Nursing Students' Awareness and Intentional Maximization of their Learning Styles

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Abstract

This small, descriptive, pilot study addressed survey data from four levels of nursing students who had been taught to maximize their learning styles in a first-semester freshman success skills course. Bandura's Agency Theory supports the design. The hypothesis was that without reinforcing instruction, the students' recall and application of that knowledge would decrease as they progressed through the program. The hypothesis was not supported: the highest indicator for intentional application of personal learning style preference was the most frequent choice at every level of the program. Learning assistance professionals have unique opportunities to teach and reinforce students' academic success strategies. This study's outcomes support that effort in that the participants who were taught learning style strategies believed they retained and applied the information throughout all levels of their degree programs.

One of the foundational assumptions of academic assessment is that students will be able to commit new information to memory then recall it when retrieval is desired or required. The skills and strategies to become an effective learner are learned behaviors, committed to memory and retrieved as needed in much the same manner that factual content is. Many institutions of higher learning give credence to that belief with freshman year experience courses, which they believe will prepare the students for academic success through future years of enrollment. But memories fade with time—a process referred to as decay, and information acquired but not used is at especially high risk for memory decay (Simon, Donoso, Foutz, Lasorsa & Oliver, 2011). Content is often assessed in college settings, but the ability to remember and retrieve academic skills that were taught is often assumed, and only considered deficient based on secondary outcomes—subsequent unsatisfactory grades, failure, or voluntary attrition. This study examined students' recollection and application of academic skills related to their learning styles.

Hundreds of dissertations, research articles and at least one meta-analysis have been published addressing the issue of teaching to students'

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learning styles (McNeal & Dwyer, 1999; Beck, 2001; Lovelace, 2005). This study contributed to the literature with a metacognitive approach to elicit the subjects' own perceptions of retaining learning style self-knowledge and intentionality in applying it at specific intervals after being taught how to identify and maximize their own preferences. The subjects surveyed were students still enrolled in a nursing program one, three, five and seven semesters after receiving learning styles instruction. The purpose of this study was to determine if a correlation existed between (1) students' academic level as they moved through the program, and (2) the degree to which these students intentionally considered and maximized their own learning style preferences.

Literature Review

At least since the times of the ancient Greeks, educators have observed that different students appeared to learn in different ways. Modern era psychologists and educators have differed on how to define learning-specific terminology, using terms such as *learning style, learning preference, personality type, personality trait, multiple intelligences, etc.,* with some overlap and even some contention, not only about the definitions, but about the relevance of the factors. Teaching, assessing, and interpreting the outcomes of students' individual learning styles and how—or if—they intentionally utilize the learning styles in their academic pursuits assumes that the student may possess a degree of ability and willingness to learn and apply them. Albert Bandura (2006) articulated Agency Theory to describe and explain individual intentionality.

Prominent Contributors to Learning Theory

A widely-accepted viewpoint linked the articulation of formal learning theory with psychology, and traced its beginnings to renown psychiatrist Carl Jung's theories of personality types that were first published in 1921 (Silver, 1997; Furnham, Moutafi, & Paltiel, 2005). Jung identified four basic personality types in two contrasting sets: thinking, feeling, sensation and intuition (Mills, 2006) and his work was foundational for some of the most prominent future learning theorists and researchers, as well as psychologists (Myers & Briggs Foundation, n.d.).

From the 1970s onward, interest has increased in expanding awareness and application of learning style assessment. Beginning in 1972, and continuing for more than three decades, the educator/researcher team of Drs. Kenneth and Rita Dunn (and Rita Dunn individually) developed and tested tools for determining individuals' learning styles within a framework of strands or domains (Learning Styles: Official Dunn & Dunn Online Assessments, Surveys & Community, 2010; Schaughnessy, 1998; Lovelace, 2005). The research team based their theories on an exhaustive historical review of learning differences. Rita Dunn, as director of the Center for the Study of Learning and Teaching Styles at St. John's University in Jamaica, NY, addressed significant research and publication to college students' learning styles (Brand, Dunn & Greb, 2002; Dunn, Denig & Lovelace, 2001; Morton-Rias, Dunn, Terregrossa, Geisert, Mangione, Ortiz & Honigsfeld, 2008). Dunn & Griggs also edited a collection of essays written by learning styles practitioners entitled, *Practical Approaches to Using Learning Styles*

in Higher Education that was published in 2000. The official web site of the Dunn and Dunn learning styles theory and research reported that "850+ doctoral studies proving the effectiveness of our model, make it the most thoroughly tested learning styles system of all time" (Learning Styles: Official Dunn & Dunn Online Assessments, Surveys & Community, 2010). Clearly, many educational researchers are interested in learning styles.

