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Abstract

In most engineering programs, international students constitute the majority of the graduate population, and a rising percentage of the undergraduate population. It is important for engineering faculty to understand these students' expectations of their professors, and make it clear what is expected of them so they will not erroneously assume that educational practices are the same as in their home countries. The educational systems they come from are very diverse, although some are adopting elements of the American educational model. In other countries, there is less emphasis on project work and other homework, and more on exams. While it seems to be rare for final grades to be based entirely on the final exam, it is not unusual for them to be based entirely on finals plus midterm exams. Homework counts for less, perhaps because the few teaching assistants that do exist are responsible for lab sections, so there is no support for grading of homework. In many places, a variety of homework is assigned. It may be collected, but it counts for nothing, or almost nothing. Seemingly because of this, cheating on homework is often tolerated. But cheating on exams may be punished severely. Practices seem to vary widely among institutions, but the penalties are generally similar: zeros, failure in course, suspension from school.

1. Introduction

International students now constitute a majority in most engineering programs. We as faculty are familiar with them as individuals. Although we discuss research and course material with them, we rarely ask them about their expectations of the educational system, and if we do, it is only after they have been here awhile and we have gotten to know them. Yet coming to America is culture shock for almost all internationals. What they find in our educational system is different from anything they have encountered in their school career.

Surprisingly, there is very little literature on the differences between American engineering education and engineering education overseas. To be sure, there are many articles on the experiences of foreign graduate students in the U.S. [2, 3, 5] and comparing the experience of American and international students [6]. There are also studies of how to relate to international students [1, 4]. These are very useful, but it is this author's belief that we cannot understand their expectations unless we know something about the educational systems from which they come.

2. Methodology

The author surveyed his own international students from 2005 to present. These were students in computer science and computer engineering. He also posted on e-mail lists read by international

students, and encouraged these students to forward the survey to other lists. The survey was taken anonymously over the Web, though several students responded by e-mail instead of through the Web form. In all, 60 students from 12 different countries contributed. The majority of these students (34) were from India, followed by 8 from Turkey, 7 from China (including one from Taiwan), 2 each from Bangladesh, Nigeria, and South Korea, and single respondents from Egypt, Nepal, Nicaragua, Pakistan, and Palestine.

It should be noted that some of the responses varied more from respondents within the same country than between respondents in different countries, so it would be difficult to justify using this survey to draw conclusions about the differences in educational systems between countries. In India, for example, there are multiple tiers of universities, with the Indian Institute of Science and the seven Indian Institutes of Technology being the most competitive, followed by BITS, Pilani (Birla Institute of Technology and Science), and then the 17 Regional Engineering Colleges (which are soon to be upgraded to National Institutes of Technology). The observations of students may vary according to what tier of universities they come from. Also, there is a built-in bias, in that the vast majority of respondents have been undergraduates in another country, but graduate students in the U.S., so what they perceive as differences between countries may actually be differences between educational levels.

3. Homework

In most countries covered in the survey, homework is treated as much less important than in the US. Students report that the weight given homework is very low (perhaps 10% of the grade, perhaps only 2% to 3%). Some of the Chinese and Indian students say that almost all homework consists of textbook problems; sometimes the answers are even in the back of the textbooks. Several Indian and Chinese students also say that homework is almost inevitably pen and paper; electronic submission is unknown.

This approach can best be understood as a tradeoff between the quality of learning and the resources required to achieve it. Where student numbers are huge and teaching assistants rare or nonexistent, no one has the time to do a thorough job of grading homework. The best tradeoff is to treat homework simply as practice for exams. Unfortunately, human nature being what it is, this leads many students to postpone learning and then cram for exams, with a consequent superficiality in learning. The American system is better able to prevent this, though it still occurs to some extent, but only at the monetary cost of smaller class sizes or more TA support.

Despite the relative unimportance of homework, several Indians report that it must still be turned in. One says, "Generally, although homeworks might be graded, they do not contribute to the final grade of the student. They are more concentrated towards the completion of it and the knowledge gained from it than the grades. The fear of punishment is normally what forces the students to complete it within the deadline." The Palestinian respondent concurred: "In Saudi Arabia, not turning [in] a homework will spur the teacher's anger. Teachers used to go around the class collecting the homework from students. Ones that did not have any thing to turn in stand up in place or line up at the front of the class."

