition : it focuses on the role of awareness and executive management of thinking, and helps learners become active participants in the learning process, instead of passive recipients of instruction and imposed experiences. It emphasizes personal appraisal and management, oriented towards cognitive development and learning; and is embedded in cognitive development, functioning as both product and producer. It is amenable to classroom instruction with teachers encouraging metacognitive dialogues and promoting self-appraisal and self-management skills. A further virtue is that self-appraisal and self-management invite both cognitive and motivational explanations as “skill and will” are interwoven in reflections and anticipations about learning.

Referring to some previous studies (i.e., O'Maley and Chamot, 1990; Dirkes, 1985**;** Cohen, 1998; Hedge, 2000; Wenden, 1991; Williams and Burden, 1997; Ridlley et al., 1992; Garham, 1997), Wang et al. (2009) provide us with valuable pieces of information about metacognitive strategies. They are executive skills that evaluate the success of a learning activity. The basic metacognitive strategies include connecting new information to old, selecting deliberate thinking strategies, planning, monitoring, and evaluating thinking process. The emphasis is on reflection on learning processes and learning to learn, leading to enhanced self-direction and learner autonomy in language learning. Through the skill of planning, monitoring and evaluating, learners manage, direct, regulate and guide their learning. Metacognitive strategies are sequential processes to control cognitive activities and to ensure that a cognitive goal is achieved. They help to regulate and oversee learning activities, such as taking conscious control of learning, planning and selecting strategies, monitoring the process of learning, correcting errors, analyzing the effectiveness of learning strategies, and changing learning behaviors and

strategies when necessary. … metacognitive strategies that allow students to plan, control and evaluate their learning have the most central role to play in improvement of learning and that students without metacognitive approaches are essentially learners without direction.

2.2. The results of previous studies

Concerning the theme many studies have been conducted with the interesting results:

In 1925, Crawford published a study which sought to verify his observation that there is a positive correlation between analyses of college students' lecture notes and their grades on subsequent quizzes. He concluded that taking notes was better than not taking notes, that reviewing notes was a key to their impact, and that organizing notes effectively contributes to improved performance on tests.

Crawford (1925b cited in DI Vesta and Gray, 1973) also concluded that a careful analysis of all the facts seems to justify the conclusion that the immediate value of notes is less than the delayed-review value. This immediate value is of sufficient importance, however, to justify the practice of taking notes, even if there is no opportunity to use them later.

On the same line, having reviewed some previous studies (i.e., Di Vesta & Gray, 1973; Monereo & Perez, 1996; Shambaug, 1994; Stahl, Henk, 1991), 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; these studies were initially aimed at distinguishing whether note-taking improved encoding or storage of information.

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. From this perspective, a clear distinction between note-taking procedures was established, identifying those allowing only for information repetition, others facilitating its elaboration, and those enhancing comprehension and restructuring of the content to be noted down.

More recently, the interest of research has shifted to what really happens in the classrooms when teachers aim at prompting certain note-taking forms. Apart from showing the adequacy of some didactic strategies such as expository patterns or "note-taking tips" these studies have highlighted the importance of teachers' and students' conceptions about note-taking, that is, the sense and functions they attach to notes.

These studies have also paid attention to the consideration of notes as a symbolic mediator

between the content taught by the teacher and the knowledge constructed by students in their minds. Castello and Monroe's article deals with such an approach: firstly, clarifying the significance of notes as a tool to transform knowledge (epistemic note-taking); and secondly, presenting some results of a research and educational innovation project aimed at studying the changes in conditions of instructional context that may promote notes becoming real tools for conceptual change.

According to Stahl et al (1991) lecture note-taking influences the academic success of high school and college students. As Spires and Stone (1989) point out, students will "increasingly have to depend on their ability to take notes in order to be successful in the classroom".

