A Study of Perceptual Learning Styles and Achievement in a University-level Foreign Language Course

Janet Renou
Universidad de Puerto Rico, Mayagüez

Introduction

Research shows that there is no general consensus on why some students are not successful in learning a foreign language. Sparks and Ganschow (1993) claim that learners may have deficits in either the phonological, semantic or syntactic systems in their native language, and that this can affect how well they can master a foreign language. In a similar vein, Downey, Snyder and Hill (2000) found a correlation between phonological processing difficulties and learning problems that foreign language learners face. However, Castro and Peck (2005) state that even students who do not appear to have any language-learning deficits, such as those who score highly on the Modern Language Aptitude Test, encounter difficulties in the foreign language classroom. This finding seems to indicate that factors other than language-learning deficits may affect one's ability to learn a foreign language.

It is now both an accepted and well-documented fact that people learn, or perhaps more accurately put, prefer to learn, in different ways. Matthews (1995) points out that, as educators, we have all faced the realization that individuals learn differently. The simple fact that many instructors teach different groups in the same manner, but that student success varies, provides credence to this hypothesis. One concept that may shed light on differences in students' success learning a foreign language, and which is being investigated for its role in academic achievement in general, is learning style. "Learning style," according to Reid (1995), "refers to an individual's natural, habitual and *preferred* way of absorbing, processing and retaining new information and skills"(viii).

Understanding the ambiguous nature of learning styles

Because of the disparity in how researchers categorize, define, group and measure learning styles, a number of researchers state that the study of learning styles is both complicated and, at times, divided (Cassidy, 2004; Kinsella, 1995; Reid, 1995; Turton, 2001). Cassidy claims that "to some extent, this can be considered a natural consequence of extensive empirical investigation and is to be expected with any continually-developing concept which proves useful in gaining understanding of such a crucial and prevailing endeavor as learning"(420). In an article where he presents a synthesis of the central themes and issues surrounding learning styles, Cassidy offers some further insight into the fragmented and disparate nature of learning styles. He attributes the construct's ambiguity to the fact that research in learning styles is no longer limited to the domain of psychology, from which many of the central concepts and theories originated. Nowadays, learning-style research is spread across a variety of disciplines—medical and healthcare training, management, industry, vocational training and many settings and levels in the field of education. To some extent, this may explain the many variations in how learning styles are categorized, defined, grouped and measured.

A review of the literature not only shows that learning-style terminology can be ambiguous, but that at times definitions overlap[1]. In other instances, as Reid (1995) points out, very different aspects of learning styles are contrasted. All of this is to say that learning styles are indeed analyzed and understood in a number of ways. The ambiguity

is such that a number of authors/researchers have attempted (to varying degrees) to present an account of the central themes of the most influential or popular learning-style models, frameworks or typologies (Cassidy, 2004; Hall & Moseley, 2005; Nilson, 2003; Reid, 1995; Sarasin, 1998)[2].

Understanding how we learn

Bandler (1979) coined the term neuro-linguistic programming in the 1970's to refer to the use of our primary senses or sensory channels (i.e. seeing, hearing, touching, smelling etc.) to process information. It is now well acknowledged that some experts attempt to understand learning through the primary senses involved (i.e. visual, auditory or tactile). For others, types of intelligence, hemispheric dominance, psychological aspects of perception and the manner in which information is processed are analyzed in the hope of learning more about how we learn. Eliason (1995) presents an overview of what various learning-style experts measure: Myers & Briggs (1987) measure personality traits; Kolb (1976) measures how we process information; Dunn, Dunn & Price (1975) include perceptual and physiological aspects of learning styles.

More recently, Hall and Moseley (2005), who carried out an overview of learning-style models, identified 71 models of learning styles published between 1902 and 2002. They went on to analyze in depth 13 learning-style models and to group 50 of them along a continuum based on the extent to which the developers of the models and instruments believe that learning styles are fixed. The question of whether learning styles are fixed or can change is a subject of debate that the scope of this paper does not allow us to expound on[3]. However, at one extreme of the Hall and Moseley survey are theorists who believe in the influence of genetics, inherited traits and the interaction of personality and cognition, while at the other end are those who believe in the role of motivation and environmental factors such as cooperative or individual learning. The views contend that if learning styles are fixed, instructors could accommodate students more easily by tapping into their preferred learning style and teaching in a way that is compatible with each student's ability to process information. On the other hand, for those who believe that learning styles change and/or expand, Hall (2005) suggests that instructors should make students aware of how they are currently processing information and sensitize them to approaches and strategies that would help them expand their repertoire of styles.

