

Improving the Engineering Education for Ethnic Minorities in Norway; a Study of the Situation at Oslo University College

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Abstract — *Up until the seventies Norway was an ethnically homogenous society. Few students with an immigrant background pursued higher education. Currently, Oslo University College hosts a large proportion of students with an immigration background. However, this group of students is not evenly distributed across the different disciplines and departments. A majority of these students decide to study engineering, and especially to embark upon the computer science programme. It is estimated that in 2002 approximately 40% of the students that enrolled onto the computer science programme had an immigration background. The policy and tradition at Oslo University College has been to handle all students uniformly and equally. However, students with immigrant background do not perform as well as their peers. Further, a significant number of students drop off at the start of the first year, and those who stay on frequently spend more time finishing their engineering degrees. A committee was established to identify the particular problems this group of students face in Oslo, as a precursor to improving the service to these students. In addition, four students with an immigrant background were used as consultants during the investigation. This paper addresses the qualitative and quantitative findings of this committee based on student interviews and questionnaires.*

Index Terms — *students with immigrant background, language, student expectations.*

OSLO AND ITS ETHNIC MINORITIES

Norway was until quite recently an ethnically homogenous society. In the seventies the first foreign workers arrived in Norway. They were mostly men, and the original intention was for them to stay for only a limited number of years, and then return. Gradually, the foreign workers were joined by their wives and children, as many chose to make Norway their new home. Refugees and asylum seekers followed, and once asylum applications were approved, other family members followed. By now there is a large proportion of young people in Norway, especially in Oslo, whose parents or even grandparents immigrated to Norway and have since lived in Norway for several decades.

Currently, Oslo University College hosts a large proportion of WIB (With Immigrant Background) students. This group of students is not evenly distributed across the different disciplines and departments. A majority decides to study engineering, and especially to embark upon the computer science programme. It is estimated that in 2002 approximately 40% of the students who enrolled onto the computer science programme are WIB students.

The policy and tradition at Oslo University College has been to handle all students uniformly and equally. However, WIB students do not perform as well as NIB (Non Immigrant Background) students. Further, a significant number of students quit at the start of their first year, and those who stay on, frequently spend more time completing their engineering degrees.

A new law introduced with the intention to improve the effectiveness of higher educations makes the funding of universities and colleges dependent on the number credits taught and the number of students who have successfully obtained their degrees. The education authorities has for a number of years endeavoured to make an efficient higher education system accessible to everyone – now the objective is for more students to succeed and hence pass through the system.

At the same time, the recruitment to higher education is low, especially mathematics, science and engineering subjects are decreasing in popularity. Engineering faculties are therefore effectively forced to “get more out of the students” to survive financially.

How can we get more of the WIB students to succeed? Perhaps the “equality principle” is not very effective? Maybe WIB students have needs or problems that we have not yet identified? By identifying these difficulties, can we take actions to improve the learning environment?

THE APPROACH – IDENTIFYING STUDENTS’ EXPECTATIONS AND EXPERIENCES

A committee was established to gain insight into the particular problems WIB students face at our institution. The committee consisted of two lecturers from the computer science department at the Faculty of Engineering and a faculty member from SEFIA (Centre for multicultural and international studies). The work was jointly funded by the engineering faculty, SEFIA and the central administration of Oslo University College.

The committee set out to acquire quantitative and qualitative data by means of questionnaires – reaching a large number of students, and in-depth one-to-one interviews with a few selected students. We decided to focus on the freshmen as it is in their first year of study that most students quit. We decided to limit our study to the department of computer science due to its large proportion of WIB students compared to other departments.

NIB students were also included in the study to serve as a control group. Experienced WIB students (successful WIB students in their final year) were also consulted during the study. Four final year students were paid to provide qualitative data through interviews. They also assisted us in the questionnaire design process.

Two questionnaires were distributed to all first year computer science students. The first during the first week (August 2002), with the purpose to identify students’ earlier experiences regarding language problems and teamwork. The second questionnaire was issued in the middle of the second semester (March 2003). The latter questionnaire was more comprehensive, and designed with help from the four student assistants.

QUANTITATIVE FINDINGS

The pilot questionnaire

The initial questionnaire was given to the students during their first week of study. They were asked to declare their native language, and answer five simple multiple-choice questions about their experiences from primary and secondary school. They had the option of either agree with, partly agree with or disagree with the following statements:

- It was easy to comprehend the teacher.
- It was easy to understand the textbooks.
- It was difficult identify the essence from texts.

