Learning Styles: Theories and Pedagogical Strategies

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Introduction

One of the most debated and disparate concepts in the teaching literature is the study of learning styles. Almost everyone in the education field agrees that different students learn best in different ways. There is far more disagreement, however, when it comes to classifying these learning styles. Educators and researchers are often daunted by the multitude of definitions, theoretical models, and learning style instruments (Desmedt and Valcke 2004). If a classification system was widely agreed upon, there would still be problems in developing an assessment tool capable of accurately determining each student's learning style. Furthermore, even if this was accomplished, the current body of research on this topic doesn't provide a convincing recommendation for how pedagogical practices should be altered in order to improve student learning outcomes. This paper will provide a brief overview of the learning styles literature, outlining the major classification theories and the pedagogical strategies employed.

Classification Systems

Currently there are 13 major models of learning styles that can be found in the literature (Coffield et al. 2004). Two of the most predominant and widely used are Kolb's Learning Style Inventory (LSI) and the Myers-Briggs Type Indicator (MBTI). The LSI, developed in 1981, is derived from an experiential theory and model of learning developed by Kolb. This test categorizes learners into four prevalent learning categories: Diverging, Assimilating, Converging, and Accommodating (Kolb 1981). Divergers are best at viewing concrete situations from many different points of view and prefer brainstorming sessions as a way to generate ideas. Assimilators can logically process and organize a wide range of information and are more interested in ideas and abstract concepts. Convergers are best at finding practical uses for ideas and theories and enjoy solving problems. Accommodators often rely heavily on information from others and take actions based on instinct rather than logical analysis. According to Kolb's model, individuals may exhibit a preference for one of the four styles depending on their approach to learning.

The Myers-Briggs Type Indicator classifies individual's along four different personality scales. The scales identify how the individual relates to the world (Introvert or Extrovert); processes information (Sensing or Intuitive); makes decisions (Thinking or Feeling); and evaluates the environment (Judging or Perceiving) (Lage et al. 2000). Whereas Kolb's experiential learning model focuses on how students take in and process information, the MBTI focuses on how students' personality traits affect their learning styles and their preferred methods of teaching. In essence, the MBTI is meant to determine how the ways in which individuals reach conclusions affect their interests and motivations.

Implications for Pedagogy

Assuming that the previously described theories and instruments accurately measure learning styles, the question still remains as how to best use this information to benefit the students' learning outcomes. Many have proposed matching students and teachers who have similar learning styles in an effort to provide a learning environment where students are able to be taught by someone with similar personality attributes, who processes information in a manner similar to the students. Some research has found that when the students' and teachers' learning styles are seriously mismatched, the students are likely to be uncomfortable, bored, and inattentive, resulting in poor performance (Felder and Spurlin 2005). For example, students who are classified as accommodators under Kolb's LSI prefer hands-on application as a way to process information and may do better with a teacher who focuses on classroom exercises and experiments than with a teacher who prefers to lecture.

There are, however, problems with this type of matching. The primary concern is that students who are taught only in the type of method that they are comfortable with, fail to develop the skills required to learn in other ways. Students who are channeled into certain teaching environments may begin to believe that they are only capable of learning in certain environments and may discount other methods of learning, of which they may not have previously been exposed. As these students progress in their educational careers, they may enter environments that do not offer such flexible teacher-student matching and find themselves unable to adapt to their current environment. Although the benefits of this type of matching may increase student learning outcomes in the short run, the long run consequences may be detrimental to the student.

A better solution that has been proposed is for teachers to modify their methods of teaching in accordance with the learning styles of their students. This first requires teachers to understand the learning styles of both their students and themselves. In the absence of any formal assessment it is generally thought that teachers default to their own learning preferences, presumably because they found that style of learning effective for themselves (Healey et al. 2005). Teachers may be unaware that their style of teaching is ineffective for the majority of students in their classroom. By having a general understanding of the spectrum of learning styles most effective for their students, teachers can tailor their instruction in a way where the students are exposed to a variety of teaching methods. This not only ensures that the students receive

some instruction in the style that they most prefer, but also that they are exposed to numerous other methods of learning that may be helpful to the students in the future.