However, homework appears to be taken more seriously in some countries. The Nicaraguan student explained,

In Nicaragua, after homework is turned in, the professor/teacher explains every single problem in detail, so the student can learn and understand the mistakes. The homework problems are solved in class in which every single student interacts as the problem is being solved. Homeworks are mostly never graded, but must be turned in. But there is a quiz every week based on the homework and that one counts.

In China, according to one student, students rarely discuss homework among themselves, unless they cannot figure it out by themselves. But in the US, students “usually discuss the homework together, unless they are required not to ... no matter whether they can figure them out by themselves.” There are advantages and disadvantages, this student said. It helps students to understand requirements and think creatively, but it can lead to some students relying on others.

Four of the eight Turks said that homework in their country was “similar to” or “the same” as homework in the U.S. One thought more homework was given in Turkey. But another Turk vehemently disagreed, saying, “During my undergraduate studies in Turkey I had prepared only 1 project and 1 presentation. Usually instructor teaches whatever he is supposed to teach without any participation from the students. No group work or whatsoever.” This, however, is about the form of homework, not its importance, which seems to be much greater in Turkey than in India or China.

In general, though, the U.S. has much more varied types of homework than universities in these students’ native countries. Homework counts for more and is taken more seriously by the students.

4. Grading

Four main differences in grading were noted, two of them peculiar to India. Most Indian universities report percentages instead of letter grades. This has its advantages and disadvantages. There is no incentive for a student to fight for one last point to achieve the next higher letter grade. But it doesn’t allow for the normalizing effect of grades (where a harder class can have a lower threshold for a particular letter grade). As one student puts it,

Grading practices and the quality of the same vary greatly from university to university. Most of them use a percentage marking scheme, but interpret them differently. In some universities grades of 70% would be fantastic grades whereas in some others, a good grade would be a full 100% and a 70% would be not bad but not great either.

This means, among other things, that U.S. institutions need to know the reputation of Indian universities when evaluating applicants from those institutions. But there may be tremendous variation even within the same university. Universities may consist of multiple schools, at different locations. The university prescribes the syllabus and conducts the examination (which is uniform across all the schools). It may “outsource” teaching to an outside management firm that builds the buildings and hires the faculty (meeting the standards set by the university).

Final exams are written under contract by teachers from several schools associated with the university. Thus, several exams are created. One exam will be chosen randomly and provided to all the schools. Exams are monitored by the faculty at each school, then some are double-checked by auditors from the university. Grading is blind, to avoid the possibility of conflict of interest. One of our respondents described grading this way:

It was not done by the professor who teaches in the class. In fact we have no clue who does it. It was very random and haphazard. One good thing is they generally won't fail you. But most of the times we get marks that are no way related to our papers.

One Indian mentioned that students could pay money to have exams regraded, but there was the possibility that their grade would go down.

There are a couple of reasons for doing things this way. It is assumed that a grader can do a more impartial job if (s)he does not know the student whose work is being graded. Second, many exams are common across an entire university, which may consist of many colleges. So anyone who is involved with the same course is assumed to be competent to grade any student in the course.

The third difference is that some countries seem almost immune to grade inflation. The Egyptian observed, "Tough questions are given and many system exist for grading, but in most courses the mean of the students grade will be in (C or D) grade."

But by far the most common observation was that final exams overseas count much more than they do in America. In China, the final counts for at least 50% to 60% of the grade. In India, it's even higher—90% to 100% is common. If anything other than the final carries significant weight, it will be midterm exams, never homework. Several students complained about the resultant pressure, but one opined, "I personally feel that the weight given for the final exams should be increased as they make you more serious for the exams." The Egyptian explained that high weight for a (common) final exam insures that an individual professor cannot exercise undue influence over a student's grade.

The big exception to the rule on weight of final exams is Turkey. Several students report that a weight of 25% to 40% is common. One even said that final exams in the U.S. are weighted more heavily.

Another exception may be Pakistan. Our Pakistani respondent, from N.E.D. University of Engineering and Technology in Karachi, reported that "usually a course is divided into two parts, theory and practical/project. For theory, 80% of the marks counts toward final; for practical/project, 50% of marks counts toward final." However, there may be less here than meets the eye, because a "practical/project course" corresponds to an undergraduate lab section in the US.

Exam practices vary between countries too. I remember that as a Fulbrighter doing tutorials in Australia, I was amazed to learn that it was considered unethical to tell a student his final-exam score before course grades were announced. The rationale was that information about an evaluation should not be disclosed until the evaluation was complete. But once grades were announced, they were posted publicly on a bulletin board—which would be unethical, even illegal, in the United States.

