Effects of the Dunn and Dunn Learning Styles Model on Reading Comprehension and Motivation: A Case Study in Innovative Learning

Ahmad Oweini; **Carma Daouk**
Department of Education, Lebanese American University, Lebanon

Abstract

The effect of learning preferences on reading comprehension and motivation/attitude has been researched thoroughly in the field of education as a new approach to learning. However, these three elements have not been studied simultaneously using the Dunn & Dunn's preferred learning style theory. Therefore, this study aims at analyzing the elements that motivate a student to learn and the elements that lead to academic achievement. The study is based on the Dunn & Dunn's preferred learning style theory which emphasizes that each student has a specific learning style and that learner's physical, emotional, and sociological needs must be satisfied within the learning environment. Using an ABAB single case study design, an investigation was conducted to determine how learning style preferences affect reading comprehension achievement and student motivation/attitude in a fourth grade student who is struggling with language processing. To measure his attitude towards learning, The Student's Motivation toward Science Learning scale was adapted, and the Dunn & Dunn learning styles were identified through the Elementary Learning Style Assessment. Results showed that the student's reading comprehension and motivational/attitude levels increased significantly when instruction used the student's preferred learning style. The results of these findings can be utilized by educators and parents to help maximize achievement and motivational/attitude levels in reading comprehension.

Keywords: Dunn & Dunn; learning style; reading comprehension; Lebanon.

Introduction

The reason why so many children fail is not because of the curriculum, but the instructional approaches that are dissonant with their learning styles (Dunn, 1990). When the teaching style fails to meet the needs of a particular learning style, then minimal learning will take place (Rhoads, 2005).

Rita and Kenneth Dunn had been advocating school change for decades by teaching instructors how to use different learning styles that maximize teaching instruction (Rhoads, 2005). The Dunns define learning style as the way "a person concentrates on, processes, internalizes, and remembers new and difficult academic information or skills" (Ivie, 2009, p. 177). A visual representation has been made in the form of a patchwork quilt that describes the 21 elements in 5 basic strands (Appendix A). The learning-style variables are differentiated from one learner to another and do not affect learners equally. Some learners are affected by as few as one to six elements, while others may be affected by as many as seventeen (Dunn, R., Honigsfeld, A., & Doolan, L., 2009).

The Dunn and Dunn Learning Style Model has been researched by over 50 American and international educational institutions (Mitchel, 2009). It is based on the theory that each student has his or her strengths as a learner (Mitchel, 2009). The model is represented through five stimuli, which are environmental, emotional, sociological, physiological, and psychological (Mitchel, 2009). Dunn and Dunn believed that each stimulus contains individual elements which contribute in mastering academic skills.

The environmental variable consists of the elements sound, light, temperature, and design. The emotional variable consists of motivation, persistent, responsibility, and structure. The sociological variable includes self,

pair, peers, team, adult, and varied. The physiological variable consists of perceptual, intake, time, and mobility. The last variable, which is the psychological variable, has three components that contain global-analytic processors, hemisphericity, and impulsive-reflective (Mitchel, 2009).

One reason for the popularity of the Dunn and Dunn model is that it was generated by classroom experience and therefore has ecological validity. More than 850 studies conducted in more than 135 institutions of higher education were performed using the Dunn and Dunn Learning Style Model (Honigsfeld & Dunn, 2009). Many of these studies included the effectiveness of tactual and kinesthetic teaching methods in comparison to traditional methods. For instance, Fine (Honigsfeld & Dunn, 2009), used soft lighting, tactual and kinesthetic instructional resources, and paired students or made them work in small teams when teaching a lesson. The results concluded higher test scores, as well as improved attitude and motivation towards learning. Other studies revealed the positive impact of the Dunn and Dunn model on concentration (Dunn & Dunn, 1979; Brand, Dunn &Freb, 2002).

Meta-analyses conducted on the Dunn and Dunn Model all yielded robust results in favor of the model (Ferdenzi, 1998; Ivie, 2009; Lovelace, 2005).