Lecture learning is prominent in college classrooms. Armbruster (2000) reported that college students usually spend about %80 of class time listening to lectures. If lecturing is the instructor's sacred cow, then lecture note-taking is the students' "pet calf".

On the same stock Kiewra and Benton (1988) have been studying the relationship between lecture note-taking behaviors and academic ability by using more global measures of ability, such as GPA and predictive achievement test scores. In addition, they have considered a) scores on an information processing ability test, b) analyses of notes taken during designated lecture, c) scores on a test based on a lecture, and scores on a course exam covering several lectures. They concluded that the "amount of note-taking is related to academic achievement" and the ability to hold and manipulate propositional knowledge in working memory is related to the number of words, complex propositions, and main ideas recorded in notes.

Similarly, there is general consensus among American college students and professors alike that taking notes on lecture information assists in the process of learning and retaining the information (Dunkel & Davy, 1989).They also continue to add that taking notes while listening to a lecture is a time-honored tradition in academic context. … 92% of the international students and 94% of the American surveyed (N=164) through a questionnaire on the value and practice of taking notes expressed the view that note taking is an important activity that assists in the process of learning and retaining the materials.

Concerning taking notes in lectures, in a study Dunkel and Davy (1989) came to the conclusion that understanding the views of students on note taking in lecture, and the considerable variation in how they conceptualize lectures, provides many insights into this component of academic literacy and, they would argue, is a necessary adjunct to other kinds of research in this area.

In the same vein, most commentators (Hartley and Davies, 1978; Kiewra, 1987 cited in Badger et al., 2001) suggest that the aim of taking note is to recall as much as possible of the

lecture. Taking note may help achieve this aim because the process of taking note aids the concentration in the lectures or because the product of note taking facilitates some kind of review process.

Referring to many studies (Baker and Lombardi, 1985; Boyle, 1996; Boyle and Weishaar, 2001; Divesta and Gray, 1972; fisher and Harris, 1972; Hale, 1993; Hartley, 1993; kiewra, 1985, 1989; Shager and Mayer, 1989; Suritsky and Hughes, 1996; Thomas, 1993), Lee et al (2008) have taken note-taking into accounts as effective strategies to improve students' learning.

A little change in the angle of our vision leads us to the importance of reviewing of notes. In a report on their study which allowed students to review their notes immediately before a test, Carter and Van Matre (1975) argued that the benefit of note-taking appeared to be derived from the review rather than from the act of note-taking itself. An interesting study by Kiewra (1985) also endorsed the value of review, but not of student note.

Experimental results confirm that achievement is usually higher when notes are reviewed. Note-taking may therefore primarily serve as an external storage function because its main value is not the activity of recording notes but the product that is externally stored and reviewed. This external storage function suggests that note-taking is important mainly as the source of a written document which can be referred to when reviewing for tests (Kiewra and Frank 1988 cited in Mee 1991).

Furthermore, Norton (1981 cited in Boon 1989 cited in Mee 1991) stated that rereading or rewriting notes seemed equally beneficial and most of the successful test performers were those who took full notes, had positive attitude towards note-taking and reviewed their notes.

Moreover, Kiewra et al. (1995) investigated how different note-taking formats in combination with review activities affect recall and relational learning. During the 19-min lecture, participants either took notes in their conventional manner, on an outline framework, or on a matrix framework. Following the lecture, approximately half of participants in each note-taking group prepared for performance tests by using their notes to write a comparative essay about the lecture topics. The others reviewed notes in their standard manner. Results indicated that essay writing was less effective than standard review practice for relational learning and that note-taking on an outline increased test performance beyond other note formats. Performance differences might have resulted from quantitative differences in note-taking favoring outline note-takers.

Additionaly, conducting a study, Kiewra (1985) concluded that listening to a lecture and subsequently reviewing the instructor's notes prior to a delayed exam leads to relatively higher achievement than does the traditional method of taking and reviewing personal lecture notes.