5. Academic Integrity

Unlike the other topics, on this question, almost all students agreed: Cheating is not tolerated on exams, but if you cheat on homework, probably no one will care. As one Indian put it,

This is one area which I saw has been very seriously implemented here than in my country. There is almost no restriction on copying the answers during the homeworks there. But it is taken seriously during any of the exams. If caught during any of the final exams then, he could be debarred and blacklisted for a period of 5 years or so depending on the university policy. But usually such severe action is avoided.

Likely this is because homework is so lightly weighted that no one can gain much of an advantage by cheating on it. Exams will be strictly monitored, so anyone who cheats on homework will get what is coming to him anyway. Copying of homework will work to the student's disadvantage, so there is no need to police it. However, in Turkey, where homework counts for more, there may be more cheating. One student declared that this is the case:

Even though we have very strict rules like here I can say that cheating is more in my country. Everyone does the homeworks together. Students study in groups in Turkey.

In writing, Asians tend to place less importance on citing sources; what is regarded as plagiarism here may be seen as legitimate reuse there.

Several other students agreed that academic integrity is enforced more in the U.S. than in Turkey, though none of them explicitly mentioned homework

6. Competitiveness of Students

While the Chinese agreed that students in China were more competitive than in the United States, there was no agreement among the Indians. Considering their answers more carefully, this appears to be because of the diversity of universities in India; some are much more competitive than others. One respondent offered, "Entrance to a good university is often very competitive but there isn't necessarily a lot of competition in class." But another student insisted this was not the case:

This is probably the biggest difference between education systems in India and the US. In India, being competitive is so ingrained a trait that it creates unbearable pressure on students to perform. And this performance is in the narrow sense of passing a certain examination, getting a good paying job and then settling into a decent life style. Therefore, knowledge earned by Indian children tends to be bookish, devoid of much practical experience. They are typically averse to taking risks - given their relatively poorer backgrounds, risk-taking is not considered an option. Sports, arts, music, even sciences are fields of education chosen only when Engineering and Medicine do not work out. This competitiveness tends to make Indians individually brilliant, but short on team-skills.

Among those saying the U.S. was more competitive than back home was the Nicaraguan student:

In Nicaragua, there is usually no competitiveness. The highly best universities are in the capital of Managua. If you got \$\$\$\$, then you have the advantage of driving to school, having a computer, internet, books, renting an apartment, etc. If you don't have money, then you need to basically pray to have someone grant you a scholarship. You can be very smart, but if you live outside the capital city, Managua, then you have to take a bus and travel at least 2 hours to get to the capital and then go to school. So, if you can't afford to take a bus every day of the week then students tend to take classes on Saturday and wake in the morning around 4AM to take the bus and get to the capital around 7AM. Then take the classes the whole day on Saturday. People that don't have computers, have to go to Internet cafés to do and submit the homeworks. You pay per hour to use the internet and also the supplies. Because students may come from different cities, it is extremely hard for

students to get together to study and do projects together. If you do get projects then everyone meets at the capital and take it from there. So, \$\$\$ talks and people with \$\$\$ have the advantage. Students with lower incomes outside the city of Managua highly depend on Nicaraguans working in the US to send the money for their kids to attend the university in the capital, Managua.

7. Asking Questions in Class

All the Chinese students agreed that Chinese are less likely than Americans to ask questions in class. But this has to do with English skills as well as cultural conditioning:

This is a significant difference. So many students raise questions during classes in US, but very few in China. I think this is because the culture in China emphasize[s] modesty. That's why Chinese students are always shy. By the way, the oral English of Chinese students are not so good compared to Indian students and native speakers, which make[s] them seldom ask questions in US.

There was, however, no consensus among the Indians. Some thought that many fewer questions were asked in India, while others thought it was nearly the same as in the U.S. Respondents from other countries were divided, with several saying that it depended on the instructor.

8. Respect Shown to Professors or Instructors

Generally, American faculty are less formal with their students than professors in their native countries. One Chinese put it this way:

We show "more respect" to Professor and Instructors. Here, professors can have more "friendship" to the students. American professors often make jokes with students, or talk other things during the class, but Chinese professors seldom do it.

Indians were in general agreement. As one put it,

Professors/instructors were highly respected, and, even feared to some extent. This was due to an extension of attitudes developed during schooling, where teachers are usually very strict. This strictness probably evolved due to the inability to give individual attention to students in a classroom due to its size. The respect and fear often combined into students providing and professors expecting sycophancy. There were always exceptions to the norm—typically, professors who had received their higher education in the US.

