
AC 2012-3286: OBSERVATIONS REGARDING THE CULTURAL DIVERSITY OF STUDENTS IN DIFFERENT ACADEMIC MAJORS

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Observations Regarding the Cultural Diversity of Students in Different Academic Majors

Abstract - The arts and humanities tend to be anathemas to students in the engineering fields. These students often do not appreciate the social value of these topics and they tend to see their incorporation in engineering works as an intrusion into their world that they do not understand. Student in classes in the humanities are most often there only because their technical curricula require that they take a few courses in these areas and/or the class they are in is the only one that fits their schedule well. These students feel compelled to be there by outside forces beyond their own control and therefore rebel against the course even before the first session. This article looks at various cultural elements that inform and influence those feelings and discusses ways to begin to change those attitudes within the student bodies.

Introduction

It has been observed that students taking similar classes in college often project a wide range of academic skills, interest in the subject matter, and personal justifications for class attendance, among other things. Since people are inherently different, there is no shock or surprise generated by these observations; merely academic curiosity and fodder for research by those so inclined.

Academic research can take many forms. It can be highly rigorous, purely anecdotal, primarily literature-based, or empirical, based on personal experimentation or observation. The data provided in this report are based solely on direct observation by the authors, supplemented by anecdotal experiences described by others in various conversations and discussions. The authors make no pretense of suggesting that the data are derived from carefully constructed experiments or rigorous academic research.

Culture, as it relates to a cohort of students, a neighborhood of people, or the practitioners of a profession can be perceived as a “state of mind”. The term incorporates the concept that all the members of the group will act in a similar manner in similar circumstances or when driven to do so by similar stimuli. The more diverse the origins of group members, the more varied and tempered the responses, or culture, become. The more interaction a group has with other similar groups, the stronger the group culture becomes and the more closely it aligns with the culture of the mentoring class.

In academia the student body, specifically in the freshman year, is comprised of people from a broad spectrum of social, familial, and historic cultures thrown together rather haphazardly. This newly constructed cohort is then expected to magically act as a unified whole toward achievement of common educational goals. It seldom goes smoothly.

When the young students are thrust together their personal values and cultural norms are often sorely tested by their newly formed alliances. Those who bring the strongest personalities to the table, typically high school athletes, honor students, or those who held a meaningful job during high school, will dominate the group. Self-confidence, physical strength or size, an air of worldly

knowledge, and similar characteristics tend to allow some students to become group leaders by default.

The group as a whole routinely adopts the general approach to academics that the leaders adopt – for better or for worse. The general attitudes of the leaders toward the field of study, to the course work offered, to the faculty and to their classmates become, by default, the cultural norms for that group, or cohort, of students. The longer the group remains together, the stronger the cultural bonds become and the more comfortable the members become with that norm.

While none of this is likely to be shocking or surprising to the experienced education professional, it is often difficult for those new to the profession to fathom or understand. One group of students is easy to work with, while another group is impossible to work with and the new faculty member has no idea why. They teach the same material in the same way to both groups, but only one class responds positively while another does not respond at all. It is useful, then, to contemplate the source of the class cultures that allow one group to learn effectively and another to reject learning in a parallel class.

The students being observed for this paper are attending a four year technical college with programs leading to bachelor degrees in engineering, engineering technology, computer science, interior design, industrial design, and architecture. Students all take a series of general education courses in English, mathematics, various sciences, the arts and humanities. The majority of the cultural differences between cohorts are most easily discernable from the general education classes because the technical classes are generally taught by faculty with similar cultural attitudes as the students they teach and there is no alternative against which to measure the observed cultural characteristics. Most of the observations in this report were generated within general education course environments.

This point strongly influences the observation of cultural differences among student cohorts. When the faculty teaching the technical aspects of a profession exudes a common culture, the students within that program of instruction will, without conscious effort or forethought, naturally inure to the same cultural biases as the faculty.

It may, therefore, be possible to more accurately predict areas of most likely future success for a student by evaluating for professional culture attributes rather than by evaluation of technical skills such as mathematics and language skills. Francesca Merlan noted in a 1997 presentation to a Fulbright symposium¹ that “Understanding is a grasping of what things mean and knowing how to interpret them and how to respond in the course of events, and is not about giving a definitive representation of them as an independent reality”. This understanding is clearly and deeply influenced by the culture of the learner. Morphy² observed in 1984 that there are “dangers inherent in reducing difference (in his case between art in Aboriginal society and art in Western society) to a dualistic opposition that fails to recognize fundamental areas of compatibility”. It is important, therefore, that the faculty respond to the compatibilities between the humanities being taught and the cultural bias of the student learner. The arts and humanities courses may be the ideal place, in fact, to nurture these compatibilities since the arts are a key element in the understanding of other places, other times and other people.

Observations

The Civil Engineering Technology student is most likely to exhibit a culture based on very linear thinking, a tendency towards critical evaluation of everything, and little patience for concepts that cannot be reduced to numerical values. They tend to see themselves as Problem Solvers and without a problem to solve, they flounder. These students require a clearly defined “problem” and a clear and unequivocal “answer” to all of life’s little mysteries. The concepts of comparative evaluation based on non-numerical, intellectual, standards are difficult for this cohort to grasp or relate to. They also often see limited value in art for its own sake and, while able to appreciate the value of art to the world at large, are underwhelmed by attempts to appreciate or understand what the artist was thinking or what the art represents.