According to Slotte and Lonka (1999) reviewing the notes during essay-writing generally resulted in good performance in an exam calling for deep-level text comprehension. However, this review effect was mainly limited to detailed learning instead of making one's own inferences.

Hartley (1983 cited in Kobayashi, 2005) gathered 57 note-taking studies and found that 34 studies favored the positive effect of note-taking, 19 studies yielded non significant results, and 4 studies revealed the negative effect. He concluded from this result of vote-counting that note-taking enhances learning in certain conditions.

In the experiments conducted by Di Vesta and Gray (1972, 1973 cited in Rickard and Friedman, 1978) it was found that a group which took notes (notes take condition) was invariably superior in passage recall to a group which did not take notes (no notes condition), thereby providing support for encoding hypothesis. However, these researchers did not find any support for the external storage hypothesis, since no advantage over a note-taking group was found for a group which took notes and also reviewed them (note have condition).

Foos et al.(1994), conducting two experiments on 260 university students, investigated the effect of self-generated materials and came to the conclusion that the students keep the self-generated materials in mind more than those generated by the others.

Similarly, Dembo (1994; cited in Seif 1380/2001) finds notes useful if they are accompanied by the reader’s own explanation and interpretations. He called these types of notes note-making and he has said "take brief notes in your own words so that the main points be included, organized and meaningful to you".

The results of a study conducted by Peverly and Brobst (2003) indicated that note taking and background knowledge were generally better predictors of test performance than self-regulation. Results imply that test performance is more related to note taking and background knowledge than to self-regulation.

Strategically, note-taking is generally considered as an effective learning tool. 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.

Another strategy is concept mapping, a tool for representing the interrelationships among concepts in an integrated, hierarchical manner. In other words, it is a strategy via which we can organize our notes. Conducting a study on the influence of concept mapping on achievement, self-regulation and self-efficacy in ESL students, Chularut and DeBacker's (2004) findings

clearly demonstrate that concept mapping can benefit ESL students across a range of levels of English proficiency, including those who were most advanced in English acquisition. This has important implications for both students and educators. Students may optimize their learning by adopting concept mapping as a learning strategy. Because concept mapping is a student-directed strategy that dose not rely on teacher involvement or other formal or complex technological support, it is easily adopted by users. Furthermore, concept mapping is flexible enough to be useful in variety of learning setting. Educators may enhance the achievement as well as the self-efficacy of their ESL students by familiarizing them with the concept mapping strategy.

Some others have geared their attention towards the quality of notes. Research on the qualitative dimension, based on the note completeness indicates that the number of idea units in lecture notes is positively related to test performance (kiewra et al., 1995). Benton et al. (1993) also presented data consistent with the conclusion that the length of lecture notes was 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. Referring to Kinsch (1994), they continue to argue that writing more extensive summaries would improve the quality of deep-level mental representations. The results they have obtained clearly show that the process of recording notes is related to text comprehension even without any instruction on how to produce the notes. In particular, they found that spontaneous note-taking is effective when deep-level understanding and one's own references are called for. The fact that the review and process effects of note-taking are different, depending on the nature of the task, poses challenge to instructional designers. First, students should be made aware that various note-taking strategies exist. This requires developing met cognitive knowledge about when and under what conditions a particular type of note-taking activity is more effective. Further, the learning situations should be such that rote learning would not be reasonable.

According to Slotte and Lonka (1999) results pertaining to note quality indicated that the participants who summarized the content of the text resulted in better performance in all tasks in comparison with those who produced notes following the text order or verbatim notes. The amount of note-taking was also positively related to text comprehension. They also state that in spontaneous note-taking summarizing and using other methods which require the elaboration from words to meaning units in one's own words lead to a deeper-level mental representation than copying, verbatim notes, or underlining text. Quoting from other studies (e.g., Robinson and Kiewera, 1995: Robinson & Schraw, 1994: Kiewra et al., 1995), where note quality has

been examined, Slotte and Lonka (1999) state that dimensional formats have improved learning from text, whereas conventional notes, taken in the students' ordinary way, have generally resulted in poorer performance.