Having teachers and students assess themselves with regard to learning styles can potentially have multiple benefits. By understanding their dominant learning preference, teachers can avoid only teaching to their preferred style of learning. More importantly, by students recognizing their strongest style of learning, they may become aware of strategies to learn more effectively in situations where their dominant mode is not being used (Haar et al. 2002). Caution should be taken however to prevent students from making decisions based solely on learning style preferences. One finding of Kolb's research was that people tend to choose fields that are consistent with their learning styles and are further shaped to fit the learning norms of their field once they are in it (Kolb 1981). Kolb collected data on the learning styles of undergraduate students in the U.S. and used the information to categorize disciplines by various learning styles (Figure 1).

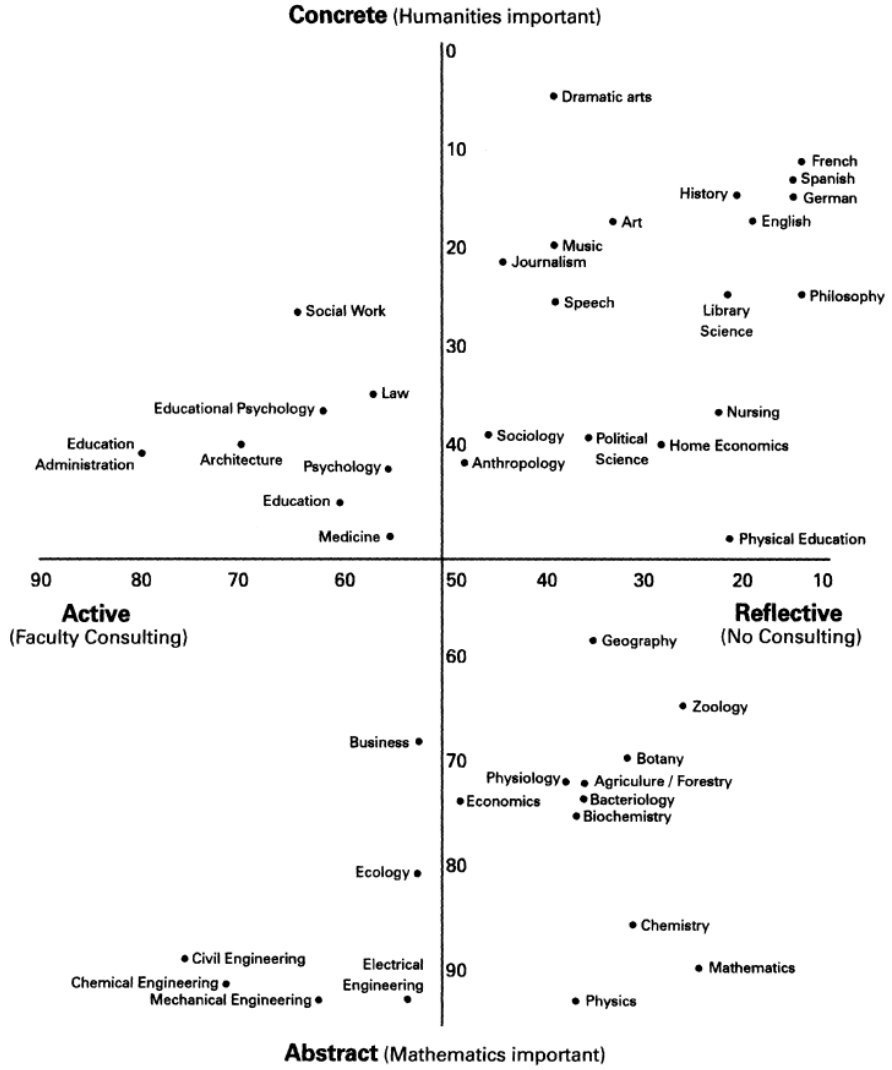

Figure 1: Concrete/Abstract and Active/Reflective orientations of academic fields (from Kolb, 1981)

This categorization was not meant to be a tool for matching students with disciplines, but rather was meant to illustrate how higher education was encouraging early specialization of students, which was not preparing them for the integrative learning experiences that they would encounter throughout their adult lives. Kolb suggested students would be best suited by being exposed to all different types of learning styles in order to maximize their development as learners. Further research into teacher-student matching found that the aim within academic departments should be to produce balanced learners with a full range of learning capacities, rather than simply matching teaching to existing learning styles (Healey et al. 2005). A separate study found that instructors or advisors who use learning styles as a basis for recommending curriculum or career choices are misusing the concept and could be doing serious disservices to their students and advisees (Felder and Spurlin 2005).