Lovelace (2005) performed a quantitative meta-analysis of all the experimental research conducted on applications of the Dunn and Dunn instruments published between 1980 and 2000. Her purpose was to assess the overall effectiveness of the models and to identify and consider the moderating variables. The method was a comprehensive literature search of books, articles and dissertations describing experimental studies with specific variables and cohorts of a minimum size. Of the nearly 700 articles based on Dunn and Dunn theory and instruments, she found 76 that met all of her limiting criteria. She discriminated for moderating variables that affected the effect sizes, and used multiple statistical analyses to calculate effect sizes for achievement, attitudes and behaviors. On the basis of her study, Lovelace concluded that "learning style instruction might be expected to increase student achievement by 25 to 30 percentile points" (p. 179).

Beck (2001) used Dunn instruments and three other instruments developed in the 1980s and 1990s to develop a comprehensive taxonomy of teaching strategies relative to learning styles. One of Beck's stated purposes was "to convince teachers that they have a responsibility to practice a wide variety of teaching strategies to meet the diverse learning styles of their students and to encourage students to expand their learning style preferences" (p.1). Lovelace and Beck's studies support the validity of teaching students about their learning styles and support the investigation described in the present study.

Throughout the final quarter of the 20th century, others explored the assessment of the ways people think and learn, and refining and differentiating between the definitions of terms. In 1977 and 1997, Lemire published the Ego Inventory Instrument to identify "style types as opposed to personality traits" (Lemire & Gray, 2003, p. 233). In 1982, the Gregorc Style Delineator was introduced. Like the Myers-Briggs instruments, it also identified style types based on four combinations of traits: Concrete Sequential (CS), Abstract Sequential (AS), Abstract Random (AR) and Concrete Random (CR) (Gregorc Style Delineator™, n.d.), and continues in use today.

In 1983, Howard Gardner introduced his theory of Multiple Intelligences, one of the outcomes of the Harvard Project Zero, "a critique of the notion that there exists but a single human intelligence that can be adequately assessed by standard psychometric instruments" (Gardner, 2005, p. 13). Dunn, Denig, and Lovelace (2001), noted Gardner's own observation of the lack of empirical evidence for his theory and attempted clarification by comparing multiple intelligences and learning styles.

Kolb's experiential model was introduced in 1984 and Fleming and Mills' sense-based model in 1992. The Kiersey Temperament Model was introduced in 1998, and was groundbreaking in that it viewed an individual's temperament as being an inborn trait of that individual, which has significant

implications for educators, who are always oriented to change.

In the 1980s, the team of Isabel Briggs Myers and her mother, Katherine Cook Briggs, with the goal of making Jung's personality theory practical, developed the Myers-Briggs Type Indicator © (MBTI). Rather than limiting themselves to Jung's three personality types, their assessment tool contained four contrasting indices of preferences: Extraversion-Introversion, Sensing-Intuition, Thinking-Feeling, and Judgment-Perception, resulting in a grid of 16 possible types (CAPT, n.d.). The MBTI instrument has been extensively utilized in a wide variety of contexts in addition to education—business, industry and medicine (Myers & Briggs Foundation, n.d.), and research continues to support the existence of the types.

Combined Teaching and Learning Assessment

In 2001, Zhang published a study in which subjects included teachers and students, not one exclusive of the other. Reflecting the differences in terminology that had characterized learning research, it differentiated between students' *learning approaches* and *learning styles*, and between instructors' *teaching styles* and *thinking styles*. Zhang stated in his conclusion that his study made two contributions to the literature: it verified that there is a relationship between an instructor's learning style and teaching style; and also that both are context-dependent. He tacitly acknowledged that the additional correlations should be addressed in a future study. The Zhang study was a model for limiting foundational learning style research to a basic question of existence of factors, rather than correlations between them, such as was done in the study being reported.

Contrasting Viewpoints

Although the evidence might appear to be overwhelming that learning styles, modalities, or preferences exist and can be identified and maximized, and that students' achievement is higher when their instructors intentionally accommodate learning styles, a few educators discounted the value of learning style accommodation by teachers (Stellwagen, 2001; Olson, 2006), and a few others supported the concept only conditionally (Forrest, 2004; McNeal & Dwyer, 1999). Lovelace, however, after completing her meta-analysis of studies utilizing the work of Dunn and Dunn, was unequivocal. In an interesting conclusion to her Discussion section, she likened educators to medical practitioners. A doctor or a nurse who knowingly withheld a needed treatment that had been proven successful, to the patient's detriment, could be charged with unethical practice. Lovelace stated that the research supporting the benefits of acknowledging different learning styles is so overwhelming that not considering and addressing learning styles in one's teaching is also unethical practice (Lovelace, 2005). In 2007, however, Kavale & LeFever published a rebuttal of Lovelace's findings, criticizing her "interpretation of effect size, narrow focus on a single model, missing information, and, most notably, a sampling bias," (p. 94). They continued, "The proponents of the [Dunn model] must address such concerns before the [Dunn model] can be accepted by the education community" (p. 94). The debate about learning styles continues.