Reid (1995) claims that three major categories of learning styles are widely recognized and relevant to the field of foreign language learning: sensory or perceptual learning styles, cognitive learning styles and affective/temperament learning styles. Sensory or perceptual learning style has to do with the physical environment in which we learn, and involves using our senses in order to perceive data. In studies on perceptual learning styles, Dunn (1990) has shown that learners whose preferred learning style is visual may have difficulty learning where the teaching mode is through lectures (auditory) as opposed to auditory learners who may prefer them. Reid purports that research generally refers to learning styles as being points along a continuum. In fact, learners may have more than one learning style and are able to switch or flex styles depending on the environment or task at hand. Cognitive styles relate to thinking, problem solving abilities and the ability to organize information. One type of cognitive learning style research measures field independence and field dependence in learners, writes Reid. The field independent students prefer to learn in a context where rules, instructions, discrete-point tests and imitation are emphasized. The field dependent

students, on the other hand, generally prefer cooperative and experiential learning environments. Affective learning/temperament learning style takes students' emotions, values and feelings into consideration. The focus is on the learner (i.e. his or her motivation, level of engagement, interaction and reception to feedback) and how he or she reacts to learning opportunities.

Perceptual Learning Style

Of particular interest to us for the present study is the perceptual learning style defined as a preference for one of the following learning modalities - auditory, visual or tactile. According to Sarasin (1998), the perceptual perspective allows us to take into account aspects of several well-recognized learning-style theories by synthesizing their important characteristics into an approach that is based on behaviors and/or actions that can be easily perceived in a classroom situation. Sarasin claims that aspects of the learning style theories of Gregorc (1995), Butler (1998), Sims & Sims (1995), McCarthy (1991), and Harb, Durrant & Terry (1993) reflect an approach based on the primary senses (visual, auditory or tactile) involved in learning.

As the name suggests, visual style refers to a preference for learning through vision, and visual learners rely on their sight to take in information. They organize knowledge in terms of spatial interrelationships among ideas and store it graphically (Nilson, 2003). Learners who prefer the auditory style learn through hearing or listening to things. They learn best when they can hear themselves express an idea (Nilson, 2003). Tactile learners prefer to learn by doing and by touching. They learn best by being active, and they often rely on physical interaction in order to master a concept (Sarasin, 1998).

Differences in learning-style components and measurement instruments

Even within learning styles, again there are differences in the components that make up each one. For example, in the category of perceptual learning styles, Dunn, Dunn & Price (1975) include visual, tactile and kinesthetic. Keefe (1979) uses kinesthetic/psychomotor, visual/spatial and auditory/verbal. O'Brien's (1989) components are visual and haptic (a combination of tactile and kinesthetic), while James & Galbraith (1985) include print visual and interactive (verbalization and olfactory). Reid's (1995) perceptual learning style includes visual, auditory, tactile, kinesthetic, group and individual learning styles.

Consequently, the instruments chosen to measure a learning style vary from one researcher to another (Cassidy, 2004; Keefe, 1987; Kinsella, 1995, Reid, 1987, Sim & Sim, 1995) and are not without controversy since their statistical reliability and validity have, at times, been questioned. For example, of the thirteen models that Hall & Moseley (2005) reviewed, not one met the criteria of reliability and validity. Although this means that one cannot be 100% certain that all learning-style questionnaire items are measuring what they say they measure or that questionnaire results will be identical if the test were taken again, it does not mean that the tests have no value. In fact, DeCapua & Wintergerst (2005), who write about the issues of validity and reliability of learning-style questionnaires, claim that although any instrument using pencil and paper is subject to questions of validity, the constructs do explain certain differences between individuals and how they learn.

Although Reid's Perceptual Learning Style Preference Questionnaire generally has high reliability and validity and has been used as the norm on non-native speakers, a recent study (Isemonger & Sheppard, 2007) which examined the factor structure of a Korean version of Reid's questionnaire showed reliability estimates were not good. Reid suggests

that educators use learning-style instruments with caution and calls for multidimensional learning-style instruments, which can provide a profile of student learning styles.

Research that links learning styles to student success

What has given rise to increasing interest in learning styles is that research points to the relationship between learning styles and teaching styles as being a factor in the success of postsecondary students (Dunn et al., 1995; Ellis, 1989; Griggs & Dunn 1996; Hall & Moseley, 2005). According to Cassidy (2004), the interest we are witnessing in the impact of learning styles on academic achievement demonstrates that research has made a move beyond investigating the traditional variables such as intelligence and motivation in an attempt to shed light on factors that affect academic success.

