

## Students' perceptions and attitudes towards agricultural engineering education in the Sultanate of Oman – Part 1: academic programme selection

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**ABSTRACT:** A written questionnaire, complemented by a focus group discussion, was used to assess the perceptions and attitudes of undergraduate students in bioresource and agricultural engineering (BAE) on degree programme and major selection, curriculum content and career preferences. The results showed that the College of Agricultural and Marine Sciences (which offers BAE) was not the preferred choice for over 78% of the students surveyed when they entered the University, and nearly 70% of this same group indicated that the College of Education or Engineering was their first choice. Once admitted in their present College, about 72% of those surveyed first chose the major in Bioresource & Agricultural Engineering from among the 10 academic programme majors offered. An overwhelming majority of the students who cited BAE as their first choice did so because of the *engineering* orientation, compared to the other majors offered. Words and phrases like *machinery* and *want to be engineer* were utilised to explain their interest in the BAE major. Most students preferred the programme (and Department) to be part of the College of Engineering, rather than Agriculture. This also reflects student's overwhelming preference to be considered as engineers (88%) after graduation.

### INTRODUCTION

Progress in engineering and technology has transformed agriculture and other land-based industries into modern industries [1]. The remarkable contributions of agricultural engineering and technology during the past century are well recognised and documented [2]. Strategically, the continuing success of the industrial sectors, which develop innovative technologies that support agriculture, relies heavily on the education of graduates who have the appropriate skills for research, life-long learning and technology transfer.

Researchers have documented the problems of declining enrolments and low appeal of engineering among school leavers [3]. Recent articles by Opara have provided empirical evidence in the mainstream engineering education literature on the extent of the problem facing agricultural engineering education [4][5]. Using focused group discussion and questionnaire surveys among final year undergraduate students at Massey University, New Zealand, the author found that most of those students surveyed came from rural backgrounds and had experience of working in the agricultural sector prior to enrolling at the University [4]. This limited source of undergraduate students is considered a major challenge in efforts to increase enrolments in agricultural engineering programmes in tertiary institutions in many parts of the world [6][7].

In recent times, there has been a worldwide debate on the future of agricultural engineering education, particularly at the undergraduate level, in response to declining enrolments, student retention problems and reduction in funding to support educational and traditional research programmes. One major outcome of this debate, particularly in North American universities, is the expansion of the agricultural engineering

horizon beyond agriculture to include other biological industries [8-10]. Accordingly, many agricultural engineering departments and academic programmes have been renamed to include words like *biological*, *bioresource*, *biosystems* and the prefix *bio* [2][6].

### Agricultural Engineering Education in Oman

Sultan Qaboos University (SQU), Muscat, offers the only degree programme in agricultural engineering in the Sultanate of Oman. The programme was one of the pioneers when the College of Agriculture was set up in the mid-1980s. A decade later, the name (and orientation) of the Department and programme was changed from *Agricultural Mechanisation* to *Bioresource and Agricultural Engineering* (BAE). One of the problems facing the bioresource and agricultural engineering programme and the College is the very low appeal of agriculture and related courses among students. Even when students have been admitted into the College, the retention of these students has become a major challenge [11].

In order to devise appropriate intervention aimed at increasing the appeal of agricultural engineering among students, it is important to understand their attitudes towards the College and the major, and their perceptions about the image/profile of the agricultural engineering profession, the curriculum content, as well as their future employment.

In this current article (part 1), the authors report on students' attitudes in choosing the College of Agricultural and Marine Sciences and the major in bioresource and agricultural engineering. The authors also examine the sources influencing students' choices. In a following article (part 2), the authors focus on students' perceptions and attitudes towards the curriculum and their employment preferences after graduation.

## METHODOLOGY

The study was carried out at the end of the 2003 fall semester. Notices were sent out to students enrolled in the bioresource and agricultural engineering (BAE) major to come to a meeting to complete a questionnaire survey on their perceptions of the major and their future profession. In addition, senior undergraduate (final year, 400-level) students were specifically asked to invite their fellow students to participate. When students arrived at the meeting venue, they were briefed about the objectives of the study and each student was given a copy of the survey questionnaire to complete.

Prior to starting to answer the questionnaires, students were encouraged to seek clarifications on the questions when necessary and the two Omani co-authors provided further explanations and translations in Arabic language so as to ensure that the participating students understood the questions and contents of the questionnaire.

All 18 students who participated at the meeting and discussion forum completed and returned their questionnaires. Students' responses were complemented immediately with a group discussion to enable them to explain some of their responses and to obtain their views on any other issues they felt was relevant to the study.

## RESULTS AND DISCUSSION

Students who participated in the study came from three main cohorts, as shown in Figure 1, with the majority in their final years. The high participation of final year students in the study was desirable given their greater in-depth understanding of the BAE major and their experience in the academic programme.