Agency Theory

A theoretical basis for examining students' metacognitive activity was Bandura's Agency Theory. While conducting research on his Social Cognitive Theory, noted 20th century psychologist Albert Bandura observed research subjects who had successfully learned to regulate a phobic negative response. They were willing and able to subsequently try addressing other stressors that had previously elicited negative responses (Pajares, 2004). Their thought (cognition) led to a decision to act (agency), and they were able to do it (efficacy). That sequence was the foundation for Bandura's Agency Theory and parallels the process examined in this study.

Personal Agency

In articulating agency theory, Bandura stated, "To be an agent is to influence intentionally one's functioning and life circumstances" (2006, p. 164). In another resource, Bandura ended his definition of the same term with "environmental events," rather than "life circumstances"(Bandura, 2008, p. 87). "Broadly speaking, *agency* is the capability of individual human beings to make choices and to act on these choices in ways that make a difference in their lives" (Martin, 2004, p. 135). Bandura chose to examine the idea of agency in terms of interactions at various distances from the self. He differentiated between three modes of agency: (1) personal agency, which is carried out by an individual; (2) proxy agency, in which the individual uses personal influence to motivate others to initiate action that benefits them; and (3) collective agency, in which people form groups in order to reach a mutual goal (Bandura, 2002). Bandura believed that the personal agency is the most significant type of agency, and that the most important factor in personal agency is *personal efficacy*, which is also referred to in the literature as *self-efficacy*. Learning and applying one's metacognitive awareness reflects personal agency in intentionality, and self-efficacy in motivation.

Core Properties of Agency

Bandura identified specific core properties of agency: (1) intentionality, (2) forethought, (3) self-reactiveness, and (4) self-reflectiveness (Bandura, 2006, 2008). Individuals plan actions with the *intention* of affecting change. Bandura referred to forethought as "the temporal extension of agency" and "anticipatory self-guidance" (2006, p. 164). Forethought gives intentionality direction. Self-reactiveness is the ability factor: having what is required to turn the intentions into actions. Self-reflectiveness is metacognitive ability to remember and interpret. The individual's reflective conclusions are then used as the basis for judging those actions and for planning future actions based on those judgments. The core properties of Agency theory have particular relevance to the study of learning style application by students.

Method

Based on the vast number of studies which have been published addressing students' learning styles, this study assumed the validity of learning style theory. Because the goal was only to address students' perceptions, not quantitative course outcomes, a metacognitive approach based on a survey was utilized.

Background of the Study

A group of faculty and professional staff at a small Midwestern college of nursing requested and was awarded a grant to design and implement an academic intervention course in academic years 1995-96 and 1996-97. As a result of the outcomes, a success skills course was designed for the freshman level in the program. The one-semester-hour, for-credit course was taught by the college's learning assistance professional for 10 successive fall semesters, through fall of 2007, after which the course was moved to the sophomore level.

Each fall, the first-year students were taught basic learning style theory and were assigned related reading. They self-identified their dominant thinking preferences and learning style dominances via several metacognitive assessments, and they held a one-to-one meeting with the instructor to discuss the academic and learning style preference results of the Nurse Entrance Test©, the most comprehensive of the assessments. The instructor/researcher tallied the responses and throughout the course, tailored the teaching modes to the class dominances and consistently, intensively, taught and encouraged metacognitive activities relative to learning styles. Throughout the course, the students were provided with a variety of specifically-planned experiences aimed at teaching them to increase their awareness of their own thinking and learning style dominances, maximize their preferences, and adapt when information was presented in their less-preferred learning styles.

Years of informal tracking indicated that students who took the class were more academically successful than those who did not, but no formal assessment had ever been done to see if students who took the class still intentionally applied the learning style strategies as they continued through four years of the baccalaureate nursing program. This research study addressed the question, "Is there a correlation between the degree to which students recall and apply learning styles information and the amount of time since they were taught to recognize and maximize their own learning styles?"

The time addressed was the year of enrollment in the program. The survey was administered in the spring semester; therefore, participants were one, three, five and seven semesters post-instruction about learning styles. The study hypothesis was that the greater the time lapse between the semester the learning styles content was taught and the survey, the less mindful application of learning styles self- knowledge there would be, indicating a lesser degree of metacognitive activity.

Site

This study was conducted in a small, fully-accredited, single-purpose college of nursing affiliated with a regional medical center. The site was located in a city of approximately 40,000 in the rural Midwest.