Entwistle (qtd. in Drysdale et al.: 272) has shown that academic success and failure in higher education is influenced by "the match between how material is presented and how students process it". Nelson et al. (qtd. in Drysdale et al.) found a correlation between learning style and increased levels of GPA. Dunn et al. (qtd. in Drysdale et al.) found that making students aware of their learning style and helping them develop study skills compatible with their preferred learning style had a positive affect on academic performance. In a similar vein, O'Brien (1991), whose subjects represented a variety of majors including business, education, and arts and sciences, found that differences in learning styles were associated with academic achievement. Based on the results of a meta-analysis of 42 experimental studies, Dunn et al. (1995) claim that students who are taught by an approach compatible with their learning do better than those whose learning styles are not matched to teaching approaches. In a similar vein, Griggs and Dunn (1996) claim that students who learn from an approach compatible with their preferred learning style experience greater academic achievement and have a more positive attitude towards learning.

Drysdale et al. (2001) carried out a study on the effect of learning style on the academic performance of 4,546 first-year students. Although they found academic performance based on learning style to be significant in 11 of the 19 courses, they found no significant differences between the learning style and academic performance of liberal arts and social sciences' students. Castro and Peck (2005) carried out a study on learning styles and learning difficulties that foreign language students face at the college level and claim that a student's preferred learning style can help or hinder success in the foreign language classroom. However, when they analyzed the distribution of grades according to Kolb's learning style types, they found no significant correlation between learning style and grades. Similarly, Tight's (2007) study of English college students learning Spanish showed that students performed equally well on vocabulary tests regardless of perceptual learning style preference.

Study

In the present exploratory study, we were interested in examining whether there is any relationship between a particular perceptual learning style (visual, auditory or tactile) and student success in an introductory university-level French course. Although student success was determined by the course grade, which is not necessarily a precise indication of level of proficiency, in general, students and instructors have a tendency to equate success with an academic grade nonetheless.

Participants

This study reports data obtained from four regular first semester university French language courses taught by the same instructor. Eighty-two English-speaking students, whose maternal language is Spanish, participated voluntarily. Their ages ranged from eighteen to twenty-three. The females outnumbered the males by ten persons. Most participants were completing their second or third year of university study. The group represented several faculties (Arts and Science, Engineering, Business Administration). For the most part, they were taking the course as an elective.

The French Course

French classes focus primarily on communication skills. The class meets three times a week for a fifty-minute session. Students are given lots of opportunities to use the target language in class when they work in pairs or in groups. In order to take advantage of class time for oral work, most written exercises are completed at home and corrected in class. However, when written work does take place in class, students have the option of working on their own or with a partner. An integral component of the course is a weekly thirty-minute laboratory session during which they complete listening exercises and have an opportunity to practice their pronunciation.

The textbook and lab manual provided learning opportunities that matched the preferences of the visual and auditory learner. In a handout, visual learners were given learning-strategy tips that matched their learning preference such as using color highlighters for "color coding" to aid recall of different pieces of new information. They were encouraged to make flash cards of vocabulary words or use images of vocabulary so they could take a mental picture of the information and to paste "stick-it" notes of key words and concepts in highly visible places such as on a mirror or car dashboard. Tips for auditory learners included interacting with others about material being learned in a listening/speaking exchange, talking aloud when studying alone to aid recall and when listening to the instructor, practice pronunciation by repeating a new word under their breath. Tactile learners were encouraged to make their learning tangible— something they could put their hands on, and they were recommended supplementary hands-on activities. For example, to learn and review new verbs, students played a "snakes and ladders" verb game, where learners handled cards printed with verbs which also served as an excellent learning tool for visual learners. Occasionally, students had the opportunity to create a conceptual map to help them learn a new form, or they were asked to come to class with a learning aid that could be held in one's hand (a game, cards, tokens etc.).

Methodology

The instructor introduced the students to the notion of learning styles on the first day of class. The instructor explained that a questionnaire consisting of 24 items that categorizes learners as having visual, auditory or tactile preferences was accessible through the internet. The students agreed to complete the self-assessment tool, the Barsh Learning-Style Inventory Questionnaire, and brought it back to class (see Appendix A). There were eight questionnaire items on the learning-style inventory that matched each of the three learning-style categories. Students ranked the questionnaire items by selecting the extent to which the statement presented referred to their preference to learning or processing information. For example, in response to a statement such as—*like to write things down or to take notes for visual review*—the student could select *Often (5points)*, *Sometimes* (*3points)* or *Seldom (1point).* The students added the points and the instructor

checked the results. During the next class, students discussed their learning style (s) and had an opportunity to ask questions about the implications of their styles on learning processes. None of the students expressed any disagreement or surprise with the questionnaire results. The instructor gave tips throughout the semester on how to flex or expand their preferred learning style so as to enhance their learning in a situation where the course material may not be presented in accordance with their preferred learning style.