Referring to Lahtinen et al (12997), Slotte and Lonka (1999) argue that the results of their study have important theoretical and pedagogical implications, since their study has shown that the quality of spontaneous used learning activities determines the quality of mental representation formed of the materials to be learned.

The research findings on whether note-taking promotes encoding have been mixed. Hult et al. (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. Their conclusions were dramatically different from those of Barnett et al. (1981), who found "strong support" for the encoding function of note-taking but not for the value of using notes to review material (Beecher, 1988).

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.

Acording to Kiewra (1985), theoretically, note taking can serve two functions. The encoding function of note taking suggests that the process of recording notes during lectures causes higher achievement than does simply listening when notes are not reviewed. The external-storage function suggests that notes are facilitative because they are reviewed. Thus, it is the product of the note taking activity which accounts for higher achievement among learners who review their notes versus learners who do not review their notes.

According to Kobayashi (2005) the proponent of the encoding hypothesis (e.g., Bretzing and Kulhavy , 1979, Di Vesta and Gray , 1972, Einstein et al , 1985 , Peper and Mayer , 1979 and Peper and 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 .

A number of studies have been conducted over the last 30 years that examine the effect of notetaking training on achievement. It is widely accepted by educators that notetaking is a valuable tool that can help increase the retention of information (Carrier & Titus, 1981, p. 385, cited in Meyer, 2002).

Some experimental studies 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**,** a study by Bretzing et al (1987) involved 15 minute training sessions before the testing and provided only general note-taking tips.

Bertzing, Kulhavy and Caterino (1987) and Peck and Hannafin (1983) conducted similar research to gain insight into this issue. In all of these studies, one or more experimental groups received special note-taking training, while one or more groups received no formal training. The results of Peck and Hannafin's study showed that the uninstructed note takers actually performed better on all three tests. Peck and Hannafin suggested that the results were a product of an "interference effect" in which the process of note-taking itself interfered with the retention of information.

In, practically, all college and high school classrooms, students take note while attending lecture presentations. Although students fill volumes of notebooks throughout their academic careers, few students are ever taught or advised about note-taking and review. In fact, Palmatier and Bennet (1974 cited in Kiewra, 1987) surveyed 233 University of Georgia students and found that although 99% of them took lecture notes, only 17% of those students had received limited formal instruction in note-taking. Such limited training is perhaps a reflection of insufficient teacher preparation in study skills such as note-taking. For example, only two of 29 educational psychology textbooks reviewed by Ladas (1980 cited in kiewra, 1987) even mentioned the topic of note-taking.

Boyle and Weishaar (2001) in their study of high school students with disabilities concluded that improved note-taking skills contribute to increasing students' comprehension, short-term and long-term recall. They extended the academic note-taking training in their study from 15 minutes to 50 minute sessions. Instructed students scored significantly higher on measures of immediate recall, long-term recall and comprehension, and number of words recorded. It is reasonable to assume that if speed note-taking is incorporated into academic note-taking and a sufficient practicing and reinforcement is provided, it will increase the number of words recorded which will have a significant impact on comprehension, immediate and long-term recall.

Since note-taking is a crucial skill, many educators (Ornstein, 1994, Eidson, 1984, Bakunas and Holley, 2001, Spires and Stone, 1989 & Kiewra, 1987, Meyer, 2002) believe that it should be explicitly taught in school According to Ornstein (1994, cited in Meyer, 2002) note-taking should be part of the curriculum. He argues that:

> Able students usually learn [note-taking] skills on their own as a

> byproduct of cognition. However, many students do not learn these skills, or learn them too late, simply because they were not explicitly taught them (p. 58).