Methodology

Subject

The participant in this study was a fourth grade student given the pseudonym John, attending an elite private school located in Mount Lebanon, 30 minutes from away from Beirut; it mostly caters to middle to upper middle class students. He was struggling academically in most of his language arts subjects.

Design

This study consisted of an ABAB design in order to determine the student's learning preferences, and their effect on academic achievement, namely reading comprehension, and motivation.

Instruments

STMEL Questionnaire

The STMEL questionnaire developed by Hsiao-Lin Tuana, purports to monitor students' motivation toward learning science (Tuan, Chin & Shieh, 2005). For the purpose of this study, the questionnaire was modified from measuring motivation towards learning science to motivation towards learning English. The questionnaire includes the following scales: self-efficacy, active learning strategies, science learning value, performance goal, achievement goal, and learning environment stimulation (Tuan, Chin & Shieh, 2005). Each item was constructed using a five-point Likert scale, ranging from strongly agree to strongly disagree.

The ELSA

The ELSA: It is an online test that measures the student's learning style. It is available at: www.learningstyles.net

CBM

The use of CBM can determine the students' expectancies of their academic performance (Overton, 2008), and may enhance the academic performance of low- achieving students since it allows instruction to be tailored to their specific learning needs. Baker and Good (in Overton, 2008) asserted that CBM is reliable and valid for assessing bilingual students.

Reading CBM

The CBM passages were different but equivalent in the level of difficulty. The passages were new to the student but were presented at the student's instructional level. Each passage consisted of a

minimum of 300 words. The passages also had 42 words deleted and were replaced by a choice of three words, consistent with the cloze reading probe (Hosp, Hosp & Howell, 2007). A total of 21 different passages were used to monitor the student's progress within the four weeks for a duration of three minutes. The CBM was completed every Monday and Friday of the week at the end of the session to determine if the student was learning adequately, to measure progress, and to ensure that instruction was working effectively.

Attitude Toward Learning Comprehension (ATLC)

The ATLC is an informal scale designed by the researchers to assess motivation/attitude with respect to reading comprehension. The survey consisted of five lines. In each line, the student is asked to choose one of the three adjectives that best describe how he felt about the session:

Line 1: Easy, Indifferent, Difficult.
Line 2: Interesting, Indifferent, Boring.
Line 3: Clear, Indifferent, Confusing.
Line 4: Fun, Indifferent, Serious.
Line 5: Calm, Indifferent, Nervous.

Procedure

The student took a post-test after each control and treatment condition. Quantitative data was collected through the CBM. Qualitative data was sought through the STMEL, Motivational Survey, ATLC survey, and ATLW survey. At the end of the study, both the quantitative and qualitative data were interpreted and analyzed.

Pretest data was collected through:

- The ELSA to determine the preferred learning style of the student;
- Baseline and aimline measures to conduct CBM probes;
- The STMEL test to determine the level of motivation for the student in English; and
- The Motivational Survey to help monitor the student's levels of motivation.

Once the pretest procedures were completed, the program commenced as follows:

The passages used to teach comprehension were extracted from the VV program. (Appendix B)

The learner was exposed to reading comprehension instruction for a period of four weeks, which included five one-hour long sessions per week. Instruction alternated weekly between the traditional teacher directed method (no treatment), and instruction based on his preferred learning style. The two weeks of the traditional teacher directed method (treatment A) consisting of reading passages selected by the instructor, followed by a number of activities, namely providing an oral summary of the text, then answering specific questions both orally and in writing about the text. This traditional method of learning comprehension mimics the one currently used at the subject's school. The teacher directed method (A) was used as the control phase in which the teacher chose how the child would learn. The student was given no choice.

