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Student Perceptions of the Public Image of Agricultural Engineering and Their Preferred Name for the Discipline and Title Degree*

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During the past decade, there has been a worldwide debate on the future of Agricultural Engineering education. In a previous paper, we discussed the historical evolution of and curriculum reforms in agricultural engineering (AE) education at Sultan Qaboos University. Some of the significant changes implemented during the last decade have included renaming the department and degree major, and restructuring the curriculum to meet ABET's minimum requirements for professional accreditation. Our objective in the present article is to assess students' perceptions on several issues affecting the future of agricultural engineering education, especially the factors which influence its attractiveness to students. Our results show that the majority of students perceived the public profile of AE and public understanding of the role of AE in society to be very low. The poor image of agricultural engineering was mostly attributed to its association with agriculture (74%) rather than engineering (26%). The majority of students expressed a preference for a degree name that includes 'Engineering' or 'Technology' rather than 'Agriculture' or 'Science'. The low appeal of names connected with biology among the students was attributed to the high esteem accorded to the engineering profession in society and also a strong connection made by students between engineering and 'machines' and between engineering and maths/physics, instead of engineering and biology. Students also suggested practical steps to enhance the image, visibility and appeal of AE among students through targeted promotional campaigns and community outreach programs.

Keywords: agricultural engineering; student perceptions; image surveys

INTRODUCTION

AGRICULTURE AND RELATED biological industries play an important role in the Omani culture and food system. Despite the overriding importance of oil and gas in the modern national economy, a significant proportion of the people living in remote areas still depend on the agriculture and fisheries sectors for their livelihood. The role of Agricultural Engineering (AE) education in the integrated national development in Oman is well recognized. The degree program in Agricultural Engineering (formerly Agricultural Mechanization) was among the pioneer programs offered in the College of Agricultural and Marine Sciences when the university was established nearly two decades ago. In previous papers [1–2], we have reported on aspects of students' perceptions and attitudes towards Agricultural Engineering education in the Sultanate of Oman, including academic program selection and curriculum content and career preferences. These findings showed that the College of Agricultural and Marine Sciences (which offers the Agricultural Engineering program) was not the preferred choice for over 78% of students surveyed when they entered the university. However, of the 10 academic program majors offered, the first choice of 72% of those who were admitted to the college was to major in Bioresource and Agricultural Engineering [1]. Although the students generally disliked courses in the basic sciences and engineering, especially when another college offered such courses, a high majority of the students perceived that it was essential to include more engineering, technology and management courses in the Agricultural Engineering curriculum [2].

In another recent paper, we described the evolution of agricultural engineering education at Sultan Qaboos University, including curriculum reforms, changes in the name of the degree major and the employment status of graduates [3]. The first significant reform occurred after the first decade, when the name of the department and degree program offered was changed from Agricultural Mechanization to Bioresource and Agricultural Engineering. Historical data on the number of students enrolled showed a considerable

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increase, which coincided with the introduction of the new major, and this trend has continued. Our analysis also showed that the employment status of our graduates is, overall, very high (> 95%) and that most graduates are employed in the public sector, where job opportunities have stagnated.

Despite these impressive records in curriculum reform and management, as well as the high employment rate of graduates, the future of agricultural engineering education remains uncertain, especially given the very low appeal of agriculture-related programs among Omani students and the declining employment prospects for graduates. One of the problems facing agricultural engineering education is its poor image [4] and rapidly shrinking traditional rural base for student recruitment [5]. These problems are expected to be exacerbated in the 21st century, when 'smart' industries and 'knowledge' economies are expected to be the norm [6–8]. Many universities around the world have responded to this challenge by changing the name of their agricultural engineering programs and restructuring their curricula [1, 3, 5]. This has led to the emergence of biology as an essential component of the curriculum and research programs of many universities, particularly in North America [9–12]. Efforts to adequately address this problem must include stakeholder analysis and involvement (including students), in order to incorporate their input into the debate. The objectives of our present article are to assess undergraduate students' perceptions of the image of agricultural engineering in Oman and to determine their preferred name for the discipline.