Ornstein (1994) believes that all students would benefit if teachers deliberately trained their students in note-taking techniques, especially the lower-achieving students. On the same stock 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. Teachers should model the desired result, and students should have the opportunity to practice and receive feedback. The teacher should not simply assume that the students know how to take good notes. Some educators believe that teaching general note-taking skills is not sufficient. Instead, they argue that teachers should provide training in a specific method or strategy of note-taking. Stahl et al. (1991) state that the Cornell Method, the Unified Note-taking System, and the Split Page Method are all effective, "time-honored tactics" (p. 615). Spires and Stone (1989) and Bakunas and Holley (2001) specifically recommend the Split Page Method. Eidson (1984), however, believes that general note-taking procedures may be more effective than specific methods because they take individual student differences into account (p. 267).

3. Summary

We may summarize what we have been dealing with up to this point. in three phases: the significance of note-taking, its theoretical bases and the ways it has been approached by the scholars.

3.1. Significance

Note-taking

(1) affects cognitive variables;
(2) acts as an external memory;
(3) causes the learners to learn, think and create;
(4) serves as an artifact;
(5) causes meaning to be encoded;
(6) is useful for review;
(7) extends attention span;
(8) causes the learner to focus on the subject;
(9) helps remembering;

(10) makes the learner active including those with learning disabilities;

(11) causes the learner to organize ideas;

(12) helps writing, understanding and memory;

(13) facilitates attending to lecture, comprehending material and recall;

(14) increases learning via actively processing the material and relating it to previous knowledge;

(15) facilitates learning through its process of recording;

(16) is used for later review as an external storage; and

(17) facilitates the selection of important points.

3.2. Theoretical bases

Note-taking is deeply rooted in cognition and metacognition. Note-takers store information in their long-term memory by writing it down. Learning is a cognitive process which, as internal representations, regulates and guides performance. Mnemonic and nonmnemonic notations by children provide evidence to argue that cognition underlies notations. The children producing more functional notations may be more cognitively advanced (Bialystock & codd, 1996; Eskritt & Lee, 2002; Eskritt & Mcleod, 2008).

Note-taking is cognitively demanding. Note-takers must listen to lectures or read texts, select important ideas, hold and manipulate these ideas in working memory, interpret the information, decide what to record and then write it down (Armbruster, 2000; Stefannou, Hoffman & Vielee, 2000).

Metacognive knowledge is essential for successful learning, because students' understanding of themselves, the task they engage in and the strategies available to them directly impact on their decisions about learning (Wenden, 2001). As metacognitively active participants in their own learning, "self-regulated learners plan, organize, self-instruct, self-monitor and self-evaluate at various stages of learning process" (Zimmerman, 1986).

3.3. Approaches to note-taking

As our review shows different educators, commentators and researchers have focused on note-taking form different angles of vision. There are some educators (Kobayashi, 2005; Badger,2001; Foos et al., 1994; Dunkel and Davy, 1989; Kiewra and Benton, 1988; DI Vesta and Gray, 1973 quoting from Crawford, 1925b) who believe that *lecture notes* positively affect recall, the process of learning and retaining the information, academic success and higher

grades.

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 et al (2008) have taken note-taking into accounts as effective strategies to improve students' learning. 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. Stahl et al. (1991) state that the Cornell Method, the Unified Notetaking System, and the Split Page Method are all effective, "time-honored tactics" (p. 615). Spires and Stone (1989) and Bakunas and Holley (2001) specifically recommend the Split Page Method.

Some commentators have emphasized the function of *reviewing* notes (Carter and Van Matre, 1975; Kiewra, 1985; Mee, 1991; Kiewra, 1985, Slotte and Lonka, 1999).

Researchers have not ignored the effect of *combining* note-taking with another skill on the students' performance. Peverly and Brobst (2003), for example, indicated that note taking and background knowledge were generally better predictors of test performance than self-regulation. Moreover, Kiewra et al. (1995) investigated how different note-taking formats in combination with review activities affect recall and relational learning.

