

Learning Styles and Multiculturalism - The Need to Combine Forces in the Computer Science Classroom

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Introduction

A current hot topic of debate in the Computer Science community is our approach to education. In the last few years since I began researching and writing on this topic, there has been a growing interest in the application of Learning Style Theories (such as Kolb) to Computer Science Education. There has been some movement towards addressing how our students learn as compared to how we as educators present material. This vital analysis is beginning to lend some insight into student failure statistics and barriers to success. Unfortunately, ethnic and racial variety complicate the problem of assessing the validity of Learning Style data. This paper, in drawing in part upon previous unpublished papers and augmenting that information with new material and insights, constitutes an introductory discussion of the intertwined nature of Learning Styles and Culture. This paper also introduces some important issues involved in utilizing Learning Style theory in a culturally diverse classroom. To provide food for thought I discuss an ongoing computer literacy project directed at the local Hispanic population. This project is attempting to incorporate Learning Style theory in a culturally sensitive manner into traditional CS content. In places I utilize a term coined in an earlier paper, "Learning Style Culture", to describe the overlap in Learning Style and Intercultural Communication theories.

The Embodiment of Culture in Learning Styles

Regardless of whose instrument is administered, a major determinant of Learning Style is the preferred approach to assimilating information. Words such as "Concrete" "Abstract" "Sequential" "Random" "Experiential" "Auditory" "Verbal" have been variously applied to reflect an individual's natural predilection for viewing themselves and the world around them. It is always emphasized that the labels and accompanying descriptions are generalities intended to provide perspective, not intended for type casting people. Yet there has been little if any recognition of the inherent perspectives these models bring with them as a result of being created, tested and analyzed primarily in the United States by Americans. (Note that the term "American" is itself open to multiple interpretation. In this context I use it in the manner most commonly associated with the word: Western, Anglo, mainstream). Just as our personal Learning Style directs us towards comfortable

methods of perception and learning, so too does our Culture affect the mental models we utilize to design and administer testing instruments and later to analyze data. Our interpretation of data leads to the way we develop curriculum. Addressing this dilemma is where a study of Intercultural Communication Theory can aid us.

Commonality Between Learning Styles and Intercultural Communications

A practical advantage in making the connection between Learning Styles and Culture is that it allows educational researchers and practitioners to draw upon the extensive knowledge of the field of Intercultural Communications and to share models, techniques and ideas. Studies in Intercultural theory have been underway since the Second World War, far longer than modern studies in either educational reform or Computer Science instruction.

We can easily identify areas of common ground between the two fields of study. The most important perhaps, can be seen in the definition of the central word "Culture". Culture has been defined in part as: "patterns of thinking, behavioral norms, and styles of communication which a group of people has developed" [1] This bears a strong resemblance to the previous description of a Learning Style as "an individual's natural predilection for viewing themselves and the world around them". It is also informative to observe that over time the evolution of the study of Culture came to include a recognition of "formal" and "informal" Cultures; that which is formally taught versus that which is informally taught.[2] This parallels the shift in Computer Science Education research from simply discussing what technical and theoretical information is relevant for students to considering how Learning Styles affect relevance.

Traditional Delivery in a Multicultural Class

Although there are some signs of change, the traditional method of delivery in the Computer Science classroom is still lecture. The instructor dispenses information to passive students. Information is provided in a linear manner, intended to convey sequential points. Students are provided assignments with varying degrees of written or verbal feedback. Although much of Computer Science involves programming (beyond introductory classes, the ability to write code is considered a basic skill), this exercise does not necessarily benefit from the current approach to instruction.

How do students of various Learning Style Cultures respond to the traditional United States Computer Science classroom? It depends in part on their preferred Learning Style but it depends just as heavily upon their Culture. Whether a student is from a Western, Latin, Eastern or Middle Eastern country (to name just a few) will affect their perceptions of authority, respect, correctness of collaboration on coding, the importance of completing assignments on time, regular class attendance, asking questions when confused, how to study for exams and a host of other issues.

A student who believes that exams are designed to demonstrate absorption of facts may memorize a set of programming manuals in preparation for a test on C++. A student who has been taught that the worst thing one can do is let a friend or family member lose face, will give a copy of their code to a study partner in order that the person have something to turn in. A student who feels that it shows disrespect to question the instructor will not ask for help no matter how badly they are failing. Many research studies have documented culturally defined behaviors similar to these and we need to incorporate this information into our educational analysis.

An Attempt At Applying Learning Style Cultures to an Hispanic Classroom

As a way of demonstrating the complex nature of this task, what follows is a synopsis of a five year old ongoing project to increase the retention rates of Hispanic students at my institution via a dedicated Computer Literacy class. Computer Literacy was selected as there were not enough Hispanic students in higher level courses to work with (a sign of problem in itself). Full details of the project are available upon request and are listed in the References section.

Interesting problems surfaced almost before the project was underway. We were unable to administer a reliable Learning Style inventory to our population because language barriers forced students to guess on many answers which invalidated the results. We considered translating the instruments into Spanish but in those cases where we requested permission from the copyright holders, we were expressly forbidden from doing so. Attempts at locating an instrument already written in Spanish failed.

Unable to obtain reliable Learning Style statistics for comparison to a control population, the next best approach was to study the Mexican and United States cultures in depth and work up an analysis of primary cultural tendencies leading to a Learning Style preference hypothesis. This was undertaken (and continues) with great care, with frequent self reminders that generalizations do not type cast the individual.

One term, when Cultural studies were well advanced, an

entire section of the Computer Literacy class was developed based directly upon a hypothesized blend of Cultural and Learning Style preferences. Class exercises, presentations and homework were all geared towards creating a strong comfort zone for learning basic computer skills (the prerequisite for advanced course work). In many ways the class was a success. Yet the most important thing learned was that the majority of the carefully anticipated problems did not arise while other, completely surprising ones did.

The most critical example of an unanticipated problem was that students did not see the relevance of the material to their life. This, after careful modeling of the presentation and follow up along culturally relevant themes. Despite enthusiastic classroom participation, students did not complete homework and other out of class work necessary to progress. Initially baffling, when viewed in Cultural context the reasoning became clear: in most Hispanic cultures, education ranks last, behind family and then work. One's future depends heavily upon maintaining familial bonds. Therefore, it takes far more than an enjoyable classroom experience for students to put aside pressing familial obligations in order to do homework. This is in direct contrast to the United States culture where work is valued extremely highly and family generally far less (these facts are extensively documented in the literature). It may be easier for US natives to understand this if we think about how many times we ourselves or others we know have put personal relationships second when work demands our attention for a "non negotiable" deadline.

Current work in the Hispanic Computer Literacy project includes experiments in raising perceived relevance of coursework in the minds of the students. This is being done in many ways, but in all cases drawing heavily upon Learning Style and Intercultural Communication theories. As of this writing, it is too early to tell what the results will be.

Conclusion

Computer Science Educators interested in the application of Learning Styles to the classroom are making important strides in understanding how students learn, faculty teach and how each can be improved. But with the growing ethnic and racial diversity in the classroom we need to be aware of our own cultural biases in the application of our tools. Much work has been done studying Cultures and their affect on behavior. It is in our best interest as educators to work with those in the field of Intercultural Communications to see how we can combine forces. Much experimentation needs to be done with the application of these theories before we can hope to obtain reliable predictable information. This paper has only touched the surface enough to lay out a rationale, provide direction for further study and hopefully inspire enthusiasm.

References

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