As for Treatment B used during alternate sessions, the student's learning preferences as assessed by the ELSA survey molded the learning environment. The V*isualizing and Verbalizing (VV) by* Nanci Bell was selected because it is designed to help struggling readers develop concept imagery by stimulating the sensory-cognitive functions, thus enabling them to connect and interpret meaning for both oral and written language (Bell, 2007).This program has attractive qualities to the student because it relies on nontraditional and engaging teaching tools, such as large story boards, flash cards, critical thinking questions, and so forth, which tie into learning style accommodations. The methodology used to teach the child followed the same structure prescribed by the VV program: Sentence by Sentence Imaging with Higher Thinking structure, Multiple Sentence Imaging with Higher Order Thinking. The skills for higher thinking included getting the main idea, drawing a conclusion, making an inference, predicting/extending, and evaluating. The student was asked to reach each passage orally and questions were posed by the teacher at the end of each passage.

Teacher Direct Method

Task Cards

Task cards were used to teach reading comprehension. They were made to help John easily remember the material by both reading and listening. They were also used to introduce new material and to reinforce previously learned material. The task cards presented information about a specific reading topic, concept, or skill that was converted into questions and answers. For example, when studying about the different kinds of butterflies in a text, John would make his own Task Cards and print the name of each butterfly on the left side of an index card. He would then glue a picture of the butterfly on the right side of another card. The cards were cut into irregular shaped thirds so that only the card with the correct picture could fit correctly to the card with the name of the butterfly.

Flip Chutes

Flip Chutes were used to teach reading comprehension. They were made from half-gallon orange juice containers. Small question-and-answer cards were inserted into the upper face of the container. As each question card descended into the slide, it flipped over and the answer became visible from the lower opening. John was allowed to decorate the container with paint relating to the reading topic.

Floor Games

Floor games were used for teaching reading comprehension. A game was drawn and designed on an old tablecloth that allowed John to jump and move around as he was exposed to the finer points of the reading topic through questions.

Multiple - sentence imaging with higher order thinking

During this part of the instruction, more units of language were added which consisted of two or three sentences at a time. The lessons continued to include colored felt squares to anchor the imaged parts of the sentences. The structure words are no longer needed, and the questions for detailed imagery are minimized as the student now is expected to imagine with a fair amount of detail. Less questioning was required, therefore each paragraph required not more than 12 minutes, consisting of five various reading paragraphs per session. The difficulty of the paragraphs was gradually increased. The student visualized and verbalized two or three sentences at a time instead of one, placing one colored square for each chunk of imagery. However, the student did not check through the structured words. At the end of each paragraph, the teacher asked higher order thinking questions based on the student's imagery.

The four weeks of the intervention consisted of both treatment A and treatment B. The first and third week consisted of the teacher directed method. The teacher directed method (treatment A) consisted of the pupil learning reading comprehension for 60 minutes per day. During the student directed method (treatment B), the teaching strategies were based on the data retrieved from the ELSA for 60 minutes a day. Task cards, flip chutes, and floor games were additional materials used to convey the information to the student.

Results

For each aspect of the intervention, quantitative and qualitative data is reported.

Results of CBM reading

The datapoints on the CBM Reading graph represent three one minute reading probes conducted on a weekly basis. The graph represents the student's frustration level at a baseline. Progress was shown when intervention was implemented which was on Week Two and Week Four. It showed a positive impact on John within a short intervention period. The solid line represents this rate of progress during those weeks. During Weeks One and Three when there was no intervention, the

desired outcome for academic achievement was not being produced because the CBM observations fell below the aimline.

John's effort, creativity and ability to think critically became noticeable during intervention. He learned how to illustrate his thoughts. Further, intertextual linking and ability to mentally develop a detailed image of the story was reflected during oral discussions. For example, when John was reading information on a certain topic on a task card, not only was he able to comprehend the information independently at hand, but also volunteered to further elaborate on abstract concepts regarding the specific topic. For instance, when reading specific information about a humming bird and how it makes it easier to obtain food, he linked the answer to the question within a matter of seconds and unexpectedly made associations within the text to his previous knowledge. Once he had developed an imaged gestalt of humming birds, he was able to independently infer, conclude and evaluate.