Some others have geared their attention towards the *quality* of notes. Research on the qualitative dimension, based on the note completeness, indicates that the number of idea units in lecture notes is positively related to test performance (kiewra et al., 1995). Benton et al. (1993) also presented data consistent with the conclusion that the length of lecture notes was 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 contribute to increasing students' comprehension, short-term and long-term recall.

In some 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.

Some other educators have come to the conclusion that note-taking strategies should be *taught*. According to Meyer (2002), being a crucial skill, 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.

4. Method

4.1. Participants

The population, including instructors and students, numbered 400. The instructors, both male and female, were teaching in Bu-Ali-Sina (Avecena) University, Islamic Azad University and 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 were not so proficient in English. Their age ranged from 18 to 24 years old and they majored in different academic disciplines including 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 and 121 were female.

4.2. Instrument

The instrument has been a questionnaire containing 20 closed-ended items (see appendix A). The choice of such a tool was theoretically motivated. That is to say, we had two purposes in mind: 1) to ensure that all subjects would have the same frame of reference in responding and 2) to code the responses directly as data and feed it/them into SPSS software for analysis.

4.3. Piloting the questionnaire

The administration of the questionnaire did not take more than 20 minutes on the part of the respondents. Moreover, being written in the Persian language, its instruction as well as it items were easily and clearly understood by the respondents. Hence, the practicality of this instrument was not questioned.

To be sure about the validity of the questionnaire it was given to some scholars to see whether it suits the purpose of the study or not. Endorsing the questionnaire, they approved it.

To estimate the reliability of the questionnaire, it was first administered to 30 participants, that is, 5 professors and 25 students in the English department of Islamic Azad University Hamedan Branch, Iran. These participants had dealt with study skills to some extent and/or in one way or another. 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.

Table 1 (appendix B) also reveals the homogeneity among all the items of the questionnaire. The result of Pearson's correlation coefficient shows 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, that is, the attitude about the effectiveness of note-taking strategies on the students' academic achievement.

4.4. Procedures used

The piloted questionnaire was randomly distributed among 193 respondents including 21 professors and 172 students. Totally 71 respondents were male and 120 were female (one case was extreme and one case was outlier).

The collected data were fed into SPPS software to be analyzed using one-sample t-test and t-test for independent groups. The findings are reported as follows.

5. Findings

Table 2: Respondents' attitude towards the effect of note-taking strategies on the academic achievement

Variable	N	M	S	df	t	p
Attitude	191	79.40	8.08	190	33.167	0.000

$P<0.01$

The results of one-sample t-test in table 2 show that there is a meaningful difference between the mean (79.40) of the respondents' attitude concerning the effect of note-taking strategies on academic achievement and that (60) of the attitude questionnaire. Hence, we can say that, from the respondents' point of view, note-taking strategies have positive effect on academic

achievement. 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 3: Comparing males' and females' attitude towards the effect of note-taking strategies on academic achievement

Sex	N	M	SD	df	t	p
Male	71	78.36	9.27	120.802	-1.285	0.201
Female	120	80.02	7.27			

N= 191, P<0.05

The results of t-test (table 3) for independent groups show that a meaningful difference is **not** observed between the males' and females' attitude towards the effect of note-taking strategies on the students' academic achievement [$t_{(120.802)}$= -1.285, N.S.].

Table 4: Comparing the professors' and students' attitude concerning the effect of note-taking strategies on academic achievement

Respondents	N	M	SD	df	t	p
Professor	20	77.90	7.47	189	0.878	0.381
Student	171	79.58	8.16			

The results of t-test (table 4) 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.].