An analysis of variance or ANOVA was used to examine whether having a particular learning style could attribute for differences in course grade. In other words, the ANOVA allows us to speak of differences or lack of differences between the variables (the learning-style preference and course grade) as being statistically significant or not.

Results

Descriptive Statistics

The results showed that close to half of all the subjects were visual learners, twenty-three percent were auditory learners and almost twenty-one percent scored the same on both visual and auditory perceptual learning styles. We categorized these learners as *combination.* The remaining seven percent of the subjects were tactile learners.

With respect to descriptive statistics as they pertain to gender differences, Figure 1 shows that the majority of both sexes were visual learners, followed by auditory and combination learners, and the least percentage were tactile learners.

Insert Figure 1

As seen in Figure 2, the grades were good overall: Ninety-two percent of the visual learners, eighty-nine percent of auditory learners, and ninety-four percent of the combination learners obtained a grade of either A or B. Although there were few tactile learners, more than half of them also obtained a grade of A or B.

Insert Figure 2

As mentioned above, to analyze the data, we used ANOVA ($F = 0.90$ $df = 3, 78$ $p. > 0.05$) statistical model. The results showed no significant differences between predominant learning-style groups (visual, auditory, tactile and combination learners) and course grades. In other words, whether one is a visual, auditory, tactile or combination learner made no statistically significant difference in their grades.

Discussion

In the present study, results do not show any statistically significant advantage to preferring one learning style over another (i.e. visual, auditory, tactile or a combination) with respect to success (course grade) in a French language course. This may be good news for the foreign language student and for the foreign language instructor since having a particular learning-style preference in this study did not provide an advantage or disadvantage for the learning outcome.

Several possible explanations for these findings merit consideration: 1) It is possible that this university French language course was taught in a manner compatible with several learning modalities. Tight's (2007) study showed that mixed-modality instruction was more beneficial than being taught solely in one's preferred modality, and in turn, being taught in one's more-preferred modality resulted in greater learning than being taught in one's less-preferred modality. Nilson states that although learners may

prefer one or two learning styles, they may use the other modalities to a lesser extent, (67).

Kroonenburg (1995) writes that language textbooks are increasingly being written to appeal to different types of learning styles, and that some authors go so far as to present structures in different forms so that instructors can aim to match their students' learning styles with the teachers' teaching styles. When course books provide such choices, we have the option of providing a multi-method instruction, but it is equally important to sensitize our students to their role in determining which style works best for them. In any case, as teachers often repeat concepts several times in class, implementing multi-method instruction may not be as daunting a task as it sounds. It can be as simple as presenting material orally one day, then following up with an overhead transparency or Power Point presentation of what was presented the day before. Afterwards, students explain to each other what they understand about the material they have been *learning*. This approach taps cognitive and metacognitive understanding through awareness, reflection and interaction (Langdon, 2008).

More evidence of the positive impact of multi-method instruction has been demonstrated by Ghillebaert (1999). She has shown that the use of computer-assisted language learning technology has proven beneficial to students of varying learning styles. In Ghillebeart's study related to annotated reading in a L2 using technology, the visual medium of the computer met the needs of the visual learner. The clicking that is an integral part of computer use allowed the tactile learners to function in their preferred learning style while the recordings proved beneficial for auditory learners. Ghillebeart states that the flexibility of use of an annotated reading lends itself well to the expansion or flexing of learning styles, therefore, providing support for those who claim that mixed-modality instruction is more beneficial than being taught only in one's preferred learning style.

2) Teachers should encourage students to take charge of their learning by expanding their preferred learning style to meet the teaching method(s) used in class. This is particularly important for tactile learners who do not respond as well to traditional methods of teaching such as written exams or papers. These learners need to know that expanding the visual or oral material into tactile material with which they can interact will help maximize their learning potential. Students can do this by organizing oral or visual material onto cards, doing role plays and using pictures for vocabulary learning. The internet offers lots of experiential activities for word creation, vocabulary and sentence building which provide the valuable hands-on learning experience that tactile learners most prefer. Again, we stress that teachers can help students to help themselves by promoting and fostering learner autonomy; that is to say by getting the learner to take charge of his or her learning. This can be as simple an act as getting students to surf the internet to find exercises to help them improve the area in which they are weak. 3) A final explanation for the findings may be that students were sensitized to the value of a multi-sensory teaching method and, thus, were able to use the learning and studying strategies to which they were exposed during the course. Dunn (1990) claims that students who are informed about their learning-style preferences and who have been exposed to learning strategies that are compatible with their preferred learning style perform better academically.

