Teaching to Different Types of Learners

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

In middle school, I distinctly remember learning about “kinetic” and “auditory” learning styles. These learning styles are one of many, including “visual” and “logical”, as listed in an Indeed article *8 Common Types of Learning Styles*, one of many articles online discussing learning styles and how to use them to your advantage.

The overlooked existence of learning styles in education means that curriculums in education would be inefficient in not considering them - if instructors are teaching the same way all the time, then students whose learning styles don’t match up well with what is being taught are naturally disadvantaged. However, in order to determine their usefulness, there needs to be research that determines if considering learning styles in instruction has any effect on students’ success. The research question of interest is: Does teaching to learning styles on a larger scale work? To answer this, I believe 3 prerequisites need to be met. Do learning styles exist? If so, do learning styles have any effect on learning different subjects? Can educators use a student’s learning style to know how to teach them?

At this point in time in the United States, learning styles are not incorporated into instruction on a large scale, in neither K-12 nor higher education. If learning styles do have a positive impact, and this continues, students whose learning styles aren’t compatible with the teaching methods being used will continue to fall behind. These *potential* inefficiencies would not be corrected - meaning the true cost of continuing on the current course is an opportunity cost. However, one benefit of not knowing the answer to the research question is forgoing the eventual cost of transforming educational institutions to incorporate learning styles into the curriculum - which would provide some complication regardless of the potential positives that curriculum could bring.

I will use literature review to summarize the current state of research of learning styles in education, including the Social Construction of Technology theoretical framework to analyze the implications of considering learning styles in large-scale instruction. While learning styles may exist on an individual scale, the current state of research indicates that they do not have any effect on a larger scale, specifically any impact on students' learning.

Background and Significance

As a computer science TA I've noticed that sometimes it takes several radically different approaches to get the student to understand a certain concept. When a student has the prerequisite knowledge necessary, but still doesn't grasp something, I like to briefly test out different teaching methods to see what they best respond to. In other words, find their learning style and teach towards that. Most education does not take learning styles into account, but rather the preferred style of the teacher and the material itself. Some topics are always taught a certain way. If learning styles exist, this could disadvantage students whose learning styles aren't compatible with those teaching methods. Adapting teaching methods for students seems to work on an individual level - would it scale to the classroom or curriculum level? This would require the existence of learning styles, and their influence on success in academia.

Methodology

The methodology used will include literature review in an attempt to summarize the current state of learning styles in education. This will include understanding learning styles as a concept (their existence), connecting different learning styles to different materials, reviewing potential correlations between race and gender with learning styles, and potentially the effect of different learning environments on the success of students with regards to learning styles. By analyzing different sources of literature in each education component that relates to learning

styles, I hope to find connections between them that give a better understanding of the current state of learning styles in education, specifically how they can be used to better help students in different fields. The theoretical framework used in this paper will be the Social Construction of Technology (SCOT), to analyze the implications of accepting Learning Styles into large-scale instruction. This will include analyzing the power dynamics of teachers and students, and administration who controls the curriculum.

Results (Literature Review)

This review will attempt to summarize the current state of learning styles in education by discussing the requirements for learning styles to be utilized on a large scale in instructional settings: Do learning styles exist (can they be measured), and if so, do they have any effect on success varying by material? These would enable instructors to confidently vary their approaches to learning styles instead of a singular, unified approach to all - which could bridge some inefficiencies in teaching.

The first necessary requisite above questions the existence of learning styles. On a smaller, more anecdotal scale, learning styles seem to exist. Most people you ask would say that they prefer to learn in different ways. But to apply this in an instructional setting on a larger scale, these learning styles would have to be standardized and measured. Alzain (2018) analyzes the precision of many learning style measurement instruments. It is difficult to measure learning styles as it isn't an objective metric such as height or weight, so it needs to be estimated - and its abstract nature means its measurements' preciseness might matter more than the accuracy. The methods of these instruments introduce bias towards different learning styles; the content in the instrument itself (text questions) can influence the measurements, skewing resulting learning style classification generally towards visual. Another study finds additional results which

corroborate the idea of human biases in learning styles making them difficult to measure, as Leutner (1998) compares the effectiveness of measuring learning styles through observation versus through questionnaires. Though the study is older, they conclude that students' learning outcomes could be predicted better by a computer-based learning style instrument rather than a questionnaire-based instrument. The computer-based instrument observed students' preferences for visual or verbal learning rather than using text-based questionnaires to ask them. An important takeaway is that the abstract nature of learning styles makes it very difficult to measure precisely, which would be necessary to classify students' learning styles in an instructional setting. Another, potentially more consequential, takeaway are the implications in the Social Construction of Technology, stemming from the inclusion of computers and more technology as a whole in measuring learning styles, compared to the natural human biases when answering questionnaire-based learning style measurement instruments. Introducing technology to curb the questionnaires' influence on student preferences can provide some potential complication in regards to measuring learning styles in different schools. Schools would need to use computers to measure learning styles with technology-based instruments, but not all schools have the same access to computers. Barrett (2014) analyzes the computer access different demographics have in Texas, resulting in disparities between race and socioeconomic groups' access to computers within schools in the state. Using technology-based learning style measurement instruments would leave these schools with less computer access naturally disadvantaged, as the students may not be able to transition into the learning-style-based curriculum as fast or as simple. This implication involving learning-style instruments would be a large part of the cost of including learning styles in standardized curriculum, as schools with less resources would have a more difficult time transitioning - potentially furthering the inequality of the education system today.