METHODOLOGY

The study was carried out at the end of the 2003 Fall semester. Invitations were sent to students enrolled in the Bioresource and Agricultural Engineering (BAE) major to participate in focus-group discussions and complete a questionnaire survey on their perceptions of agricultural engineering education and its image generally. The detailed research methodology has been described elsewhere by the authors [1]. In brief, we surveyed undergraduate students enrolled in BAE at Sultan Qaboos University in the Sultanate of Oman. The written questionnaire was complemented with focus-group discussions, which enabled the authors to explain the objectives of the study and the students to comment further on some of their responses. Eighteen students responded to the invitation to participate in the study and they all completed the questionnaire. The frequency of students' responses for each question was expressed as a percentage of the total, and the results obtained are discussed below.

Public image of agricultural engineering

We used a series of questions to explore student perceptions of public understanding of the role of agricultural engineering and to assess its image in society. The majority of students perceived there to be a very low or low public understanding of AE and its role in society in comparison to other engineering disciplines (Fig. 1). The students' perceptions of the positive image/profile of AE among the public was slightly better (Fig. 2). The very low to low public understanding of AE and its

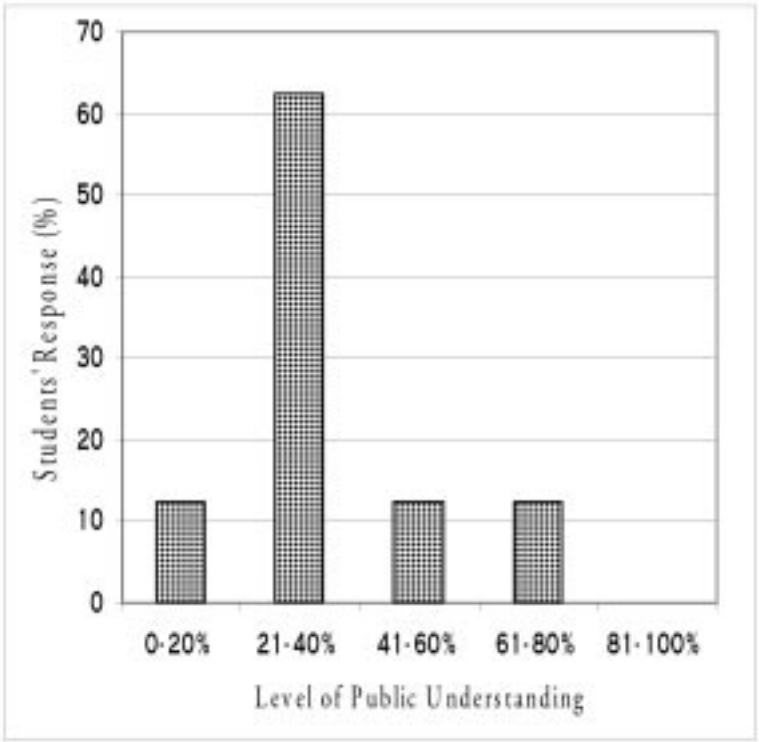

Fig. 1. Student perceptions of public understanding of the agricultural engineering profession and its role in society.

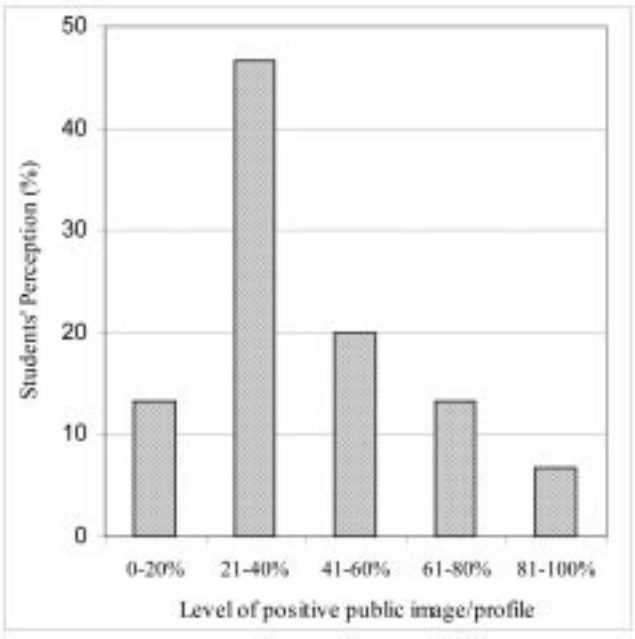

Fig. 2. Student perceptions of the public profile of agricultural engineering compared to other engineering disciplines.