Results of the attitude towards learning English questionnaire

At the first session, John found English to be difficult, boring, confusing. He also felt nervous during the session. This negative attitude towards learning English remained consistent until the fourth session. During the fourth session, a change in John's attitude became remarkably visible. He still found the material difficult; however, it became clearer and more engaging. He became calmer as the sessions prolonged and felt less nervous when learning.

By the end of the 17th, 18th, 19th, and 20th sessions, John felt completely at ease and developed a whole new attitude towards English. The shift in attitude was not gradual. Instead, a sudden positive inclination became visible after the third session.

SMTEL

The SMTEL Questionnaire showed that, after the reading comprehension sessions, John developed a strong liking in reading and considered English as an enjoyable language. These findings suggest that he became more motivated to read. The statistical analysis was performed using SPSS®, version 20.0.

The dependent t-test that was applied to determine the statistical significance of differences among the rating scales of the first day and the last day of intervention regarding the different sections of the SMTEL questionnaire showed significance on four out of six sections of the questionnaire: Self-efficacy, Active Learning Strategies, Performance Goal, and Learning Environment Stimulation (Appendix C).

Discussion

The researcher examined the student's achievement scores in reading comprehension and his attitude towards learning English when an innovative instructional approach is used, namely accommodating the student's learning preferences using the Dunn and Dunn model. When the student's learning style preference was integrated within the instructional strategies and the learning environment, higher motivation and better reading comprehension were achieved. This conclusion supports the research conducted in more than 120 institutions which showed a positive impact on the learners' achievement (Boyle, 2005; Rautopuro & Vaisanen, 2003). Further, a meta-analysis conducted at thirteen universities in the mid-90s confirmed that students whose learning styles were accommodated could be expected to achieve 75 percent of a standard deviation higher than students who had not had their learning styles accommodated (Dunn, Honnigesfeld, Shea Doolan, Bostrom, Russo, Schiering, Suh, and Tenedero, 2009).

Reading achievement test gains were significant when modality-congruent, learning strategies were implemented. In contrast, when dissonant instructional strategies were employed, little gains in achievement were attained, consistent with findings that learners' academic achievement increases

when the student's perceptual learning styles are blended with instructional learning strategies (Ferdenzi, 1998), especially when instructors are aware of their role as a facilitator in the classroom (Honigsefeld & Dunn, 2009).

During the weeks where the traditional teacher-centered approach was implemented, John was incapable of recalling details from the text or re-telling the text. His summary was in the form of fragments. He was not confident and became irritated when he was incapable of recalling the details of the text he had read minutes ago.

Choice and contrast methods of learning were introduced for stimulating verbalizing and thinking. This instruction only had a small window of time to help John experience success in learning to comprehend and write. Every frame of instruction was aimed at remediating his difficulties since he had been exhibiting failure for years. There was only little time during which he was willing to learn. John validated Dunn et al.'s assertion that

> "when students understand how they learn best, they inevitably adjust conditions and devise strategies for facilitating their progress. They become able to study more effectively and realize that it is not what, but how they study that really counts." (Dunn et al, 2009, p. 138)

Geiser (1998) concurred that this innovative instructional approach improved students' perceptions of their personal abilities and empowered them to strive beyond what they had previously accomplished.

Another variable that showed significant improvement was motivation. As motivation is the key trigger to academic success, highly motivated classrooms consist of teaching strategies that are harmonious with the students' learning styles (Elliot & Dweek, 2005).

Teachers who accommodate students' learning styles deliver content in ways that suitably match students' strengths, hence leading to increased academic performance and improved attitudes toward school (Lovelace 2005). Exposure to learning style requires recognition of the need for diverse strategies designed to complement individual differences. As a result, teachers make a concerted effort to eradicate the one size-fits-all approach and acknowledge the need to modify their classrooms, instructional practices, and assessments (Favre 2007a, 2007b; Fine 2003; Shea Doolan 2004). Education stakeholders recognize that these modifications are essential for academic success. Textbooks and materials are slowly changing from being essentially analytic, auditory, and visual to becoming increasingly global, kinesthetic, and tactual (Fine 2003).