6. Discussion

We reviewed the literature related to the topic and conducted a survey study to obtain pieces of information regarding the relationship between (teaching) note taking strategies and academic achievement As for our survey, generally note-taking strategies, when used, have positive effect on academic achievement. The analysis of mean comparison between professors' and students' attitudes and males' and females' attitudes revealed that the difference was not significant. One explanation may be that both professors and students, whether male or female, have experienced the benefits of note-taking, on the one hand, and the items of the questionnaire each has been able to elicit the respondents' judgment about a given aspect of note-taking, on the other hand. These similar beliefs of respondents provide the foundation of a composite theory.

The findings clearly indicate that note taking can benefit the students. This may be explained in some ways. First, note-taking causes meaningful learning. Second, each note-taking strategy performs its own function in building the students' cognitive structure regarding the content of the subject matter they deal with. For instance, concept mapping causes the students to visually represent their understanding of what they hear or read. Third, reviewing the notes also plays a crucial role in recalling and fixing knowledge in one's long term memory. Finally, note-taking provides the learners with security which many practitioners in teaching advocate to be the facilitator of learning.

From a theoretical perspective there is place to claim that there is a strong bound 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/or learning ideas (kiewra, 1985; Dunkel & Davy, 1989; Badger et al, 2001; Kobayashi, 2005 & Ornstein, 1994); 2) being practiced, note-taking strengthen our cognition power (Mee, 1991); 3) providing the learners with confidence and security, it facilitates learning; 4) While taking notes, both short and long term memories are involved, giving rise to learning (Kiewra , Benton & Stephen, 1988; Boyle & Weishaar, 2001; Cottrell, 1999); 5) extending our attention span, it causes us to concentrate on the subject under study (Mee,1991) and 6) it constitutes a stable external memory that is intended to learn and create (Rickards & Friedman, 1978; Mee, 1991; White, 1996 & Piolat et al, 2005).

The findings of this study are practically significant for *teachers*, *students* and *researcher*. For *teachers*, because they may raise the 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. Teachers may use it as a scaffold to assist their students to achieve a sound knowledge of what they are supposed to learn. To plan more successful note-taking training teachers are recommended to obtain information about the ways students take notes. For *students*, because it is a very strong learning strategy via which they may optimize their learning. When learned, note-taking strategies will be student-oriented ones and can be adopted readily without teacher's help. Moreover, the variety of these strategies requires the students to develop their metacognitive knowledge to be able to prefer one strategy over the other as the task, time and situation demand. For the *researchers,* because further investigations are recommended to deeply discover the how of the association between note-taking and cognition. Additionally, researcher may decide to compare the extent of the effect of different note-taking strategies on the students' academic achievement.

One may observe similarities and difference(s) between the present study and the previous ones. The results of this study is consistent with those of some others (e.g., Dunkel & Davy, 1989; Mee, 1991; Van Meter, Yokoi, & Pressley, 1994 & Kobayasshi, 2005). This study, compared with others, however, enjoys a more comprehensive literature review, which in turn provides those interested in the theme with a valuable treasure of sources. This study, like many others, suffers its own limitation. The inequality in the size of male and female respondents may cause us to generalize the result hesitantly to argue that both males and females view note-taking strategies almost in a similar way.

7. Conclusions

In the light of the literature reviewed and the survey study conducted we come to the answers to the six questions raised. As for the first question, in the consensus of many researchers, professors and students using note-taking strategies positively affects students' academic achievement. Regarding the second question, we found that there is a strong bound between note-taking strategies and cognition and/or metacognition. The results of the majority of the previous studies and those of the present one indicate that teaching note-taking strategies to the students positively affects their academic achievement. Concerning fourth, fifth and the sixth questions we understood that Iranian professors and students, regardless their sex, evaluate the effectiveness of note-taking highly and positively in students' learning.

8. Recommendation for further research

The future researchers may further investigate 1) the relationship between the contents of notes and what is recalled by the note takers; 2) the effect of the quality of notes on the quality of mental representation; 3) the performance of note takers who review their note 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.

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Appendix A

Dear professors/ students,

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

no of items	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

Table 1: 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

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