Sample

A convenience sample was utilized. The sample consisted of all students who had completed the success skills course as a first-semester student in the baccalaureate nursing program and were still enrolled in the college in

the spring semester of the year of the study as a freshman, sophomore, junior or senior nursing student.

The enrollment at the site college at the time of the study was approximately 150. The enrollment included advanced placement students in several "tracks," such as L.P.N. to B.S.N., A.D.N. to B.S.N., etc., as well as students from two partner institutions. None of the advanced placement students or students from one of the partner colleges were required to take the freshman course that included the learning styles content; therefore, only 52 students were enrolled who had taken the course in which the learning style instruction was given, and therefore eligible to participate in the study. All but one of the 52 signed the informed consent and participated, a 98% participation rate.

Design

The research design for the small pilot study was descriptive and correlational. A survey was administered to all subjects in the sample and the data were analyzed with descriptive statistical applications by level and by response. It included correlational data analysis to identify and describe any correlation between the reported level of recollection/application (Statement Q6) and the subject's current level in the nursing program (Statement Q7). The researcher hypothesized that a negative correlation would exist between the subjects' reported recollection/application of learning style information taught in the freshman success skills course and the subjects' levels in the program at the time of the survey: that is, the higher the level in the program, the lower the recollection/application of the strategies learned the first semester of the freshman year would be. Data retrieved from statements other than Q6 and Q7 were considered informational and not directly related to this analysis.

The research site required all formal research involving human subjects to receive approval of an Institutional Review Board (IRB). The research design was formalized, submitted to the IRB process, and received approval. The IRB review included the consent form and the assessment tool.

Instrument

A ten-question Likert scale survey was developed by an associate faculty member of the college and peer-reviewed by members of the Institutional Review Board. Page 1 was the informed consent document entitled "Research Survey," and page 2, printed on the reverse side of the paper, was the actual survey, entitled "Learning and Teaching Styles Survey." (See Appendix A: Research Survey and Learning and Teaching Styles Survey). The instrument made statements about five specific personal learning/thinking characteristics that had been identified, assessed, and emphasized throughout the freshman success skills course: three learning style preferences (visual, auditory, kinesthetic), and two hemispheric thought dominances (right brain, left brain) and asked participants to indicate level of agreement.

The second set of five statements on the survey consisted of two statements about the student's perception of competency in applying his/her own learning and thinking styles/preferences, and three statements

about the students' preferred teaching style. Including these statements of self-perception is consistent with the agency aspect of Bandura's Social Cognitive Theory. Personal agency includes intentionality and forethought about what one can do (Bandura, 2002), both characteristics of one who is learning and continually applying a discrete body of knowledge. The means of response was designed as a Likert scale from 0 to 5, with 0 being "Don't Know," 1 being "Strongly Disagree," and 5 being "Strongly Agree". The higher number would be the more positive the response. One of the two independent variables, assessed by statement Q7, was the level in the baccalaureate nursing program.

In this small college, the nursing faculty (as well as the researcher) was interested in knowing if their students were applying the instruction they had received in the success skills course. Each student in the sample was sent a copy of the survey via email, with several options for returning it. When the return rate was low, the nursing faculty at all four levels in the nursing program invited the researcher to personally present the opportunity to participate at a designated time in their classes. Following the brief presentations, consent forms and 51 valid surveys were completed and returned: two online and the remainder hard copies. The cohort of subjects was comprised of 29 first year/freshman Nursing majors, 11 sophomore Nursing majors, eight junior Nursing majors, and three senior Nursing majors.

Interpretations Summary

A positive correlation between length of time and application of the information would mean that as time passed (increased) after the instruction, the students' recollection and application would also increase. Based on theory and research on forgetting, that would not be the expected finding. Memory/forgetting theory asserts that as new information is learned, previously-learned information that is not reinforced can be displaced from short term memory. An additional risk is retrieval failure, in which no cue presents that will trigger retrieving the learning style knowledge when it is needed at a later time (Simon, Donose, Foutz, Lasorsa, & Oliver, 2011).

A finding of no correlation between time and recollection and a negative indication of use of learning style knowledge would indicate the students were not benefiting from the instruction, which would be a curricular issue for the College to address. A finding of no correlation between the time and recollection variables in this study, but a positive indication of use, could indicate that the students were maximizing their knowledge without ongoing external reinforcement or cues to recall and apply the metacognitive skills relative to learning style. State (internal) dependent cues would result from continually retrieving and applying the skill. Metacognitively applying learning style adaptations would have become its own cue, thereby, continually reinforcing the memory. From the educator's viewpoint, that would be the desired outcome: initial, appropriate teaching/learning would be so effective that long-term retention would be supported through voluntary repetition.