Limitations of the study

Because of the small numbers and limited design, we are unable to draw strong conclusions from the study. On the one hand, we had very few students who scored a C, D or F. In addition, there was an equally low number of tactile learners. A future study would require a greater number of participants in the hope that there could be a larger spread of students across all course grades and greater representation of the categories of learning styles. A greater number of students would allow us to run more powerful statistical analyses (i.e. Chi Square), which were not possible to do without violating assumptions.

On the other hand, with the learning-style questionnaire being a self-report instrument, one of the factors that can affect validity is the extent to which those who complete it have a clear understanding of themselves. Drysdale et al. (2001) point out that knowing themselves, as well as internal factors such as mood, illness or stress can affect how students complete the questionnaire. Although *2000 university students* have used the instrument, there are no statistical data available on its reliability and validity[4]. The debate over the reliability and validity of learning-style questionnaires remains such a concern that, in a future study, one suggestion would be to use more than one method for gathering learning-style data. In a recent study, sixty-five university students had their perceptual learning styles assessed using two methods— direct self report and the Barsh Learning Style Inventory Questionnaire (Kratzig & Arbuthnott, 2007). Only 44% of the participants were classified as having the same learning style on both instruments. This provides support for DeCapua & Wintergerst (2005) who suggest a triangular approach to assessing learning styles using a questionnaire, oral interview and participant observation.

Conclusion

By emphasizing learning styles, we focus on the learner and by doing so we are getting the learner to reflect on how he or she learns. Hall and Moseley (2005) purport that this shift of focus can have positive effects on student motivation and on teachers "who feel that they are engaging directly with learners' needs rather than delivering a prescribed curriculum" (248). Similarly, Sarasin stresses the importance of educators taking interest in students' preferred learning style since it will help them answer the fundamental question, "How do my students perceive and process information" (2). The view is that if we know the learning style of our students, we can tailor our teaching style to meet their learning preferences, and teach the material to gear toward their strengths.

Another important goal is to strengthen learner weaknesses by helping students overcome the limitations of specific learning styles. Sarasin (1998) emphasizes the importance of promoting strategies that are not specific to one learning style. By exposing learners to a variety of strategies that may help them to flex or expand their learning style, we help them develop more as independent learners. When our students participate in classroom activities by working in pairs and groups, which was often the case in this classroom context, we provide them an opportunity to not only interact with classmates who use different learning styles, but also to learn from them.

Nilson (2003) claims that "*all* learners learn more and better from multiple-sense, multiple-method instruction" (86). Although many neurons connect the ear to the brain, we retain only ten to twenty percent of what we hear. However, Woods (1989) claims that most people can recall between thirty and thirty-five percent of what they see, and this may stem from the approximately 1.2 million neurons that connect the-eye to-the

brain (Clute qtd. in Nilson: 67). In our study we see evidence, much as Woods purports, that one's ability to recall information increases greatly when both speaking and doing are employed. Therefore, it seems reasonable to claim that if we teach in the three sensory modes— auditory, visual and tactile, we would help our students retain and retrieve far more information than they would if we exposed them to only one sensory mode of learning.

Notes

[1] Although the scope of this article does not permit us to enter into the discussion on the multiplicity of learning-styles terminology, we acknowledge the existence of varying definitions of learning style and the references that follow will provide the reader more information on the debate over both the use and interchangeability of terms such as learning/cognitive style, or approach or strategy (Cassidy, 2004; Ehrman, Leaver, Oxford, 2003; Galloway & Labarca, 1990).

[2] For a comprehensive review of how characteristics of learning-styles overlap, see Cassidy (2004) who presents the overlaps in 23 learning-style models or Reid (1995) who focuses on learning styles important to the foreign language classrooms and provides a chart of overlapping and mutually exclusive terms.

[3] For a discussion of learning styles in terms of their stability or changeability see Loo (1997).

[4] We corresponded with the creator of the Learning Style Inventory, Dr. Jeffrey Barsch, who confirmed its use with over 2000 students at Ventura College, California, but who advised that no statistical analyses have ever been carried out on the instrument. A Yahoo search on the internet shows more than forty institutions of higher education using the learning styles questionnaire.

Bibliography

Bandler, Richard. *Frogs and Princes. Neuro Linguistic Programming*. Utah: Real People Press, 1979.

Butler, Kathleen A. *Learning and Teaching Style: In Theory and Practice*. Revised ed. Columbia CT: Learner's Dimension, 1988.

Cassidy, S. "Learning Styles: An Overview of the Theories, Models and Measures." *Educational Psychology* 24.4 (2004): 419-444.

Castro, O. and V. Peck. "Learning Styles and Foreign Language Learning Difficulties." *Foreign Language Annals* 38.3 (2005): 401-409.

DeCapua, A. and A. Wintergerst. "Assessing and Validating a Learning Styles Instrument." *System* 33 (2005): 1-16.