role in the economy might partly explain its perceived poor image. When students were asked to name any famous agricultural engineers in Oman or overseas (excluding faculty/staff), the majority responded, 'I don't know'. Among the three students who claimed that they knew someone, none of them was able to name any when the question was explored further during discussion.

The majority of students perceived the poor image of AE to be partly due to its association with agriculture rather than engineering (Fig. 3). Engineering was commonly connected with words like 'high tech', 'trendy', 'smart' and 'sophisticated' among the students, while agriculture and fisheries were mostly linked with words like 'rural', 'poor', 'dirty', 'manual work', 'backward', etc. One student explained: 'Doctor, you don't understand, if you tell people you are studying agriculture, they think you are not intelligent.' Another student added: 'Everyone thinks if you study agriculture you must work on the farm.'

Improving the image/profile of agricultural engineering

When students were asked to 'suggest up to four practical steps you would recommend in order to

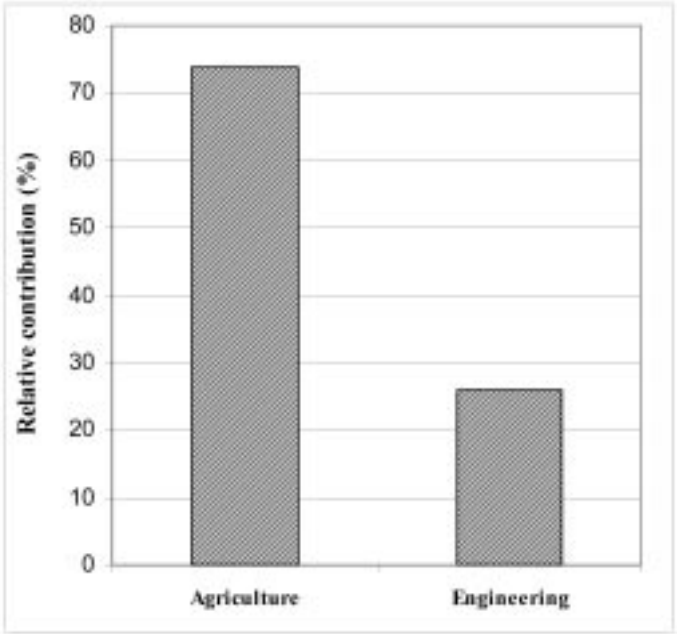

Fig. 3. Student perceptions of the relative contribution of the 'agriculture' (range = 60–100%) and 'engineering' (range = 0–60%) disciplines compared to the poor image of agricultural engineering.

enhance the public understanding and image/profile of agricultural engineering, many suggestions were offered. Based on further group discussion of this topic, the key suggestions made by the students were broadly classified into the following action points:

(a) Targeted advertising, publicity and promotion of agricultural engineering related events and achievements.
(b) Extension and community outreach programs (introducing innovative technologies and organizing 'how-to-do' events for agribusinesses such as irrigation, greenhouse technology).
(c) Linking students with industry and future employers (e.g. introducing industry-supported design projects for final-year students; summer jobs for students).
(d) Creating more employment opportunities for agricultural engineers beyond the agricultural sector.
(e) Renaming the college and degree programs to make them more attractive to students and their families (one student asked 'What is the meaning of Bioresource? I think it is confusing to us').
(f) Revising the curriculum to increase the amount of laboratory and 'practical' fieldwork (experiential learning).

Some students pointed out that the considerable amount of time available to them during the semester breaks, particularly during the summer, means that they are idle if they have no courses to take. They suggested that ongoing industry experience programs could be implemented, even if they worked as volunteers, to enable them to get training and experience in the industry. Many students felt that the internship program alone was not sufficient, especially when compared with the higher level of industry training received by their counterparts in the College of Engineering.