A negative correlation between time lapse and application would mean that as time passed (increased) after the instruction, the students' recall and application would decrease. That would be the expected finding, based on theory and research on forgetting, reinforcement and recall (Loftus, 1985). The implication of finding a negative correlation—forgetting—would be that

learning styles instruction needs to be repeated periodically throughout a student's academic experience in order to be recalled and utilized.

Results

The hypothesis that students would recall and apply learning style knowledge less and less as they moved through the nursing program was not sustained. The responses to the statement, "I try to use study strategies that match my learning style," remained high throughout all four levels of the four-year nursing program. There was no statistical correlation between the level in the program and the degree to which student reported that they intentionally applied learning styles information to their learning: all reported applying it at a high level.

A Cumulative Frequency Display determined that of the entire cohort, 96.1% of all the students responded at 3.0 or higher on Statement 6 (Q6): "I try to use study strategies that match my learning style" There were no responses of 0 (Don't know) or 1 (Strongly disagree) at any class level.

Table 1. Cumulative Frequency Display for Responses to Q6

Responses on Likert Scale	Frequency	Percent	Valid Percent	Cumulative Percent
0	0	0	0	0
.5	0	0	0	0
1	0	0	0	0
1.5	0	0	0	0
2	2	3.9	3.9	3.9
3	8	15.7	15.7	19.6
3.5	2	3.9	3.9	23.5
4	14	27.5	27.5	51.0
4.5	4	7.8	7.8	58.8
5	21	41.2	41.2	100
Totals	51	100.0	100.0	

The researcher utilized a Stem and Leaf Display to identify that the median score for the entire cohort was 4, and the mean was 3.94. An SPSS statistical analysis indicated a mean on Q6 of 4.1961 (on a 5-point scale), with a standard deviation of .8549. The range (5-2) was 3. (See Table 2).

Table 2. Stem and Leaf Display

Responses on Likert Scale	Number of Responses to Question 6: "I try to use study strategies that match my learning style."
1.5-2	22
2.5-3	33333333
3.5-4	3344444444444444
4.5-5	44445555555555555555555

5= Strongly Agree 1= Strongly Disagree 0= Don't Know

Levels 1 (Nursing interest) and 2 (freshmen) were combined for this analysis because they were both first-year students, in the same nursing classes together, and, therefore, equally removed in time from the learning styles instruction. The mean for Statement 6, "I try to use study strategies that match my learning style," for Combined Level 1 and 2 (Nursing interest and freshmen) was 4.22; for Level 3 (sophomores) 3.95; for Level 4 (juniors) 4.00; and for seniors, 4.67. An SPSS Crosstabulation demonstrated that the most frequently-selected response was 5 at all levels, although at Level 4 (juniors), answers of 3 and 5 were chosen with equal frequency (See Table

Table 3. Q6 Response and Program Level Cross Tabulation

Response to Q6: "I try to match my learning style to what I am studying." ↓	**Nursing Interest and Freshmen** (n=29)	**Sophomores** (n=11)	**Juniors** (n=8)	**Seniors** (n=3)	**Totals** (n=51)
2.0	0	2	0	0	2
2.5	0	0	0	0	0
3.0	4	1	3	0	8
3.5	2	0	0	0	2
4.0	8	3	2	1	14
4.5	3	1	0	0	4
5.0	12	4	3	2	21
% of Class responding at 3 or higher	100%	82%	100%	100%	100%

The hypothesis that the nursing students in this study would be less and less mindful of their learning style and intentionally apply it less and less as they continued through the program was not supported by the results of the study. The class mean of awareness and application decreased only slightly from the freshman to the sophomore year, then increased again the

junior and senior years. Throughout all four years, response 5, "Strongly Agree," was the most frequent response to Statement 6: "I try to use study strategies that match my learning style," although at the junior level, an equal number of option 3 was selected. At the nursing interest/freshman, junior and senior levels, 100% of the subjects responded with at least a score of 3 to Statement 6. All but two of the students (3.1%) who were succeeding at a level high enough to remain in the program believed they were consciously aware of and using the learning style knowledge they gained the first semester of their freshman year at a rate of 3 or higher on the 0-5 Likert scale.

Discussion

This small research study of a discrete population addressed the question, "Is there a correlation between the degree to which students recall and apply learning styles information and the amount of time since they were taught to recognize and maximize their own learning styles?" Forgetting theory suggests that there would be a negative correlation, the longer the time post-instruction, the less retention and application there would be. The results indicated that there is no correlation: students who had been taught to identify and apply learning styles information believed they retained the knowledge and intentionally applied it at a high level throughout their college experience, demonstrating a high level of self-efficacy.