The final questions addressed the students’ experiences and expectations collaborating with students fluent in other mother tongues. The rationale behind the questionnaire was as follows: The most visible difference between the NIB students and the WIB students is that the WIB students are not as drilled in using the Norwegian language since they are using their native language to some degree. Many students have distinct foreign accents and some difficulties comprehending Norwegian speech and expressing themselves orally. Others have no difficulties at all. Still some students have hidden language problems – some resesarchers claim that they have a weaker ability to abstracting concepts in Norwegian - and they have problems understanding more subtle distinctions and unexpressed suppositions in the Norwegian language.

As the main emphasis is on project work throughout the engineering programme, we found it important to gain insights into how students perceive teamwork and collaboration with fellow students mastering different native languages. 137 students completed the questionnaire, 85 of them were NIB students and 52 were WIB students. The forms were designed to be easy and quick to complete.

First, the questionnaires revealed that a total of 22 foreign languages are spoken among the students in the first year. It is possible that this number is even higher, as about 30 students did not complete this question.

Most of the NIB students expressed that it was easy to understand the teacher. But not all of them agreed completely. 5 students out of the 85 only partly agreed.

The corresponding statistics for the WIB students are: 40 out of 52 agreed completely, and 12 agreed only partly. Hence, less than 6% of the NIB students and 23% of the WIB students occasionally experienced problems comprehending the teacher.

Only 58 NIB students found the textbooks easy to understand. 24 of them partly agreed that textbooks were easy to understand, which also means that they sometimes found the textbooks difficult, and two disagreed completely. Corresponding figures for the WIB students are: 21 out of 52 agreed that it was easy, 28 only agreed partly, and 3 disagreed completely. Thus, 30% of the NIB students had some difficulties reading the textbooks, while nearly 60% of the WIB students experienced likewise.

When asked about the difficulty of extracting the essence from a text, 6 out of the 85 NIB students agreed, 49 agreed partially, and 29 disagreed. This means that 55 out of 85 (64%) occasionally have problems abstracting. Correspondingly, 40 out of 52 (77%) WIB students reported having similar problems.

Conclusions: the pilot questionnaire

There are measurable differences in language proficiency when comparing NIB and WIB students. Still, both NIB and WIB students struggle with language related problems, but the difficulties are more pronounced among students without Norwegian as a native language.

It is interesting that both groups find the teacher easier to understand than the textbook. One would expect that dialectal variations and poor diction could play a role especially for the WIB students. The difference in difficulties is greatest among the groups with respect to textbook reading. 30% of the NIB students have problems while this number is 60% for WIB students.

Teachers must be aware of the implications of having student with weaker language skills: It is more difficult to them both to understand the teachers and the textbooks. Consequently, the topics are perceived as difficult and take longer to master. Further, these students may also be frustrated more quickly than their peers. Being uncertain about their own understanding of the subject may prevent and inhibit them from participating in discussions.

Insufficient language competence may be the root of yet other social problems. The NIBs often communicate implicitly in a cultural context where vital information is implied. This can easily lead to misunderstandings. Misunderstanding about the agreed time and place often leads to bad feelings between students in the same team.

The follow-up questionnaire

Our understanding of the students' situation was considerably widened when we had analysed the second, more comprehensive questionnaire, which the freshmen filled in March of 2003.

Interviews with our student assistants revealed important dimensions of students needs. During the interviews and the questionnaire design workshops the assistants expressed that the students do not solely engage in educational activities. Other factors are often of greater importance. To become an engineer is not the main objective for many of the freshmen. Students often have no clear perception of what an engineer is and what engineers do in their profession. They do not think this is their only educational nor occupational option. Social life is of higher importance, especially finding study companions, extracurricular activity and socialising. The first priority for students is to establish a social network as they commence upon their engineering degrees.

These insights affected the design of the second questionnaire. In addition to questions addressing language proficiency problems – i.e. how they managed to follow lectures and reading textbooks, the students were asked about their previous computer experience and their social life during their time at our institution.

100 students completed the second and more comprehensive form. There were 62 NIB students (48 men and 14 women), and 38 WIB students (29 men and 9 women).

Language and prior knowledge

We asked if it was easy, partly easy or not easy to follow the lectures, and if it was easy, partly easy or not easy to understand the textbooks.

There were only small differences between the NIB and WIB students' ability to comprehend lectures. About half of the students indicated that they had no difficulties following the lectures, and about half the students replied that they had some difficulties. Only a few students found it difficult. However, the responses from the WIB women deviated a from the trend, as only two out of nine had no difficulties following lectures – the others found it partly difficult.

As for the text books, all the WIB women found them either difficult or partly difficult to understand, and none of them found the textbooks easy. In contrary, 36% of the NIB women had no problems with the textbooks. Corresponding figures for NIB men were 19% and 24% for the WIB men.