Limitations

The findings should be viewed in light of several limitations. First, the study was limited to one student hence generalization to the larger population is not possible. The attempt to explain the academic achievements of students with LD in education may be more effective if using a larger sample. Future research should use a larger sample and examine students in different school subjects. Second, the length of the study was eight weeks, which is relatively short. Longer observation periods may lead to even more reliable results.

Implications

Findings of this study may influence educational practices and encourage teachers to implement innovative approaches of teaching through accommodating students' learning styles.

To teach effectively, teachers must know how to teach pupils based on the latter's identified brain processing, environmental requirements, sociological inclinations, perceptual strengths, and interests or talents.

In fact, one of the tenets established by The American Association of Colleges for Teacher Education in 2008 to prepare preservice and in-service teachers to teach students who come from

diverse cultural and linguistic backgrounds is the recognition of learning-style theory and research (Dunn et al, 2009). As early as 1980, Scott Thomson, executive director of NASSP, stated that "the ability to map learning styles is the most promising development in curriculum and instruction in a generation. It is the most scientific way we know to individualize instruction" (Dunn et al, 2009, p. 139).

Recommendations for future studies include a longer intervention period of at least 2 to 3 months, and implementation on larger samples that include different age groups, abilities and socio-economic backgrounds to examine the effectiveness of the Dunn and Dunn Learning Styles on various cohorts across time.

References

Alshumaimeri, Y. (2011). The effects of reading method on the comprehension performance of saudi efl students. *International electronic journal of elementary education*, *4*(1), 185-195.

Retrieved from http://www.iejee.com/4_1_2011/11_IEJEE_4_1_Alshumaimeri.pdf.

Babbitt, N., Ballard, R., Erickson, J., & Gray, L. (2008).*Reading success*. North Carolina: Rainbow Bridge Publishing.

Bell, N. (1986). *Visualizing and verbalizing for language comprehension and thinking*. (2nd ed.). California: Gander Publishing.

Boyle, R. (n.d.). Applying learning-styles theory in the workplace: How to maximize learning-styles strengths to improve work performance in law practice. (2005). *St. John's Review*, *79*(1), 97-125.

Brand, S., Dunn, R., & Freb, F. (2002). Learning style of students with attention deficit hyperactivity disorder: Who are they and how can we teach them. *The clearing house*, *75*(5), 268-273. Retrieved from www.jstor.org/stable/30189757 (Brand, Dunn & Greb, 2002).

Butler, R. (2004). *Advantage reading:High-interest building for home and school*. CA: Creative Teaching Press.

Curriculum-based measurement warehouse. (n.d.). Retrieved from: http://www.intventioncentral.org/cbm_warehouse.

DeVita, G. (2001). Learning styles, culture and inclusive instruction in the multicultural classroom: A business and management perspective. *Innovations in Education and Teaching International*, 165-173. Retrieved from http://www.tandf.co.uk/journals

Dunn, M. (2010). Response to intervention: Employing a mnemonic-strategy with art media to help struggling writers. *Journal of International Education and Leadership*, *2*(3), Retrieved from: http://www.jielusa.org/

Dunn, R. (n.d.). Learning-a matter of style. (1979).*Educational Leadership*, 430-432

Dunn,R. (1990, October). Rita dunn answers questions on learning styles. *Educational leadership.*

Dunn, Honnigesfeld, Shea Doolan, Bostrom, Russo, Schiering, Suh, and Tenedero, 2009).

Dunn, R. & Burke, K. (2006). Lscy: Research and implementation manual. *Learning style: The clue to you*, DOI: www.cluetoyou.com.

Dunn, R. & Dunn, K. (1979). Learning syles/teaching styles: Should they be matched. *Educational leadership*.

Dunn, R., Honigsfeld, A., & Doolan, L. (2009). Impact of learning-style instructional strategies on students' achievement and attitudes: Perceptions of educators in diverse institutions. *The clearing house*, *82*(3), 1.