Limitations

A significant limitation of this study was that all data were subjectively reported by the subjects. Replication studies would be needed to establish the external reliability of their responses, and quantitative correlations would help establish the meaningfulness of the responses, i.e., even if they did recall and use the information, did it help?

The sample for this study was small: n=51. The study was conducted with a convenience sample because (1) every eligible student in the college comprised the population, so it could not be enlarged at this site, (2) only that specific cohort had all received the same instruction in the same class from the same faculty, and (3) the lean design eliminated most extraneous variables and provided the opportunity to support evidence-based practice. Larger samples would provide more robust data, but would necessitate using a different site and a different population. Many of the recommendations for future research that follow correspond to the possible limitations of this study.

This study's research design included the Spearman's *r* statistical analysis to see if higher intentional use of the learning styles knowledge correlated with higher grades. Since the mean scores for all classes were high and showed no arithmetic variance from one to another, that statistical analysis was not run. With a larger sample, more robust statistics could be run.

Implications

This small, pilot study of a targeted sample achieved its goal of determining the degree to which four cohorts of nursing students believed they recalled and maximized their own learning style preferences after

receiving instruction while first-semester students. It has significance because it reflects the students' own perceptions, which inform self-efficacy, which is a construct of sufficient importance to pursue as academic support apart from immediate quantitative grades outcomes. It also has implications for the role of learning assistance professionals in providing learning styles information and assessment to students.

Instruction

Learning assistance professionals often fulfill the role of instructor of success skills in higher education settings in classes, workshops and individual interactions. Adequate research exists to support the benefits of teaching students about learning style preferences to legitimately consider learning style awareness a success skill. For some students, that interaction may be their only opportunity to learn to assess and address their own strengths and challenges relative to learning style preferences, strengths and challenges. Learning assistance professionals who are knowledgeable about assessment and maximization of personal learning style preferences can provide assessment tools, instruction, and reinforcement, both initially and on an ongoing basis, to students who may not have any other means of access to it.

Learning styles information could be a valuable complement to tutoring skills. A tutor who can quickly assess and determine that the client with whom s/he is meeting is very dominantly visual would present information differently from how s/he would present it to a client who is very dominantly auditory. Diagramming a sentence structure for a dominantly visual second language student instead of just explaining it verbally could make the difference between effectively communicating a much-needed clarification, and not successfully communicating it at all.

This small study was exploratory in that was extremely limited, and its results can be used to contribute to hypotheses for future research efforts. Although a significant body of literature supported the premise that the instructor's accommodation to students' learning styles resulted in higher achievement, additional correlational research needs to be done to determine if students' intentional application *apart from the faculty awareness and adaptation*, results in higher achievement.

Self-efficacy

Prominent self-efficacy theorist, Albert Bandura, relied on much subjective data in his extensive, multi-decade research supporting social cognitive theory, agency and self-efficacy (Bandura, 2002). Comparing quantitative evidence of various academic outcomes is a needed next step in the research. A next logical question to address is if there is statistical correlation between thinking one is using the strategy, using the strategy, and benefiting from the strategy.

A recent IRB-approved formal study of nursing students who were and were not taught a specific success strategy included a self-efficacy component as well as a statistical analysis of their test grades. Students in the experimental group who learned the success strategy earned higher test scores at a rate that was statistically significant, and also scored higher

on the post-intervention self-efficacy survey with a difference that was statistically significant (Mayfield, 2010). In future learning style studies, determining if learning style self-awareness contributed to the students' self-efficacy would be desirable information, particularly if it were a small study in which the raw scores on the academic factor were homogeneous. Numerous instruments assessing self-efficacy have been developed and tested. One such instrument available to researchers is the General Self-Efficacy Scale (GSE) (Jerusalem & Schwarzer, 1979). It has been used for more than three decades, in more than 20 countries and languages, and subjected to numerous validity and reliability studies. The GSE would be an accessible and efficient tool for future studies.

If two variables were studied, such as self-efficacy and grades, and only self-efficacy presented a strong difference between the groups, that may still be adequate evidence to support an intervention based on only that variable. Numerous studies indicated a strong relationship between self-efficacy and academic success, so providing a metacognitive skills set might result in higher present self-efficacy and higher future grades, even if that variable is not different at the present time. A single assessment gives data, but a correlational assessment composed of two dependent variables would produce stronger results, and longitudinal studies of the same students would provide even stronger data.

A study designed to compare scores on the perceived maximization of one's own learning style and grades earned in general education courses and courses in the major would provide valuable data. A study designed to survey students who had dropped out or been dismissed from the program and compare their responses to the scores of students who had been successful and remained in the program, would provide the data needed to assess the potential for correlation between program success and application of learning style knowledge. A study comparing outcomes based on the way the student learned about learning styles—in class, online, from a tutor, etc., would also provide evidence upon which to base future directions for the objectives of learning center personnel relative to their clients and the training provided for tutors.