Downey, D., L. Snyder, and B. Hill. "College Students with Dyslexia: Persistent Linguistic Deficits and Foreign Language Learning." *Dyslexia* 6 (2000): 101-111.

Drysdale, M.T., P. Ross and R.A. Schulz. "Cognitive Learning Styles and Academic Performance in 19 First-year University Courses: Successful Students Versus Students at Risk." *Journal of Education For Students At Risk* 6. 3 (2001): 271-289.

Dunn, R., K. Dunn and G.E. Price. *The Learning Style Inventory*. Lawrence, KS: Price Systems, 1975.

Dunn, R. et al. "Aeta-analyticValidation of the Dunn and Dunn Learning Styles Model." *Journal of Educational Research* (1995). 88. 6 (1995): 353-361.

Dunn, R. "Rita Dunn Answers Questions on Learning Styles." *Educational Leadership* 48. 2 (1990): 15-19.

Eliason, P. "Difficulties with cross-cultural learning-styles assessment." *Learning styles in the ESL/EFL classroom*. Ed. J.M. Reid Boston: Heinle & Heinle Publishers, 1995. 24-36.

Ellis, R. "Classroom Learning Styles and Their Affect on Second Language Acquisition: A Study of Two Learners." *System* 19.2 (1989): 249-262.

Ehrman, M., B. Leaver and R. Oxford. "A Brief Overview of Individual Differences in Second Language Learning." *System* 3.3 (2003): 313-330.

Galloway, V. and A. Labarca. "From Student to Learner: Style, Process and Strategy." *New perspectives and new directions in foreign language education* ed. D.W. Birckbichler Lincolnwood, IL: National textbook Company and ACTFL, 1990. 111-158.

Ghillebaert, Françoise. "Teaching Reading Skills through Technology: "King", an Annotated Version with Libra software." *Language Learning Technologies: Hardware and Software Issues on the Advent of a New Millennium*. Ed. Ute S. Lahaie. 1999, 1-26

Gregorc, A. F. *An Adult's Guide to Style.* 2nd. Ed. Columbia CT: Gregorc Associates, Inc., 1985.

Griggs, S. and R. Dunn. Hispanic-American students and learning style. EastLansing, MI: National Center for Research on Teacher Learning.ERIC. Document Reproduction Service no. ED 393607, 1996.

Hall, E. "Learning Styles—Is there an Evidence Base for this Popular Idea?" *Education Review* 19.1 (2005): 49-56.

Hall, E. and D. Moseley. "Is there a Role for Learning Styles in Personalized Education and Training." *International Journal of Lifelong Education* 24. 3 (2005): 243-255.

Harb, J. N., O.S. Durrant and R.E.Terry. "Use of Kolb Learning Cycle and the 4 MAT System in Engineering Education." *Journal of Engineering Education* 82.2 (1993): 70-77.

Isemonger, I. and C. Sheppard. "A Construct-Related Validity Study on a Korean Version of the Perceptual Learning Styles Preference Questionnaire." *Educational and Psychology Measurement* 67.1 (2007): 357-368.

James, W.B. and M.W. Galbraith. "Perceptual Learning Styles: Implications and Techniques for the Practitioner." *Lifelong Learning* 8. (1985): 20-23.

Keefe, J.W. *Learning style theory and practice*. Reston, VA: National Association of Secondary Principals, 1987.

—— "Learning Style: An Overview." Ed. J.W. Keefe *Student learning styles: Diagnosing and prescribing programs* Reston, VA: National Association of Secondary School Principals, 1979. 1-17

Kinsella, K. "Understanding and empowering diverse learners." Ed.J.M. Reid *Learning Styles in the ESL/EFL Classroom* Boston: Heinle & Heinle Publishers, 1995. 108-117.

Kolb, D.A. *Learning Style Inventory: Technical Manual*. Boston, MA: McBer, 1976.

Kratzig, G.P. and K. D. Arbuthnott. "Perceptual Learning Style and Learning Proficiency: A Test of the Hypothesis." *Educational Psychology* 98.1 (2006): 238-246.

Kroonenberg, N. "Meeting Language Learners' Sensory Learning Style Preferences." *Learning styles in the ESL/EFL classroom*. Ed. J.M. Reid Boston: Heinle & Heinle Publishers, 1995. 75-85.

Langdon, H. W. *Assessment and Intervention for Communication Disorders in Culturally and Linguistically Diverse Populations*. New York: Thomson Delmar Learning, 2008.

Loo, R. "Evaluating Change and Stability in Learning Styles – A Methodological Concern." *Educational Psychology* 17 (1997): 95-100.