Perhaps a broad exposure to different learning environments is in the best long-run interest of students, but what about students in schools that are extremely underperforming? Some have argued that the schools that produce the lowest test scores would benefit their students by focusing solely on teaching students using the methods that are best suited to their personalities. Even though the students may not develop the skills required to learn in all different environments, they at least could attain some baseline level of knowledge. In 1999 the school district of Freeport, IL was mandated by court ruling to change their methods of instruction in order to accommodate what had been a very low scoring population of minority students. In response to this ruling, teachers identified their students' learning styles using the Learning Style Inventory and began to tailor their classroom instruction to the individual student's learning styles. Data of test scores before and after the intervention show that test scores improved in reading, language, and math, which was attributed to the new focus on individual learning styles (Burke and Dunn 2002).

This experience, however, was not the first of its kind. Previous to the Freeport experiment more than thirty schools or school districts throughout the United States with poorly achieving minority students specifically adapted their teaching methods to the learning styles of their students. In every case the students earned statistically higher achievement test scores after only one year of a learning style approach. Those students continued that upward trend for the next two to three years, during which their gains were monitored and reported (Dunn and DeBello 1999). Although the administrators of these interventions claim that teaching to the students' learning styles was the cause of the increased test scores, this may not necessarily have been the case. The school districts that undertook these programs did so because there was tremendous external pressure to increase the test scores of their students. It is likely that the teachers in these schools not only adjusted their methods of teaching to better match the students learning styles, but also improved the quality of their teaching in general because of the external focus on the school. Principals and school administrators likely increased their involvement with the teachers and the students in order to facilitate a successful outcome of the intervention. Because of the numerous factors involved, it is difficult to attribute the improvements in the students' test scores solely to the focus on learning styles.

Ultimately these programs had positive outcomes, so this is not to say that efforts should not be taken to adapt teaching methods to learning styles, but researchers and policy makers should strive to understand whether or not a causal relationship does in fact exist. If one does, then efforts to identify and cater to the learning styles of low performing students should be expanded to other schools that are searching for ways to increase student performance. If one does not, then perhaps more comprehensive programs directed at teacher accountability can provide the needed stimulus in many poor performing schools.

One final, but important area in the literature of learning styles that has been taken for granted is whether or not teachers can accurately identify their students' learning styles. The vast majority of teachers report that they understand the learning styles of their students, but one study which measured the learning styles of the students and compared the results to the teachers' perceptions found that teaches frequently misinterpreted the learning style preferences of their students and that experience did not help teachers become any better at predicting students' learning styles (Pettigrew 1989). Even if it is beneficial for teachers to cater to their students learning styles, this cannot be done unless teachers have the ability to accurately diagnose their students' learning styles. A universally accepted measurement tool for doing this would greatly assist in this endeavor.

Conclusion

While much research has been conducted into understanding students' learning styles and determining the practical implications of this knowledge, there is still much to be determined in this field. One overview of the theories and measurements of learning styles concluded, "For those working within an educational setting wishing to utilize learning style to promote more effective learning, whether through individual or group profiling, design of instructional methods, or identifying learner preferences, operationalising learning style is a necessary but highly problematic endeavor" (Cassidy 2004). Given the vast amount of differing conclusions on this topic, many educators may be left without a clear idea of how to use this information going forward. The best course of action for teachers is probably to offer a diverse set of learning experiences in order to ensure that students of all styles are able to grasp the information in the ways that best suit their personalities. This will also provide an opportunity for all students to develop strategies for learning in multiple ways. Further research on the topic of learning styles can help answer some of the unresolved debates in the literature and lead to solutions that will improve the performance of both students and teachers.

Annotated Bibliography

Burke, K., and R. Dunn. "Learning Style-Based Teaching to Raise Minority Student Test Scores: There's No Debate!" ***The Clearing House*****, 76(2), 2002, 103-106.**
This article describes the results of a court ruling in 1999 that mandated that the school district of Freeport, IL bring minority students up to the academic level of the majority and respond better to the diversity among Freeport's students. In response to this ruling, teachers identified their students' learning styles using the Learning Style Inventory and began to tailor their classroom instruction to the individual student's learning styles. Data of test scores before and after the intervention show that test scores improved in reading, language, and math. The authors attribute the increase in these test scores to the new focus on individual learning styles. They recommend that school districts across the United States begin retraining their current teachers on more effective teaching techniques that are directed at teaching to individual student's learning styles.