Obviously, some of these suggestions are more difficult to implement, while others can easily be incorporated into the existing degree plan and teaching program. Faculty and staff can do more to incorporate the suggestions made in (a) to (c) above; however, creating more employment opportunities falls beyond the mandate of faculty and staff. Efforts by the government to diversify the economy and facilitate private sector participation will contribute towards addressing this problem. While employment prospects in the public sector are increasingly shrinking, there is anecdotal evidence that some graduates turn down job offers in the private sector, preferring to wait for opportunities in the public sector, which command higher status, good pay and job security. This situation was highlighted a decade ago by Al-Mughairy [13], based on his interviews with a number of graduates from the college: 'Their personal goal was attaining a secure job with one of the Ministries, where the major component of the job was administrative and ample security was available.'

There is also a need to promote and encourage entrepreneurship among Omani graduates (including agricultural engineers), and similar proposals have been made in the past by other authors. Al-Mughairy [13] questioned whether 'our young agricultural graduates are willing to face the challenge of further developing a scientific agricultural system'. The author went further and outlined a range of opportunities for graduates in agricultural-related disciplines in Oman:

- The Bahla agricultural development project had no takers—in spite of the fact that the government offered the land on a nominal payment of RO35 per year, and a 50% subsidy on all agricultural accessories [1 RO = US$ 2.58].
- Opportunities for innovative farming to produce mushrooms and flowers.
- Use of greenhouses in the interior where the weather is conducive to protected-environment agriculture.
- Consultancy and technical services for small-scale farmers, dealing with field mechanization, spray application and machinery dealership.

At the end of 2003, the college embarked on an internal review of its name as part of continuing efforts to enhance its image and appeal among students and the public. The lead author served on the committee charged with seeking stakeholders' views and reporting back to the college. Each of the ten potential names included one or several combinations of the following keywords: (Bio/Natural) Resources, Food, Agriculture, Marine, Environment, and Veterinary. Despite a strong interest in new names that included the words 'Food', and 'Resources', the college decided to retain the existing name (Agricultural and Marine Sciences), since no clear substitute emerged from the extensive stakeholder study. At the program level, it should also be pointed out that part of the recommendations implemented following the recent merge of the Department of Bioresource and Agricultural Engineering and the Department of Soil and Water Science was to rename the major as 'Agricultural Engineering'. The new merged department is called the Department of Soils, Water, and Agricultural Engineering. It is hoped that the new name of the major (Agricultural Engineering) will remove some of the ambiguity expressed by many students with regard to the meaning and relevance of the word 'Bioresource' in the former name, as highlighted above.

Given the high emphasis that most students placed on the need for targeted action to improve the image and appeal of agricultural engineering, we explored this issue further by asking them to indicate at which stage they considered students should be targeted with information about agricultural engineering. Targeting students with information when they enroll in the Intensive English language program (prior to enrolling in the college