Conclusion

This small, focused, pilot study indicated that subjects who had learned how to self-assess and maximize their learning style preferences believed they retained and applied the information with intentionality throughout their four-year college program. Although counter to expectations based on memory/forgetting theories, Bandura's Agency Theory supports the findings. Future studies designed with a more robust statistical application, a correlation between responses and grades, a self-efficacy pre- and post-intervention assessment, and a larger sample, would give additional basis for valid comparison and provide the means for establishing the reliability and validity of the instrument. At this point, the results of this study are a promising step.

References

Bandura, A. (2002). Social cognitive theory in cultural context. *Applied Psychology, 51*(2), 269-290. Retrieved June 19, 2011, from http://des.

emory.edu/mfp/Bandura2002AP.pdf doi: 10.1111/1464-0597.00092.

Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on Psychological Science (1)*, pp. 164-180. Retrieved from http://des.emory.edu/mfp/Bandura2006PPS.pdf.

Bandura, A. (2008). Reconstrual of "free will" from the agentic perspective of social cognitive theory. In J. Baer, J. C. Kaufman & R. F. Baumeister (Eds.), *Are we free? Psychology and free will* (pp. 86-127). Oxford: Oxford University Press.

Beck, C. R. (2001). Matching teaching strategies to learning style preferences. *The Teacher Educator, (37)*1. doi: 10.1080/08878730109555276.

Brand, S., Dunn, R., Greb, F. (2002). Learning styles of students with attention deficit hyperactivity disorder: Who are they and how can we teach them? *Clearinghouse (75)*5. doi: 10.1080/00098650209603953.

CAPT (n.d.). Jung's Theory of Psychological Types and the MBTI Instrument [webpage]. Retrieved from http://www.capt.org/mbti-assessment/mbti-overview.htm.

Dunn, R., Denig, S., Lovelace, M. K. (2001). Multiple intelligences and learning styles: Two sides of the same coin or different strokes for different folks? *Teacher Librarian (28)*3, 9-15. Retrieved from http://www.teacherlibrarian.com/.

Dunn, R., & Griggs, S. (Eds.) (2000). *Practical approaches to using learning styles in higher education* [abstract]. Westport, CN: Greenwood Publishing Group.

Furnam, A., Joutafi, J., & Paltiel, L. (2005). Intelligence in relation to Jung's personality types. *Individual Differences Research, (3)*1. Retrieved from http://www.idr-journal.com/index.html.

Forrest, S. (2004). Learning and teaching: The reciprocal link. *Journal of Continuing Education in Nursing, (35)*2, Retrieved from http://www.slackjournals.com/article.aspx?rid=4356.

Gardner, H., Shulman, L. S., (2005). The professions in American today: crucial but fragile. *Daedalus, (134)*3, 13-18. Retrieved from http://www.mitpressjournals.org.

Gregorc Style Delineator—self assessment instrument for adults (n.d.). [Website]. Retrieved June 20, 2011, from http://gregorc.com/instrume.html.

Kavale, K. A., & LeFever, G. B. (2007). Dunn and Dunn Model of Learning-Style Preferences: Critique of Lovelace meta-Analysis. *Journal of Educational Research (101)*2, 94-97. Abstract retrieved from http://www.heldref.org.

Jerusalem, M., & Schwarzer, R. (1979). The General Self-Efficacy Scale (GSE) [Assessment instrument]. Retrieved from http://userpage.fu-berlin.de/~health/selfscal.htm.

Learning Styles: Online Learning Style Assessments & Community (2010).

[Website]. Retrieved from http://www.learningstys.net/en/about-us.

Lemire, D. & Gray, J. (2003). Brief report: An introduction to learning styles for developmental educators Part II: The Ego Inventory. *Journal of College Reading and Learning (33)*2. Retrieved from http://www.crla.net/journal.htm.

Loftus, G. R., (1985). Evaluating forgetting curves. *Journal of Experimental Psychology: Learning, Memory, and Cognition, (11)*2. doi: 10.1037/0278-7393.11.2.397.

Lovelace, M. K. (2005) Meta-analysis of experimental research based on the Dunn and Dunn model. *Journal of Educational Research, (98)*3. doi: 10.3200/JOER.98.3.176-183.

Martin, J. (2004). Self-regulated learning, social cognitive theory, and agency. *Educational Psychologist, 39*, 133-145. doi: 10.1207/s15326985ep3902_4.

Mayfield, L. R. (2010). Effects of learning Mayfield's Four Questions (M4Q) on nursing students' self-efficacy and multiple-choice test grades. Liberty University doctoral dissertation published online at http://digitalcommons.liberty.edu/.