Cassidy, S. "Learning Styles: An overview of theories, models, and measures." ***Educational Psychology: An International Journal of Experimental Educational Psychology*****, 24(4), 2004, 419-444.**
This article provides a resource for educators who wish to further understand the different methods that have been used to understand the existence and importance of different learning styles. The authors present an overview of theories, instruments and empirical work in the field of learning style. The study uses findings from existing literature on learning styles to summarize the effects of different learning styles on areas such as academic achievement, clinical training in medical schools, career development, and police training. In most instances the authors find that it is important to take into account the full range of learning styles to account for individual differences in learning. They recommend applying a more student-centered approach that will allow educators and trainers to more effectively target their audience and provide the type of instruction that will maximize student learning. In terms of research, they find that a vast number of disparate attempts to explain and measure learning styles has made it difficult for practitioners to synthesize the numerous empirical and conceptual frameworks that have been presented. They recommend deliberately choosing a model which reflects a broad awareness of the field in order to allow the results and outcomes of future research to be more clearly understood.

Coffield, F., D. Moseley, E. Hall, and K. Ecclestone. "Learning styles and pedagogy in post-16 learning." Learning and Skills Research Centre, London. 2004.
This project argues that one of the problems with understanding the existence of learning styles is that there are conflicting assumptions about the process of learning. They cite some theories that highlight the importance of brain function in understanding how people learn, claiming that specific neural activity can be identified in different areas of the brain. Other research they

investigate derives it theories from psychological theories, such as personality traits, intellectual abilities and fixed traits that contribute to the formation of learning styles. These different theories have implications for the types of assessments that can be used to identify learning styles. This also has major implications for pedagogy. If fixed traits and abilities do determine learning styles, then it may be beneficial to find ways to best diagnose learning styles and design interventions that tailor to the student. If learning styles are more fluid, however, this might lead to labeling students and promoting a narrow view of matching students to teachers in a way that is inefficient. Ultimately the report finds that the vast disagreements amongst researchers as to the different types of learning styles and ways to best assess them has complicated the field of study and requires further analysis before this topic can be better understood.

Desmedt, E., and M. Valcke. "Mapping the Learning Styles "Jungle": An overview of the literature based on citation analysis." ***Educational Psychology: An International Journal of Experimental Educational Psychology*****, 24(4), 2004, 445-464.**
This paper uses citation analysis as an alternative way to organize the learning style literature. The authors look to highlight the dominant theories and their relative impact to assist novices to the learning styles field. Variations in definitions, theoretical models, and learning style instruments has made it difficult for educators to utilize the existing literature to help them make informed choices in the classroom. The study finds that the most relevant learning style literature is that of Kolb whose theory says that based on previous experiences, learners program themselves to grasp reality through a particular pattern of emphasis on the four modes of learning: concrete experience, reflective observation, abstract conceptualization, and active experimentation. The Learning Style Inventory (1981) was created to assess these orientations towards learning.

Dunn, R., and T. C. DeBello. ***Improved test scores, attitudes, and behaviors in America's schools: Supervisors' success stories*****. (West-port, CT: Bergin and Garvey), 1999.**
This book provides an overview of the Dunn and Dunn learning-styles approach that has been used in many schools throughout America. Numerous case studies are presented that indicate that when the Dunn and Dunn learning-styles approach is used, schools report statistically higher standardized achievement and aptitude test scores among average, poorly achieving, and Special Education students. The various chapters of the book offer a variety of situations in which this method has been effective.

Felder, R., and J. Spurlin. "Applications, Reliability and Validity of the Index of Learning Styles." ***International Journal of Engineering,*** **21(1), 2005, 103-112.**
This paper discusses the Index of Learning Styles (ILS) and its usefulness in assessing preferences on the four dimensions of the Felder-Silverman learning style model. In 1997 a web-based version of the ILS was created on the internet which is widely used by teachers and students who use the information for classroom instruction or research. The authors of the paper

look to understand the underlying assumptions of the model upon which the ILS is based and to determine whether or not the ILS is a reliable test in determining students' learning styles. The authors claim that understanding the results of the test across a classroom of students can better help a teacher find appropriate ways to present material to the students. They do caution, however, that the test should not be used as a basis for recommending curriculum or career choices to students because doing so may limit their developmental experiences and prevent them from undertaking endeavors in which they may find success. Ultimately, they determine that the ILS is a valid and reliable instrument in determining student learning styles.