There is a noticeable connection between prior experience and the ability to understand textbooks. All the students who today find it easy to read textbooks, had either "much" or at least "a little" knowledge when they started. 60 out of the 79 students who have some difficulty understanding textbooks indicated that they had "little" or "no" prior knowledge. Four of the WIB female students had "a little" experience with information technology at the beginning, 5 of them had no prior experience. Only 4 out of the 33 students who reported having "much" prior experience, later found the textbooks difficult, while 16 of them found the textbooks "partly" difficult. Currently, there are no computing related admittance requirements to become a computer science student. Unfortunately, this policy signals that no such knowledge is needed. Perhaps that can deceive some students?

Anyhow, prior knowledge in itself is not enough to succeed. Most students find it hard to understand the textbooks, despite their prior knowledge. 41% of the WIB male students had "much" knowledge when they started, but only 24% find the textbooks easy. 35% of the NIB men claimed to have "much" prior knowledge, but only 19% of them find it easy to understand the textbooks. An exception is the NIB women, who manage with a limited amount of prior experience: 31 had "much prior computing experience" at the beginning and 34% had no difficulties with the textbooks. The difference between

the sexes can probably be ascribed to the fact that women often have more realistic and modest ideas about themselves and their own competence. None of the WIB women had “much” prior computer experience, and as mentioned previously, none of them find the textbooks easy.

The differences in language proficiency also affects these results. Male WIB students have more really difficulties reading textbooks than male NIBs, despite a higher percent of them claims to have prior computing experience.

We asked the students if they would have attended a voluntary summer foundation course in elementary computing, if given the option. Half of the students replied “yes”. This half comprised of 25% of the NIB men, 72 % of the WIB men, 57 % of the NIB women and 100% of the WIB women.

Teams and teamwork

All freshmen are initially organised into groups of 4-5 members where the purpose is to learn cooperation, teamwork, communication and publishing skills. These groups are composed by the teacher, with a policy to mix students with respect to WIB/NIB category and sex. Students were asked about their experiences working in these teams.

We are happy that nearly 80% were both content with the composition of their team and with the cooperation within the team. Students are different, and the chemistry between the group members can not always be optimal, so the result could not possibly be 100. As much as 94% indicated that they had influence on the decision making in the team and that their voices were heard. All the women indicated that they had a say, and 96% of the WIB men replied likewise. NIB men were least content, as only 86% felt that they had been heard. We interpret this as an indicator that we have an open and including environment where most students feel accepted.

However, about a third of the students found it difficult to find friends at the college. 71% of the male NIB students find it easy to establish contact with fellow students, while only 43% of the NIB female students think likewise. Further, only a minority of the students engage in the student activities organised at the college (movie club, diving club etc). Their social networking is therefore mostly done during the hours of study.

It is important for the students' well-being to get acquainted and make friends, and some of the students can be both modest, shy and silent. If the assigned team do not provide the necessary friendship, it can be difficult to find friends, because there are no distinct groups to associate with. The large lecture theatres and the lack of communal areas is a drawback.

Students are by default assigned to different standard “classes” – a group of about 30 individuals. A few years ago lectures were given for individual classes, but now all lectures are given in plenary. Only tutorials are conducted on a class basis. Perhaps it would be helpful to make the class affiliation more visible for the students, by giving the class a distinct functions and help the students to make the class their own environment.

The questionnaire had an open question: We asked what the computer science department could do to improve the learning environment. Some of the answers do not belong to the issues discussed here, as better food and better air condition, but two of the themes that occurred were:

- Textbooks in Norwegian (about 10%)
- Lectures in smaller groups, stronger class affiliation (about 10%)

CONCLUSIONS

The insights obtained through this study can be used to improve the students' learning environment, and help increase the success rate. First, the study elucidated that there are differences in language abilities when comparing NIB and WIB students. This problem is difficult to eradicate. However, simple remedies can help reduce the language barriers. Further, prior computing experience plays a role in the competence making; and action should be taken to reduce the gap between students with and without prior experience, and we must tell the students beforehand that it is advantageous to possess prior knowledge. Finally, action must be taken to stimulate social networking making it easier to make friends quickly. The students well-being and feeling of belonging will be increased, and the students are then more likely to complete their degrees successfully on time.