McNeal, G. H. & Dwyer, F. (1999). Effect of learning style on consistent and inconsistently designed instruction. *International Journal of Instructional Media, (26)*3, pp. 337-45. Retrieved from http://www.adprima.com/ijim.htm.

Mills, R. (2006). The Keirsey Temperament Model: A model for helping educational administrators facilitate ethical decision making. *Education, (26)*3. Retrieved from http://www.projectinnovation.biz/education.html.

Morton-Rias, D., Dunn, R., Terregrossa, R., Geisert,G., Mangione, R, Ortiz, S, Honigsfeld, A. (2008). Allied health students' learning-styles identified with two different assessments. *Journal of College Student Retention: Research, Theory & Practice, (9)*, 2. Retrieved from http://baywood.com.

Myers & Briggs Foundation (n.d.). [website] Retrieved from http://www.myersbriggs.org.

Olson, J. K. (2006, October). The myth of catering to learning styles. *Science & Children*. Retrieved from http://www.nsta.org/publications/journals.

Pajares, F. (2004). Albert Bandura: Biographical Sketch. Retrieved from http://des.emory.edu/mfp/bandurabio.html.

Shaughnessy, M. F. (1998). An interview with Rita Dunn about learning styles. *The Clearing House, (71)*3, pp. 141-5. doi: 10.1080/00098659809599346.

Silver, H. F. (September, 1997). Integrating learning styles and multiple intelligences. *Educational Leadership, (55)*, pp. 22-7. Retrieved from http://www.ascd.org/publications/educational-leadership/sept97/vol55/num01/Integrating-Learning-Styles-and-Multiple-Intelligences.aspx.

Simon, L., Donoso, D., Foutz, K., Lasorsa, M., Oliver, S. (2011). Forgetting to remember important course information: Instructors' perspectives. *College Student Journal, (45)*1. Retrieved http://www.projectinnovation.biz/csj.html.

Stellwagen, J. B. (May/June, 2001). A challenge to the learning style advocates. *The Clearing House, (74)* 5. doi: 10.1080/00098650109599205.

Zhang, L-F. (2001). Approaches and thinking styles in teaching. *The Journal of Psychology, (135)*5. doi: 10.1080/00223980109603718.

Appendix A

Research Survey©

Researcher: Linda Riggs Mayfield, MA, Associate Faculty
Blessing-Rieman College of Nursing
Quincy, IL 62305-7005

Approval: This research proposal was formally submitted and has received the approval of the Internal Review Board (IRB) of the Research Committee of Blessing-Rieman College of Nursing.

Purpose: The purpose of this survey is to assess the degree to which students who complete NSG 103: Success Skills for Lifelong Learning retain and apply their understanding of learning and teaching styles in subsequent semesters of their college experience at Blessing-Rieman College of Nursing, and secondarily, to determine if there is a correlation between applying that knowledge and the students' grade point averages. The data will be analyzed as part of doctoral course requirements of the Researcher. The results will be used to make curricular decisions about future NSG 103 course content, and may be submitted for publication.

Confidentiality: The responses will be kept in strict confidence, in accordance with standards of professional scholarship and the stipulations of the policies of Blessing-Rieman College of Nursing. No student's personal identity will be utilized or revealed in any reporting of the survey results.

Consent: Completion and return of the statement below with student's name and class level filled in will constitute consent to use the data for the research study.

I, have read, understand, and agree to the terms of this research survey. I am completing it on this date:

I am now enrolled as a (circle one) NI FR SO JR SR student in the nursing program.

Signature:

General Directions:
Participants may complete the survey online and return it as an email attachment to limayfield@brcn.edu ; or print or pick up a hard copy and submit it in the box marked for that purpose in the Library Computer Lab; or place a hard copy in Linda Riggs Mayfield's mailbox in the Academic Assistant's office.

Please see the next page (or back of hard copy) for the Survey.

Appendix A- continued

	Learning and Teaching Styles Survey NSG 103 Students Blessing-Rieman College of Nursing 2002-2006 Please reflect, then indicate to what degree you agree with the statement by placing an "x" under the appropriate number on the Likert Scale.	Strongly Agree				Strongly disagree	Don't know
		5	4	3	2	1	0
	Sample: I know my dominant learning style	**X**					
1	I am a dominantly visual learner						
2	I am a dominantly auditory learner						
3	I am a dominantly auditory learner						
4	I am a dominantly kinesthetic learner						
5	I tend to be a dominantly left-brain thinker.						
6	I try to use study strategies that match my learning style.						
7	My preferred teaching style is lectures.						
8	My preferred teaching style is activities						
9	My preferred teaching style is reading assignments and presentations by others.						
10	If an instructor teaches in a style that does not match my preferred learning style, I know skills that help me adapt.						