Dunn, R., & Burke, K. (n.d.). Redesigning the middle-school classroom: Five easy steps to improve students' grades and decorum. In

Elliot, A.J., & Dweek, C.S. (Eds). (2005). Handbook *of competence and motivation.* New York: Guilford Press.

Ferdenzi, A. (1998). Effects of modality-responsive home-learning treatments on parental attitudes and efficacy when helping their first-grade children's word-recognition achievement and attitudes. (Doctoral dissertation)

Heffner. (2011). Research methods. Allpsych online, Retrieved from: http://www.allpsyh.com/researchmethods/ababdesign.html

Heiman, T. (2006). Assessing learning styles among students with and without learning disabilities at a distance-learning university. *Learning Disability Quarterly*, *29*, 55-62.

Hosp, M., Hosp, J., & Howell, K. (2007). *A practical guide to curriculum-based measurement*. New York: The guilford press.

Honigsfeld, A., & Dunn, R. (2009). Learning-style responsive approaches for teaching typically performing and at-risk adolescents. *The Clearing House*, *82*(5), 220-224.

Ivie,S. (2009). Learning styles: Humpty dumpty revisited. *Erudit*, *44*(2), 177-192.

Koch, K. (2007). A conversation with rita dunn. *Institute for learning styles journal*, *1*, 1-11.

Learning styles: The debate. (2012, 04 09). Retrieved from: http://www.brainboxx.co.uk/a2_learnstyles/pages/LStyles_debate.htm

Lindamood bell: Learning process. (n.d.). Retrieved from: http://www.lindamoodbell.com/programs/visualizing-verbalizing.html

Novogrodsky, D. (2012). Analysis of the learning styles of diverse student populations and implications for higher education instructional change. *ProQuest dissertation & thesis*.

Mitchel, C. (2009). *Effect of preferred learning styles on motivation and achievement in kindergarten students*. (Doctoral dissertation).

Overton, T. (2008). *Assessing learners with special needs:an applied approach*. (6th ed.). New Jersey: Pearson.

Özbaş, S. (n.d.). The investigation of the learning styles of the university students. *The Online Journal of New Horizons in Education*, *3*(1), 53-58. Retrieved from: http://www.tojned.net/pdf/v03i01/v03i01-08.pdf.

Rautopuro, J. & Vaisanen, P. (2003, 09 17). "I did it my way?". the impact of learning styles and strategies on students success in quantatative research methods in educational sciences. *Education-Line*, DOI: www.leeds.ac.uk/educol.documents/00003164.htm

Rayneri, L.J., & Gerber, B.L. (2004). Development of a student perception inventory. *Roeper Review*, *26*(2), 1-10.

Rhoads, A. (2005). *Reaching them all: Using student learning styles to teach more effectively*. Manuscript submitted for publication, Baker College, Baker College, Michigan.

Stake, R. E. (1995). *The art of case study research*. New Delhi: SAGE.

Tuan, H., Chin, C., & Shieh, S. (2005). The development of a questionnaire to meausure students' motivation towards science learning. *International journal of education*, *27*(6), 639-654. Retrieved from www.ntcu.edu.tw/chin/file/29.p.

Willis, M., & Hodson, K. (1999). *Discover your child*\. California: Prima.

Note: If you are interested in getting a copy of the appendices, contact the authors.

About the Authors

Ahmad Oweini, *Ed.D.*, associate professor of education at the Lebanese American University. He is a counselor and special educator; and the president of Alphabète Learning Center which is specialized in assessment and remediation of learning disabilities.

Carma Daouk, has *M.A.* in Special Education. She is the owner of SmartStep Learning Center for academic remediation. She is also an instructor at the American University of Technology in the Learning Enhancement and Assistance Program (L.E.A.P), a special college program designed for students with intellectual disabilities.

Addresses

Dr. Ahmad Oweini;
Associate Professor; Department of Education; Lebanese American University;
13-5053 Beirut – Lebanon.

e-Mail: a.oueini@alphabete.org

Carma Daouk;
Graduate Student; Lebanese American University.

e-Mail: steped81@hotmail.com