McCarthy, B. "Using the 4 MAT System to Bring Learning Styles to Schools." *Educational Leadership* 48.2 (1990): 31-36.

Matthews, D. B. *An Investigation of the Learning Styles of Students at Selected Postsecondary Institutions in South Carolina*. Orangeburg: South Carolina State University, 1995.

Myers, I.B. and P.B. Briggs. *The Myers-Briggs Type Indicator*. Palo Alto, CA: Consulting Psychologists Press, 1987.

Nilson, Linda B. *Teaching at Its Best. A Research-based Resource for College Instructors.* 2nd ed. Bolton: Heinle & Heinle, 2003.

O'Brien, T.P. "Relationships Among Selected Characteristics of College Students and Cognitive Style Preferences." *College Student Journal* 25 (1991): 492-500.

O'Brien, L. "*Learning Styles: Make the Student Aware*." *National Association of Secondary School Principals Bulletin* 73 (1989): 85-89.

Reid, J.M. *Learning Styles in the ESL/EFL Classroom*. Boston: Heinle & Heinle Publishers, 1995.

—— "The Learning Style Preferences of ESL Students." TESOL Quarterly 21.1 (1987): 87-111.

Sarasin, L. C. *Learning Style Perspectives. Impact in the Classroom*. Madison: Atwood Publishing, 1998.

Sims, S.R. and S. Sims. eds. *The Importance of Learning Styles: Understanding the Implications for Learning, Course design and Education*. Westport, Conn: Greenwood Press, 1995.

Sparks, R. and L. Ganschow. "Searching for the Cognitive Locus of Foreign Language Learning Difficulties: Linking First and Second Language Learning." *Modern Language Journal* 77 (1995): 289-302.

Tight, D.G. "The Role of Perceptual Learning Style Preferences and Instructional Method in the Acquisition of L2 Spanish Vocabulary." Diss. U of Minnesota, 2007. DAI 68 (2007).

Turton, D. "A Longitudinal Study into Learning Style Preferences of University ESLStudents." Diss. U of Southern California, 2001. DAI 63 (2001).

Woods, D. R. "Developing Students' Problem-Solving Skills." *Journal of College Science Teaching* 10.1 (1989): 108-110.

Appendix A

BARSCH LEARNING STYLE INVENTORY

Please check the appropriate line after each statement.

		Often	Sometimes	Seldom
1.	Can remember more about a subject through listening than reading.	___	____	___
2.	Follow written directions better than oral directions.	___	____	___
3.	Like to write things down or take notes for a visual review.	___	____	___
4.	Bear down extremely hard with a pen or pencil when writing.	___	____	___
5.	Require explanations of diagrams, graphs or visual directions.	___	____	___
6.	Enjoy working with tools.	___	____	___
7.	Are skillful with and enjoy developing and making graphs and charts.	___	____	___
8.	Can tell if sounds match when presented with pairs of sounds.	___	____	___
9.	Remember best by writing things down several times.	___	____	___
10.	Can understand and follow directions on maps.	___	____	___
11.	Do better at academic subjects by listening to lectures and tapes.	___	____	___
12.	Play with coins or keys in pocket.	___	____	___
13.	Learn to spell better by repeating the letters out loud than by writing the word on paper.	___	____	___
14.	Can better understand a news article by reading about it in the paper than by listening to radio.	___	____	___
15.	Chew gum, smoke or snack during studies.	___	____	___
16.	Feel the best way to remember is to picture it in your head.	___	____	___
17.	Learning spelling by “finger spelling” the words.	___	____	___
18.	Would rather listen to a good lecture or speech than read about the same material in a book.	___	____	___
19.	Are good at solving and working on jigsaw puzzles and mazes.	___	____	___
20.	Grip objects in hands during learning period.	___	____	___
		___	____	___

21.	Prefer listening to the news on the radio rather than reading about it in a newspaper.	___	___	___
22.	Obtain information on an interesting subject by reading relevant materials.	___	___	___
23.	Feel very comfortable touching others, hugging, handshaking, etc.	___	___	___
24.	Follow oral directions better than written ones.	___	___	___

BARSCH LEARNING STYLE INVENTORY
SCORING PROCEDURES AND EXPANATIONS

SCORING PROCEDURES

OFTEN = 5 POINTS SOMETIMES = 3 POINTS
SELDOM = 1 POINT

Place the point value on the line next to its corresponding item number and add the points to obtain your learning style preference scores under each heading.