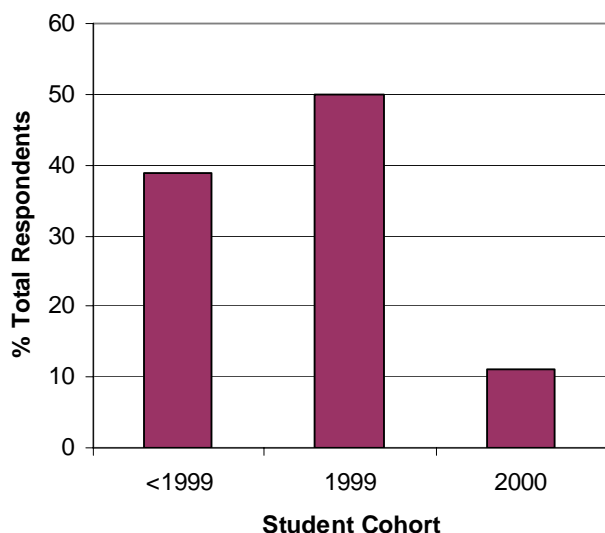


Figure 1: Cohorts of students who participated in the study.

### Choice of Undergraduate Degree (or College)

About 78% of the students indicated that the College of Agricultural and Marine Sciences was not their first (preferred) choice when they applied for admission to the University. Among these students, over 69% stated that the College of Education or College of Engineering was their first choice, while the rest chose the Colleges of Commerce or Science.

The second choice for these students was the College of Science or Commerce (69.23%), while only 15.38% indicated that the College of Agricultural and Marine Sciences was their second choice. These results clearly highlight the very low appeal of a degree in agricultural and marine science among students.

When students were asked to identify who was the greatest influence in choosing which degree they would study at university, a high majority (80%) indicated that the decision was entirely their own. The rest of the students (20%) indicated *my parents* or *my brother/sisters* as their greatest influence. Interestingly, none of the students agreed that their *teachers* or *friends* had the greatest influence in their choice to study a particular university degree.

The researchers contend that this result does not diminish the vital role played by career advisors and counsellors in high schools, which provide both students and their guardians with invaluable information to assist them in their choice of degree programmes and careers. Although further detailed research is warranted to confirm these findings among a wider range of students and degree programmes, the results do, however, offer some insights into the influences that bear upon students when selecting a preferred university degree programme.

### Choice of Bioresource and Agricultural Engineering Major

Over 72% of the students surveyed stated that the BAE major was their first choice when they were offered admission in the College of Agricultural and Marine Sciences. When the students were asked to explain their reason for choosing the BAE major, the inclusion of the word *engineering* in the name, as well as the expectation of courses in *machinery*, appeared to be their main attraction.

Students utilised several phrases to describe these influences, including the following:

- *Engineering (unlike other departments);*
- *I liked machines;*
- *Want to be engineer;*
- *Most close to engineering, especially machinery courses;*
- *Relates to engineering;*
- *Liked more maths courses;*
- *Preferred courses with calculation;*
- *I liked mathematics/physics, etc.*

Among those students who did not choose BAE as their preferred major/Department, over 71% chose *Food Science and Nutrition* or *Soil and Water Sciences* as their first choice, and *Bioresource and Agricultural Engineering* as their second choice. Overall, these results indicated a high rate of preference for the BAE major among those students surveyed after they had been offered admission into the College of Agricultural and Marine Sciences.

### Engineering or Agriculture, or Both: A Programme Dilemma

Agricultural engineers are often confronted with the dilemma of programme alignment and identity between engineering and agriculture. In this study, the researchers posed several questions to the participating students in order to assess their perceptions and preferences on the location (College-wise) of their degree major, focus of curriculum content (engineering vs

agriculture), and preferred professional identity after graduation.

Given a choice of three colleges (Agriculture, Science or Engineering), over 64% of students chose the College of Engineering, while the rest (36%) chose the College of Agriculture as their preferred location for a Department of Agricultural Engineering. Furthermore, 75% of the students surveyed would be interested to do an agricultural engineering major that had a greater focus on *engineering*, rather than *agricultural and marine sciences*.

#### Course Duration

The majority of students preferred a 4-year undergraduate programme duration (see Figure 2); but when asked if they would be daunted by a 5-year degree if enrolling again, their responses were equally split between *yes* and *no*. It should be noted that the undergraduate degree (Bachelor of Science in Bioresource and Agricultural Engineering) in the College of Agricultural and Marine Sciences is a 4-year programme, while the undergraduate degree (Bachelor of Engineering) in the College of Engineering is a 5-year programme.