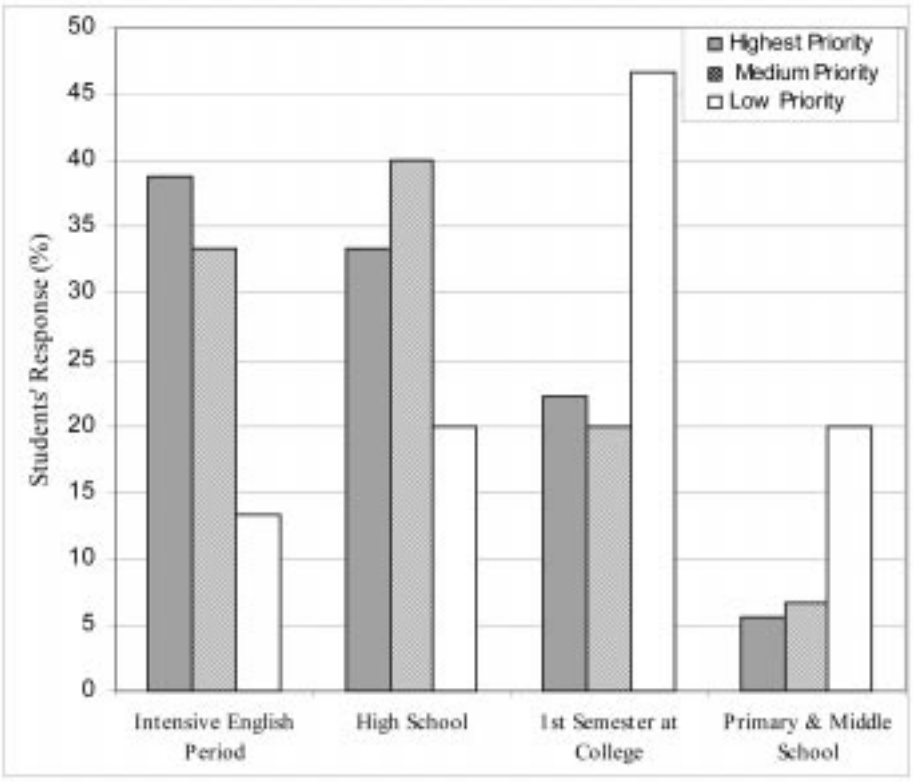

Fig. 4. Students' perceived priority on the appropriate intervention stage to target students with information and publicity materials in an effort to improve the profile of agricultural engineering.

and selecting their degree major) and at high school was rated highly (Fig. 4). It appears from these responses that most students consider the period they spend in English language training to be quite influential in developing their understanding and deciding on their preferences from among the range of academic programs offered in the college. Targeting students with information at high school or during intensive English language training were rated equal when students' responses for 'highest priority' and 'medium priority' were combined. Further interpretation of the overall student response (Fig. 4) also suggests that targeting students when they are already enrolled in the college is a bit too late, while primary and middle schools may be considered too early. Perhaps, once the students have been allocated to the college, such promotional activities should focus on the problem of student retention affecting the college [14].

It should also be pointed out that most students are not aware of the range of degree majors offered in the colleges prior to their admission into the university, since they are required to indicate their college preferences only. Admission into university colleges is based on the student's grades in high school, while selection for degree majors within a college is based on a combination of factors, including the student's preferences among the majors offered and the grades they attained in requisite courses during the first semester in the college. Students enrolling in the Agricultural Engineering major are expected to attain good grades in the mathematics and physics courses they take during their first semester in the college.

Regarding specific activities which could be targeted at high-school students to enhance the appeal of agricultural engineering, students offered the following suggestions:

- Include agricultural engineering technologies in school curricula through practical field exercises, technology laboratory sessions, and quizzes.
- Organize periodic events focusing on high-tech and engineering (demonstrations of new equipment; new experiments using results from university research), and discussing future job and career prospects.
- One student made the following important point, with which others generally agreed: 'We should inform high-school students that there is engineering in the college, and also that if they miss (entering) the college of engineering, they can still do engineering in this college.'

Changing the name of Agricultural Engineering

We explored students' input into the ongoing debate about the name 'Agricultural Engineering' by posing the following question to them in the questionnaire: 'There is a debate about the name ''Agricultural Engineering'' and what alternative names may be most appropriate in order to enhance its appeal to prospective students and employers. Select three names from the following list which you think are most appropriate in the