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TABLES AND FIGURES

FIGURE 1

PERCENTAGE OF STUDENTS WITH "PRIOR EXPERIENCE"

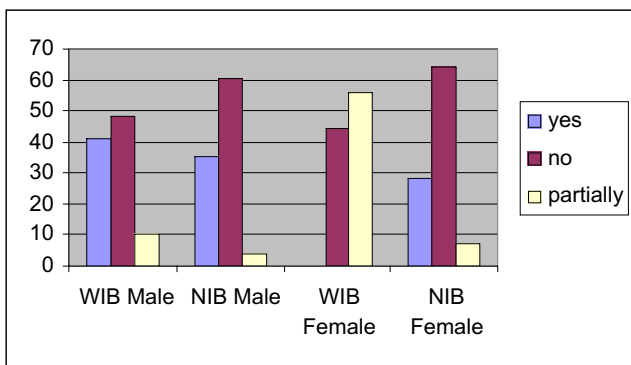


FIGURE 2:

PERCENTAGE OF STUDENTS WHO FOUND IT "EASY TO FOLLOW LECTURES"

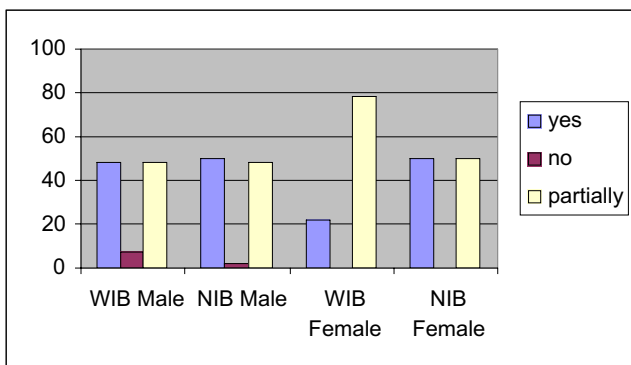


FIGURE 3
 PERCENTAGE OF STUDENTS WHO FOUND IT "EASY TO UNDERSTAND THE TEXTBOOKS"

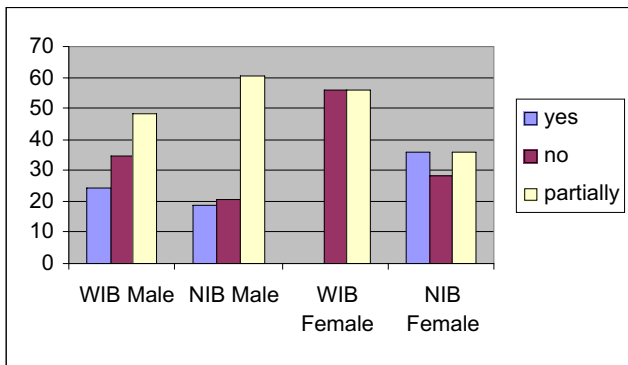


FIGURE 4
 PERCENTAGE OF STUDENTS WHO WOULD "AGREE TO PARTICIPATE IN AN OPTIONAL FOUNDATION COURSE"

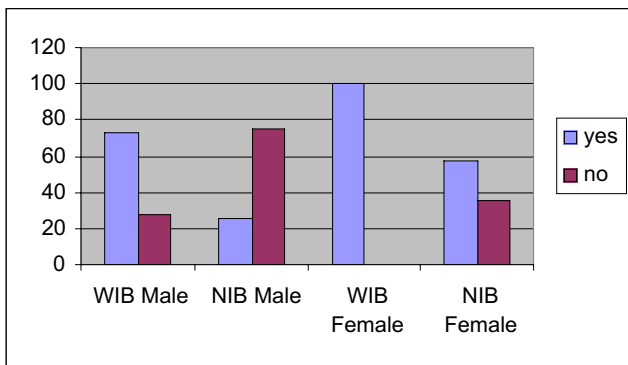


FIGURE 5
 PERCENTAGE OF STUDENTS WHO FOUND IT "EASY TO MAKE FRIENDS"

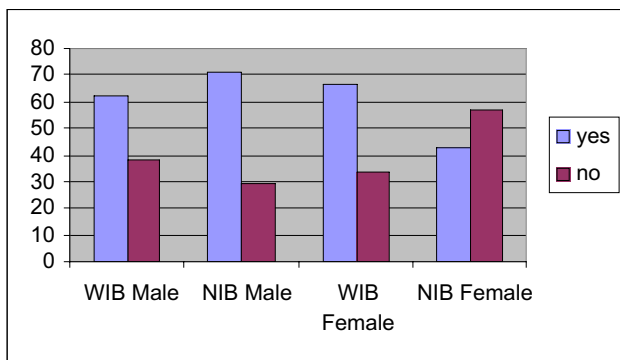


FIGURE 6

PERCENTAGE OF STUDENTS WHO "SOCIALISE WITH GROUP MEMBERS"