Visual		Auditory		Tactual	
No.	pts	No.	pts	No.	pts
2		1		4	
3		5		6	
7		8		9	
10		11		12	
14		13		15	
16		18		17	
20		21		19	
22		24		23	
	VPS		APS		TPS

VPS = Visual Preferences Score
APS = Auditory Preferences Score
TPS = Tactual Preferences Score

If you are a VISUAL LEARNER, that is, you have a high visual score, then by all means be sure you see all study materials. Use charts, maps, filmstrips, notes and flashcards. Practice visualizing or picturing spelling words, for example, in your head. Write out everything for frequent and quick visual review. It is obvious you learn best when you SEE things… make it a point to see things.

If you are an AUDITORY LEARNER, that is, have auditory score, then be sure to use tapes. Sit in the front of the lecture hall or classroom where you can hear best and can review them frequently. Tape your class or lecture notes. After you read something, summarize it on tape or out loud. Verbally review spelling words, lectures or test material with a friend.

If you are a TACTUAL LEANER, that is, have a high tactile score, trace words, for example, as you are saying them. Facts that must be learned should be written several times. Keep a supply of scratch paper just for that purpose. Taking and keeping lecture notes will be very important.

<u>As a result of this learning inventory what do you think you can do to strengthen your learning? Give yourself some examples.</u>

Figure 1

Fig. 1 Predominant Learning Style according to percentage of Male and Female Students

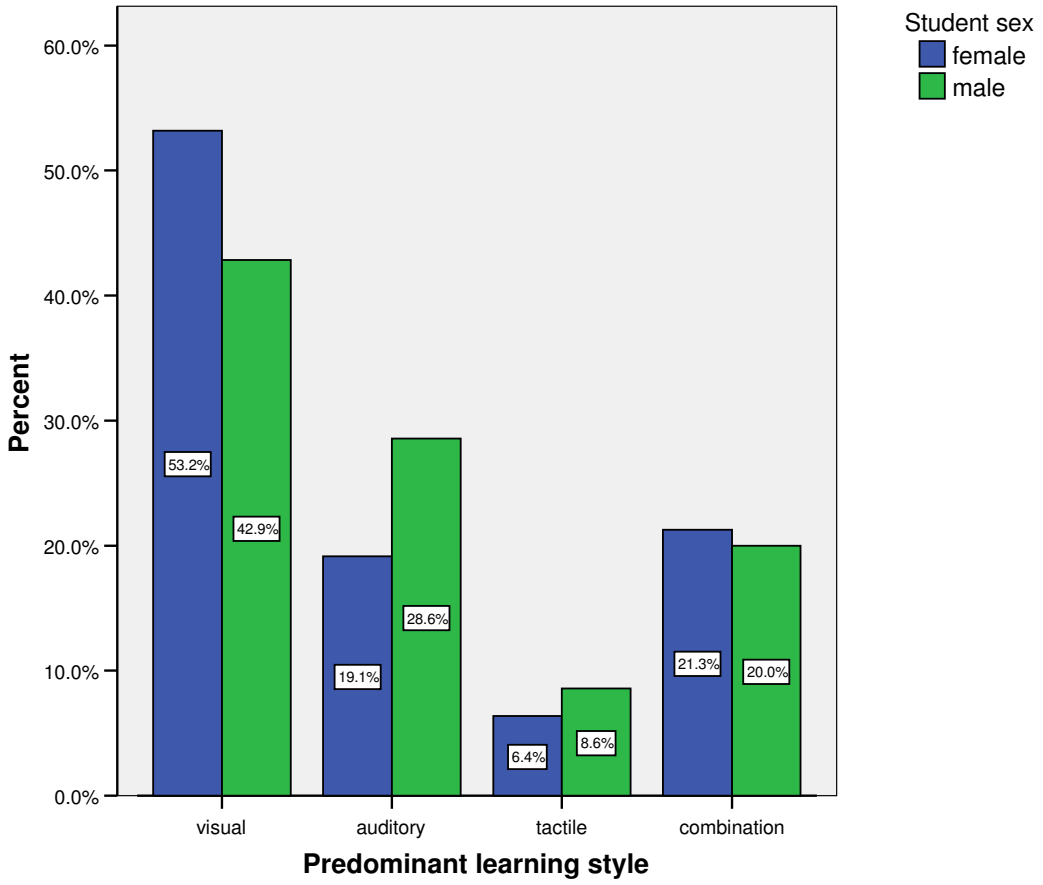

Figure 2.
Fig. 2. Percentages of Learners according to Predominant Learning Style and Course Grade

	Predominant Learning Style			
Grade	**Visual**	**Auditory**	**Tactile**	**Combination**
A	67.5% (27)	84% (16)	50% (3)	53% (9)
B	25% (10)	5% (1)	17% (1)	41% (7)
C	7.5% (3)	0% (0)	17% (1)	0% (0)
D	0% (0)	10% (2)	17% (1)	6% (5)
Total	100%	100%	100%	100%