The second question relates to the application of learning styles to success in certain fields. Pashler (2009) agrees that people do differ in learning preferences - however concludes that those preferences do not interact with different instructional methods, by analyzing studies by institutions that lack the core evidence of a crossover interaction. It is possible to classify a student's learning style, but proving the utility of its application into study is difficult. The research concludes that further research is needed, specifically a methodology that at this point has been lacking - randomizing instruction based on classified learning styles, with assessments to test the interaction between learning style and instruction. Since learning styles are difficult to measure and classify, and instruction is difficult to carry out scientifically, the lack of this methodology has left the use of learning styles in education to yet be accepted. Li (2016) provides a more recent perspective of the application of learning styles in instruction. While the paper determined there was still no scientific evidence of the validity of learning styles' applications, anecdotal evidence of its usefulness is enough to continue researching - the reason for the interaction is not yet proved is not that it has been debunked, but rather the difficulty and limitations of the scientific research on learning styles in an instructional setting.

However, these anecdotal examples of teaching towards learning styles in action calls into question the definition or scope of learning styles. Since there is no clear-cut definition of learning styles, the anecdotes within the paper are *labeled* as learning styles. One example is a special education teacher who utilizes lights and different sound effects to teach music, which the paper argues might be seen as learning styles oriented. Another example cited is a history teacher who won an award for teaching styles that involve altering the environment to reflect the historical event or period being studied (using artificial smoke for war battles or modeling a crime scene for a famous murder). Are examples like these ways of catering towards students'

visual or hands-on learning styles (meaning students who have largely different learning styles, like potentially reading, would suffer)? Or are they just ways to drive engagement that would work with everyone? Deslauriers (2019) studies the effects of active vs. passive learning, and concludes that the subjects undergoing active learning results in more actual learning due to the engagement in the classroom. The question here is what constitutes a learning style, and on a higher level, what constitutes a teaching method *for* a specific learning style. Because learning styles are not a quantifiable phenomenon, many anecdotes of learning styles like above rely on a wide definition of learning styles, or no definition at all. The wider the definition, the more examples can give credit to learning styles. The more narrow the definition, potentially including the line between engagement and learning styles (one could argue student engagement is dependent on learning styles), the less examples of student learning can be applied to learning styles. In order for learning styles in large-scale instruction to occur, researchers and schools would need to agree on what would be a sufficient application of learning styles from teaching methods, but more importantly, what is a learning style. This definition would be dependent on the measurement of learning styles, and as discussed earlier, measuring learning styles is difficult. Under the Social Construction of Technology theoretical framework, this brings the problem of the technology ultimately deciding the curriculum, as opposed to using the technology as a tool to enforce the curriculum.

Discussion

My stated requirements for the application of learning styles to be introduced on a large scale, the existence and measurement of learning styles and its interaction with instruction, are not yet met. A common theme in literature surrounding learning styles is there is not enough research done on learning styles. Learning styles are such an abstract concept, that it is really

tough to frame a study in a truly scientific manner. More progress has been made on precisely measuring learning styles, with the goal of improving the limitation of the biases in these instruments. Limitations in the current state of research failing to prove an interaction between learning styles and instruction include a methodology that combines a precise classification of learning styles in student subjects and a scientific approach to analyze the practical utility of the interaction.

Although further research needs to be done to satisfy those requirements - even more would need to be done to carry out the execution of applying learning styles in a teaching environment. I believe that this should largely include much discussion on what constitutes a learning style, and teaching methods that incorporate learning styles. An implication regarding the Social Construction of Technology theoretical framework of learning styles being incorporated into large-scale instruction is teachers experimenting different methods with learning styles in mind. Individually, these experiments could go wrong, and can be detrimental to students' learning. This is why it is so important that a technical definition or measurement of learning styles is decided, and proper research is conducted to determine appropriate ways to teach towards that.

Assuming a positive interaction between learning styles and instruction, it is possible the cost of changing instruction from student to student or style to style outweighs the new benefits. While there is a long way to go to even get to that point, it is worth considering the long-term effects and implications of actually splitting up curriculum, or even students, by learning styles. One consequence would be potentially altering the power dynamics in at least the curriculum taught in education - the student would no longer be adapting to the teacher, but since students' learning styles are baked into what the teaching methods are, the teacher is more adapting

towards the students (or groups of students). Another more alarming consequence of teaching towards learning styles long-term, is that it could result in a more specialized, less well-rounded student body, where students are even more uncomfortable in subjects that aren't compatible with their preferred learning style. I propose that once the application of learning styles gets to the stage of deciding how to apply during instruction, educators take the implications seriously and treat learning styles more as a skill to be taught rather than a limitation varying by student - and utilizing it as a means to recognize what students are missing, rather than what they are capable of.

Conclusion

Does teaching to learning styles on a larger scale work? More specifically - Do learning styles exist? If so, do learning styles have any effect on learning different subjects? Can educators use a student's learning style to know how to teach them? While learning styles may exist on an individual scale, the current state of research indicates that they do not have any effect on a larger scale, specifically any impact on students' learning. Considering the potential cost to transform academic curriculum into learning-style based, an improvement in instruction effectiveness due to learning styles would have to be significant. No large-scale research has been conducted with that conclusion at this point. Due to the nature of the necessary research and methodologies, including the difficulty of conducting experiments and research in an instructional setting, I believe more research should be conducted - specifically regarding learning environments, and how they impact learning in regards to learning styles. This could provide some insight into the impact of teaching styles because online and in-person learning have naturally different teaching methods. Students today who grow up with more online learning may learn and think differently than older generations who didn't. With the rise of

online learning, the inclusion of learning environments in learning style related research can provide natural experimental groups for comparing and studying the interactions between learning styles and teaching methods. This could be one potential research solution to the limitations of past learning style research - specifically setting up instruction to be able to analyze the interactions more effectively.

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