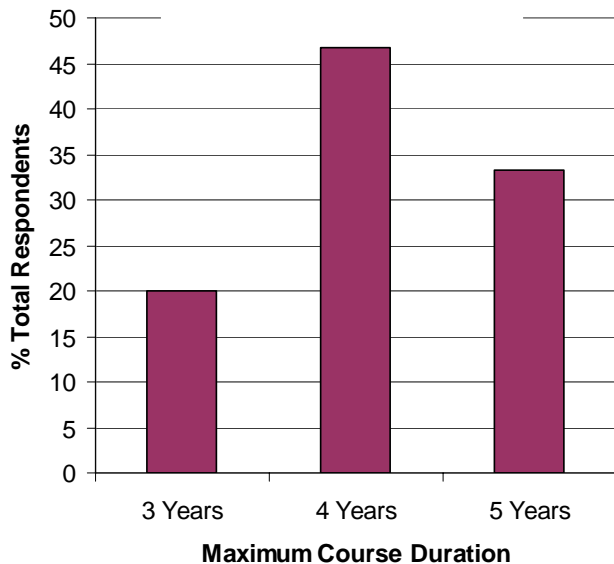


Figure 2: Students' preferred duration of undergraduate programme in agricultural engineering.

#### Preferred Title After Graduation

After graduation, an overwhelming majority of the students (87.5%) would consider themselves to be an engineer, instead of agriculturist, scientist, or technologist (see Figure 3). This level of response reflects students' unequivocal choice of the College of Engineering as their preferred location of agricultural engineering programmes; this is in addition to their willingness to study an agricultural engineering major that has a greater focus on *engineering*, rather than *agriculture*.

The experience of the authors in Oman and elsewhere in the region is that the title of *engineer* is considered by many people as prestigious; it is not uncommon to find civil servants whose job titles include the word *engineer* or are addressed as *engineer*, even when they do not possess an engineering qualification and are not registered engineers.

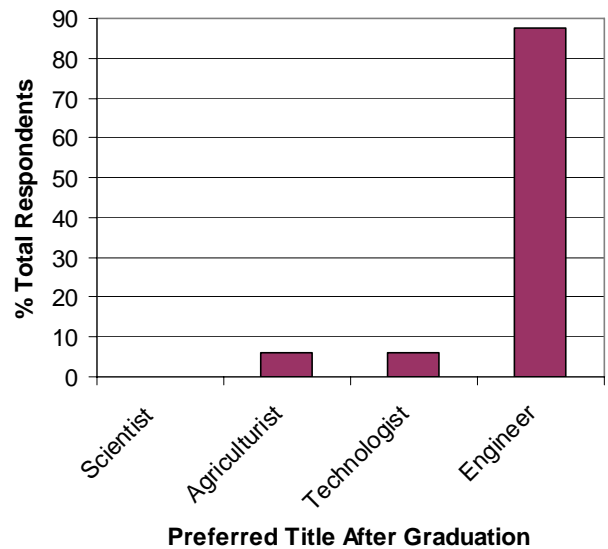


Figure 3: Students' responses to the question, *After graduation, what would you consider yourself to be?*

#### Historical and Current Context

Historically, the earliest programmes in agricultural engineering education started in colleges of agriculture and, in some countries, such programmes were offered jointly by colleges of agriculture and engineering. Today, despite the maturity of the discipline, many academic institutions (such as the SQU) still offer their agricultural engineering programmes through colleges (mainly agriculture) other than engineering. This situation creates problems with academic programme accreditation and the recognition of graduates from such programmes as professional engineers by their peers in the other engineering disciplines.

#### CONCLUSIONS

Using a structured questionnaire, the authors investigated undergraduate agricultural engineering students' attitudes towards pursuing a degree in the College of Agricultural and Marine Sciences and a major in bioresource and agricultural engineering at Sultan Qaboos University in the Sultanate of Oman.

The researchers also examined the sources of influence on students' choice of degree type (college at the University) and explored several factors that impacted on students' attitudes towards the agricultural engineering discipline.

The main findings are summarised as follows:

- Programmes in agricultural and marine sciences are highly unpopular among students in preference to degree programmes in education and engineering.
- An overwhelming majority of the students in the survey reported that they had the greatest direct influence on which degree they pursued at the University, followed by their family members.
- A vast majority of students indicated that the major in bioresource and agricultural engineering was their first choice after they had been offered admission into the College of Agricultural and Marine Sciences. For these students, the inclusion of the word *engineering* in the name of the major, their preference for courses

involving *calculations* and their expectation of courses in *machinery* appeared to be the main attraction for the major.

- The majority of the students surveyed would prefer the agricultural engineering programme (and department) to be located in the College of Engineering, and a greater proportion of the students would be interested in pursuing an agricultural engineering major that had a greater focus on *engineering*, rather than *agricultural and marine sciences*.
- The students surveyed generally preferred the duration of the BAE programme to remain at the current 4-year degree plan, with 50% of the respondents felt that they would be overwhelmed if the duration of the programme was increased to a 5-year plan.
- After graduation, an overwhelming majority of the students participating in the survey would consider themselves as engineer instead of agriculturist, scientist or technologist. This response corroborated the students' attraction towards the word *engineering* in the name of the programme (and Department), as well as their preferred alignment of the programme towards the College of Engineering over the College of Agriculture.

These findings should provide useful management information to assist educational administrators in their efforts to develop appropriate strategies and policies to attract, advise, retain and graduate students in agricultural engineering programmes in particular, and colleges of agriculture in general.

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