The Construction Management student, by contrast, is more concerned with costs and schedules than in what those resources can deliver. They will typically see the creation of art as a long-term process with limited potential for effective economic return and a high potential for disrupting a construction timeline. They have little patience for the archeologist who needs to excavate an historic site located within the project boundaries or for delays caused by needing to wait for an artist to “watch the paint dry” before delivering an art work to the job site. They often fail to grasp the concept of the artistry that exists in what they are building; being far more concerned with getting the job done quickly to maximize profit.

The architecture student often does get the concept of art in structures. They recognize the impact that cultural norms in architecture have on the cultural expressions of a society. The architecture student is generally more willing to chance the expression of an opinion that may be uncommon, or even contrary to cultural norms of the classroom in order to generate discussion of that opinion and perhaps to change the culture, however, slightly. In the humanities class the Architecture student is more likely to engage in the intellectual aspect of the topic, while the engineering student is busy trying to decide how best to catalogue the subject matter and align the concepts in a linear, clearly definable, fashion.

The computer science student makes his mark in the world by creating the impossible in a virtual world with unknown tools and building blocks of ephemeral thought. He is comfortable with mixing the real with the imaginary and with intellectually developing ways to bridge the two. Discussions about the meaning and intent of art and humanities are easy for this student to engage in because he is not constrained by artificial limits like time and money. Where the engineer sees himself as a Problem Solver, the computer scientist sees himself as a creative thinker. He can easily instill himself into the mind of the artist and begin to understand and appreciate what the artist had in mind with his work.

The meaning of it all

Observations of anything are only interesting intellectual amusements unless a way can be found to utilize the information in some appropriate fashion. If the observations noted can be put to use in designing courses to serve the needs of the student, particularly if the student is not aware they are being catered to, then useful intellectual growth can occur in the individual.

To engage the Civil Engineering or Civil Engineering Technology student in a non-engineering discussion it is necessary to create the appearance of a linear path to truth for the student to navigate. This student must be led, by linear regression methods, albeit intellectual ones, to follow the thought process of the artist. They cannot be expected to accept the non-linear unless they have followed a linear path, even if it is a convoluted one, to get to the desired conclusion. This requires the professor of humanities to begin to formulate the concepts in a way that leads the engineering student through the growth of the artist or humanist and the evolution of the concepts embodied in their work so the student can linearly follow that evolution and begin to appreciate the outcomes. Once trained in the understanding of this work, the engineering student is fully capable of expanding the thought process to encompass more traditional ways of seeing the arts and humanities, but the initial discussions need to be tailored to the engineering thought process to fully engage the student in later discussions. Indeed, some of the more erudite discussions in the arts and humanities have been reported in classes of engineering students who have had that opportunity early in their educational exposure to those topics.

Similarly, the Construction Management student needs to be able to follow the evolution of the concepts within the mind of the artist/humanist, but from a somewhat different perspective. In this case the concepts of cost-effectiveness and profit margin are engrained in the psyche of the student from the first day of class – or even earlier, since many of these students come from families in the construction industry. That means that the professor of humanities must teach first the sustainability and efficiency of the artistic thoughts that drove the artist/humanist to the end result being discussed. Once the concepts of sustainability and efficiency are seen in the humanities, the Construction Management student can begin to appreciate the social values of the work more fully. Once fully engaged in the social values, the student can begin to understand the thoughts of the creator who developed them and to better understand the works themselves.

Clearly, the historic approach to teaching the arts and humanities does not serve well the average engineering student, construction management student, architecture student or computer science student. A stronger appreciation for the culture of those professions may be able to allow the professor of humanities to more quickly pierce the veil of indifference engendered in so many of these students. When the culture of the profession rules the technical courses and the culture of the humanities fails to fit the culture of the technical course, the humanities course will suffer the greater loss. Students in these professions are at least pragmatic and they tend to observe well the culture exuded by their technical faculty. The student who chooses to do well in the technical area will then tend to emulate the culture of the professionals with whom they have the most direct contact – their own technical faculty – to the detriment of further knowledge gains in non-technical areas.

Conclusion

In the end, a creative faculty in the humanities can subtly change the underlying culture of these technical professionals for the future and slowly convert them to a life-long appreciation for the arts and humanities so ably captured in the civil works of former civilizations. That will then transfer to future generations in an evolutionary process not unlike the one that has led to a centuries-long decline in the appreciation of arts and humanities by these professionals as they became more specialized in their fields. In this case, however, the trend can be reversed and a

greater appreciation can be grown in future generations of professionals from the seeds planted today in the minds of the current generation.

References

[1] Merlan, Francesca, *Representing the rainbow: Aboriginal culture in an interconnected world*, paper presented to Fulbright Symposium, Darwin, Australia, July, 1997

[2] Morphy, Howard, *Journey to the Crocodile's Nest*, Aboriginal Studies Press, Canberra, Australia, 1984.

Biographical Information

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Prof. Hopcroft has been teaching Civil and Environmental Engineering at Wentworth Institute of Technology for more than 18 years. He has taught freshman, sophomores, juniors and seniors and has taught students from technology and engineering programs as well as students from four separate majors. He has collaborated with faculty from several other colleges, departments and programs at Wentworth to develop the observations outlined in this paper. He also has nearly 45 years of professional practice background and continues to consult on various projects. He is a Registered Professional Engineer in all six New England States and a Licensed Site Professional in Massachusetts.