While several Indians said that respect was similar in the U.S. and India, the only respondent that said that *more* respect was shown in the U.S. was the Nicaraguan:

There is no respect to professors and professors don't have a lot of respect towards students in Nicaragua. That's probably because of culture. A professor may see a very nice looking student and the first thing you see is the professor making sexual comments. No respect. In the US, there is a lot of respect for everyone.

9. Terminology

One of the survey questions asked the students to comment on terminology that meant something different in the U. S. All of the interesting responses were from India, probably because among

the countries represented, only India uses English as a language of daily discourse; the others see English only in textbooks and other technical material, where terminology tends to be standardized.

One category has to do with arithmetic:

Americans use o in place of 0. Another one: Numbering- Americans would call 100,000 as hundred thousand. An Indian would probably say it as “one lakh” (comes from Sanskrit term Laksha).

Also,

[A]bout multiplication and division. When we say 4 into 2, we mean 4 multiplied by 2 which is 8. But I realised that here, 4 into 2 means 4 divided into 2 which is 2. That could get confusing at times.

Another category is academics (each paragraph below comes from a different student):

In my country, masters level education is called Post Graduate Studies where as under graduate level is called Graduate level.

'School' here also means college and/or university here. Back home school means just up to 12th grade, after which its just college/university.

The exam is usually referred to as “paper” while here it is usually called “exam”. So after the exam we go to collect the “paper” but here it is collect the “exam”. Here for an exam, “grades” or “points” are given. There it is usually referred to as “marks”.

10. Other

In India and China, most students in the same program are together in the same courses. An Indian student explained it this way:

In India (and I believe in Italy) everyone is assigned to a major (computer science, electronics engineering, mechanical engineering, etc) at the time of admission. Students are usually not allowed to change their major. All the first year students take the same set of courses so they spend the whole day together, and form close friendships. Universities here are very lonely affairs in comparison. Because of the close friendships, students often study together after class or meet up at someone's home. [When I came to NCSU, I hadn't realised that students had to choose their own courses. I remember my first meeting with Dr. Davis ... I was quite baffled when he asked me which courses I had signed up for]

Because of this, they are on the same class schedule. A Chinese commented,

We have a longer class duration; normally, each class has two sessions with 45 minutes, there is a 5-10 minute break in between. [The] American system [has a] very flexible class schedule, start[ing] from 8:00 am to 6:30 PM. Normally in China, all the classes start and end at the same time. And we never have a class open in the noon, for example, no class from 12:30 to 2:05. It is exactly time for students to sleep, each day :). Yes, Chinese have a habit for a nap during the noon (12:30 --1:30) each day.

In-class active learning exercises appear to be rare in these countries. Most of class time is taken

up with lecture or quizzes. As one Turk put it, “no activities at all ‘0’ and I absolutely mean it. None. Just in a big long desk with others and take notes.”

The only student to mention political disruption was one of the Bangladeshi students, who said, “Political and natural conditions often affect the length of the academic semester.”

Graduate student life in the U.S. differs a lot from being an undergraduate in India. In India, almost all students live in “hostels” (dorms) where food is provided. In America, they live in apartments and cook their own food. They also have to worry about funding and visa status. They have to get along with students from several other countries, not just Americans.

11. Summary

Most students from overseas are going to have to work harder on homework at American universities than they did back home. They need to learn quickly how to allocate their time. If they are running out of time, they may be tempted to cheat, and then surprised if they are punished for this, since it wouldn't have attracted much attention back home.

International students may be reluctant to ask questions in class because of cultural conditioning or language difficulty. It would be very helpful for us to encourage them, by calling on them, and by taking their questions seriously. Furthermore, we can help them overcome their language difficulties by speaking slowly, enunciating clearly and avoiding the use of idioms, especially in first-semester classes. The fact that most class materials are now on the Web helps; in earlier days, students were much more dependent on listening to lectures and writing down notes.

We should also recognize that students from many cultures will resist coming to office hours, so we should go out of our way to encourage them [1]. It is also helpful to look over their writing assignments in advance, when asked, so you can provide advice on style, word usage, and grammar that they would otherwise have nowhere to obtain.

Understanding students' backgrounds is important in making them feel that they belong, and getting them off to a good start in their academic program. In this paper, I have attempted to gather together the observations of dozens of international students to provide a snapshot of the educational experiences that have influenced their expectations.

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