

Responding to Diversity

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April 17, 2005

Students do not all learn in the same ways. As educators, we need to be mindful of this and respond accordingly. If we do not, then we run the risk of treating students with disabilities, students below the poverty line, and students of different race or gender than our own as unintelligent, incapable of understanding or achieving. Studies have shown that rather than trying to educate everyone in a homogenous way, we do far better to diversify our techniques and attempt to connect with our students as they are – rather than as we are.

Gender bias is a prevalent problem in science, most notably in the field of physics. While females generally seem as capable as males with regards to subject matter and problem-solving, very few earn PhDs or become physicists. Guzzetti and Williams spoke about this issue from the perspective of the students, in addition to that of the teachers. They found that even when the teachers of the classes were aware of some bias on their parts (such as calling on males more frequently) and attempted to compensate, they overlooked more subtle sources bias. For example, refutation, a proven effective instructional method, was favored by males but not females, who felt that their input was often undervalued or dismissed by the males who were perceived as opinionated and dominating. Because of their lack of self-confidence and fear of being wrong, both of which were fed into by the (perceived) male-dominated culture of the classroom, the female students were unintentionally sidelined.

Meanwhile, Hesse (and anthropologist) saw that while the dividing line was not crisply between males and females, there was a dividing line between two groups of

students: those who “played at” being scientists, and those who viewed their role as primarily receiving an education. Females almost exclusively fell into the latter category, while most of the males fell into the former. Hesse observed that the students were receiving mixed messages about what was important during their schooling: some professors valued play seemingly above coursework, while others discouraged it. Here, again, the perceived male-dominated culture of play tended to sideline the students who thought their role was primarily completion of problem sets.

Both of these gender articles make it clear that students as a whole do not engage in physics in the same way. Females tend to be more likely to focus on the explicit goals of the assignment (often through invisible and unrewarded creative means), while males tend to respond better to internally motivated science-type games and discussions. However, due to the nature of the males’ preference (and the already male-dominated physics field), females are often discriminated against improperly (and usually unintentionally). Understanding that females (and some males) need direct support and encouragement through appreciation of their problem-solving efforts, and that it is often uncomfortable for them to engage in refutation-type exercises with males gives the instructors a way to combat this pervasive bias.

In addition to gender, race is often a stumbling block to education. Since most teachers are white, communication with African-American (and other minority) students is often difficult. One error has been to try to insert culture into education rather than provide education within the framework of the culture. Ladson-Billings discusses a three-year long study of successful teachers of African-American students where the culture framed the education. Certain commonalities emerged among these teachers, such as their

choice to teach in their schools, their understanding of their role as a part of the community at large, their loose, fluid roles with their students (allowing themselves to learn from the students), and their belief that all students can learn. Moreover, having a culturally relevant pedagogy involves three criteria that teachers should use as guides: the demand of academic success from their students (often channeled through African-American boys, who have social power), appreciation of the students' culture and refusal to remove the students' culture from their education, and the demand that their students develop a broad sociopolitical consciousness and engage critically in the world. Hence, students' education is enabled by the integration of the local culture.

Often connected to race is the issue of poverty. However, poverty is more general in that it refers to the students' socio-economic status - which affects students of all race and color, usually in rural or inner-city schools. Habermann addresses this issue in a charged way, indicating the prevailing attitude of schools before presenting hope in the form of signs of effective teaching. Because research indicated that a leading indicator of performance on achievement tests is the students' socio-economic status, many teachers take a "why bother?" attitude with them into the classroom. However, rather than spending their time as laborers and executors of pragmatic deeds such as paperwork, punishment, and monitoring, teachers would be better off as professionals; there are a number of signs of good teaching and none of them involve the amount of paperwork a teacher gets through. Rather, good teaching is evident when students are involved in issues they regard as vital, or when they are reflecting on their own lives, or when they question prevailing assumptions; whenever students see big ideas, are involved in course planning, and redo their work it is likely that learning and effective teaching are taking place.

Habermann is apparently encouraging teachers not to treat their students as objects to be dealt with, but rather as subjects who can help the teacher reach the end products that are desired.

Finally, some students are different not due to race, gender, or socio-economic status, but rather by the fact that they are disabled. Many negative assumptions surround the issue of including them with mainstream students in general education classes; the article [Including Students with Disabilities Into the General Education Science Classroom](#) takes a look at those assumptions and argues them. The authors found that when the science teachers were properly trained, these assumptions were simply wrong. Students with disabilities did not worsen the behavior of the general education classes; often behavioral incidents decreased. Also, students with disabilities tended to improve their social standing and relieve some of the stigma associated with them in the eyes of their peers. Most importantly, general education students did not perform more poorly on standardized tests; while they performed the same as before, the disabled students performed much better when in the mainstream classrooms than when segregated. The largest contribution to these improvements was the new methods that the teachers took into the classroom, with the disabled students in mind. Hands-on curricula, such as FOSS, appealed to the students with disabilities without missing mainstream students. Hence, taking the consideration of diverse needs into the classroom led to improved performance.

Through these five examples of gender, race, socio-economic standing, and “differing ability levels,” we see the recurring theme. Teachers must make every effort to involve all of their students. This involvement necessarily means respecting the culture from which they come, acknowledging that they learn in a myriad of appropriate ways, and

assuming that they are each capable of learning. Simply expecting to educate students by following a set catchall procedure is misguided and sure to fail. Both the students and the teacher must create dynamic, safe, fluid culture in the classroom, and the objective of this culture should be to engage in learning and professional development, not simply to fulfill the requirements of a job.

The five articles summarized above are:

Guzzetti and Williams (1996). "Gender, Text, and Discussion: Examining Intellectual Safety in the Science Classroom." *Journal of Research in Science Teaching*, 33 (1), 5-20.

Hasse, C. (2002). "Gender Diversity in Play With Physics: The Problem of Premises for Participation in Activities." *Mind, Culture, and Activity*, 9 (4), 250-26.

Ladson-Billings, G. (1995). "But That's Just Good Teaching! The Case for Culturally Relevant Pedagogy." *Theory Into Practice*, 34 (3), 159-163.

Habermann, M. (1991). "The Pedagogy of Poverty Versus Good Teaching." *Phi Delta Kappan*, 73, 290-294.

(Author unknown). (year unknown). "Including Students with Disabilities into the General Education Science Classroom. (info unknown).