Harr, J., G. Hall, P. Schoepp, and D. Smith. "How Teachers Teach to Students with Different Learning Styles." ***The Clearing House,*** **75(3), 2002, 143-145.**

This article presents a case study that was conducted based on interviews and observations of eight teachers employed in K-12 public schools who were selected based on their reputations as excellent teachers. The authors specifically looked to assess how teachers talk to their students about different learning styles, as well as how and why teachers respond to their students' different learning styles. The authors find that all of the teachers identified different learning styles among their students. Each teacher believed that modifying the teacher's method of instruction was necessary to ensuring that all students effectively learned the material. Other studies have found that teachers have a tendency to teach to their own learning style, but the teachers in this case study reported that they did not necessarily teach using their own dominant learning style. Rather, they identified the needs of individual students and sought out the best ways of connecting with the students. The authors recommend that both students and teachers should learn how to assess themselves with regard to learning styles. This will help students to become aware of strategies to lean more effectively in situations where their dominant learning style is not being used.

Healey, M., P. Kneale, and J. Bradbeer. "Learning styles among Geography Undergraduates: An International Comparison." ***Area*****, 37(1), 2005, 30-42.**

This paper looked to explore the variation in learning styles among geography undergraduates in Australia, New Zealand, the UK, and the US. The authors used Kolb's Learning Style Inventory (LSI) to assess learning styles and compared the results to LSI data from other disciplines from previous research. The authors believe that preferred learning abilities will draw students to particular subject studies that play to their learning strengths and in which they then enjoy relative success. The implication is that teachers can use this knowledge to tailor their instruction to methods that best support the predominant learning style. Although the results show that geography undergraduates generally fall into the assimilator category, the authors argue that understanding learning styles is more about self awareness than it is about restricting the tools that teachers should use in the classroom. Students who understand the different types of learning styles and where they fall on the spectrum may be encouraged to make an additional effort in areas which they previously thought they were incapable of doing well.

Kolb, D. "Learning Styles and Disciplinary Differences." ***The modern American college*****, 1981, 232-55.**
This essay describes Kolb's experiential learning theory, which is still today one of the most influential theories on learning styles. Kolb states that there are four prevalent types of learning styles that exists. Convergers organize knowledge in such a way that through hypothetical-deductive reasoning they can focus it on specific problems. Divergers are interested in people and tend to be imaginative and emotional. Assimilators are interested in abstract concepts and enjoy creating theoretical models. Accommodators are experimenters and tend to solve problems in an intuitive manner. Subsequent research in the field of teaching has used Kolb's learning style classification to look at how learning styles differ across disciplines and to describe the benefits and costs of matching learning styles between students and teachers.

Lage, M., G. Platt, and M. Treglia. "Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment." ***The Journal of Economic Education*****, 31(1), 2000, 30-43.**
This paper describes an experiment that was conducted at the University of Miami where changes were made to an introductory economics course in order to provide a class experience that was more accessible to students with varying learning styles than the traditional lecture format. The new class format was called the "inverted classroom" and provided students with a variety of resources to help facilitate learning such as PowerPoint slides, taped lectures, in-class worksheets, practice exams, and classroom experiments. The multiple resources made available to the students were meant to give the students the flexibility to choose the materials that were most compatible with their individual learning styles. At the end of the semester students were surveyed on their satisfaction with the course and the majority of the students viewed the inverted classroom favorably compared to the traditional classroom experience. The instructors also enjoyed the inverted classroom and thought that the increased interaction with the students was beneficial to their learning. The authors conclude that the inverted classroom is a technique that should be expanded in order to better appeal to the learning styles of every student in the classroom.

Pettigrew, F., and C. Buell. "Preservice and Experienced Teachers' Ability to Diagnose Learning Styles." ***The Journal of Educational Research*****, 82(3), 1989, 187-189.**
Much of the research on learning styles has recommended that teachers become aware of their students' learning styles and cater their instruction to best meet the needs of the students. This paper looks to answer the question: do teachers really understand the learning styles of their students? To answer this question, the authors conducted a random experiment where selected students completed the Canfield Learning Styles Inventory. The results were compared to the learning styles profile assessment that the instructor created for the student. The results of the study showed that the teachers were rarely able to accurately describe the learning styles of the students. The authors conclude that teachers cannot tailor their instruction to the individual students if they cannot accurately determine their learning styles. To correct this shortcoming

they recommend that information about learning styles should be included in the curriculum of professional preparation programs.