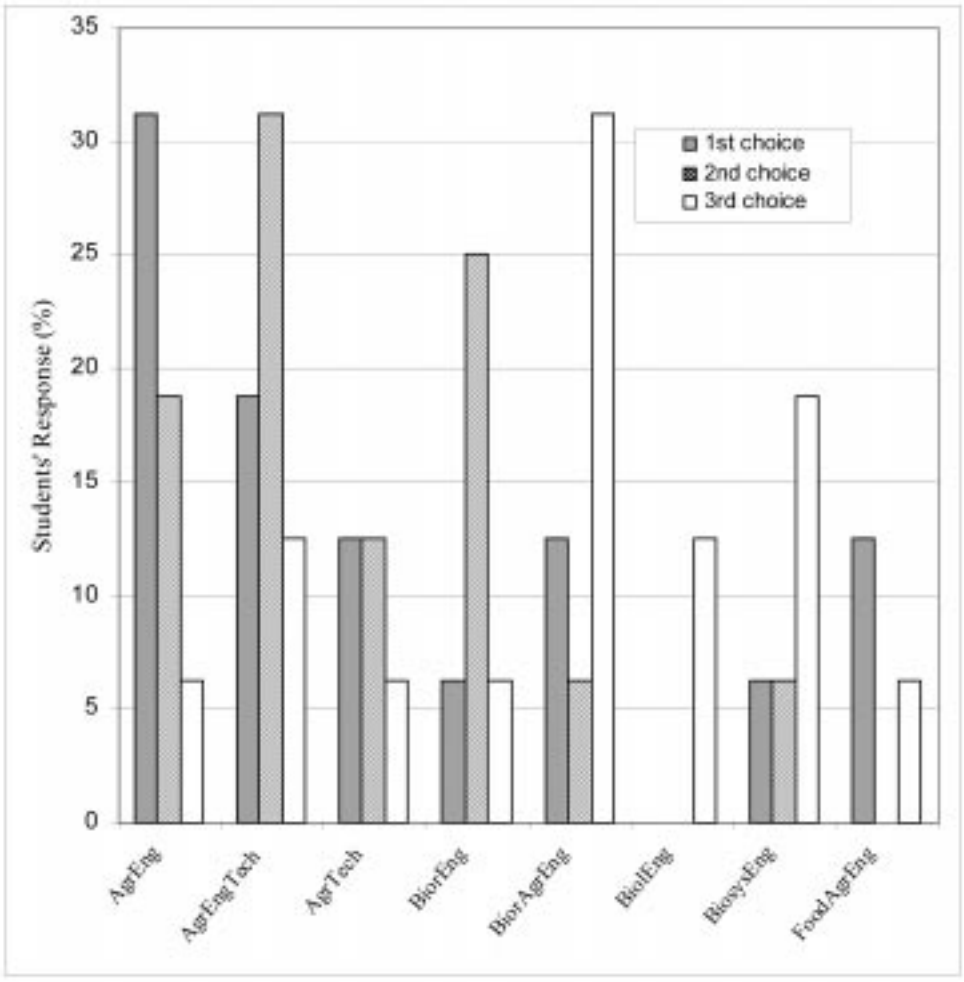

Fig. 5. Students' preferred name for the Agricultural Engineering discipline.

21st century.' Students showed a high interest in the name 'Agricultural Engineering' and other names which included it (Fig. 5).

In general, students reported a higher preference for names which included 'engineering' and/or 'technology' rather than those which included 'biology'. In an earlier article, the students' favoured the inclusion of more engineering and technology content in their curriculum, and considered the inclusion of more biology and chemistry, or mathematics and physics, as least important [2]. These results corroborated student perceptions that the poor image of 'agricultural engineering' related more to the agricultural component than the engineering (Fig. 3). Furthermore, the engineering profession is held in particularly high esteem in Oman, to the extent that graduates from non-professional engineering programs (in science and applied sciences such as agriculture) are commonly referred to as engineers, even within government establishments [13].

We investigated further students' attitudes toward agricultural engineering by asking them the following question: 'If the following degree names were used to describe and deliver a major in agricultural engineering, which three names would you prefer.' Similar to their response on discipline name, the majority of students reported very high preference for degree names that included the word 'engineering' and 'engineering technology' (Fig. 6). There was a very low appeal among the students for degree names containing 'agriculture' or 'science', which includes the name of the degree awarded in our current program (BSc in Bioresource and Agricultural Engineering).

CONCLUSIONS

In this paper, we have presented the results of a survey on senior undergraduate students' perceptions of the public profile of agricultural engineering in the Sultanate of Oman. Students also reported their preferred name for the discipline and title of the degree awarded. Students considered the overall public understanding of the agricultural engineering profession and its role in the economy to be very poor or poor. They also perceived the public image of agricultural engineering to be low in comparison with other engineering disciplines. The poor image of agricultural engineering was attributed mostly to its association with 'agriculture' rather than 'engineering'.

To improve the public image and enhance the

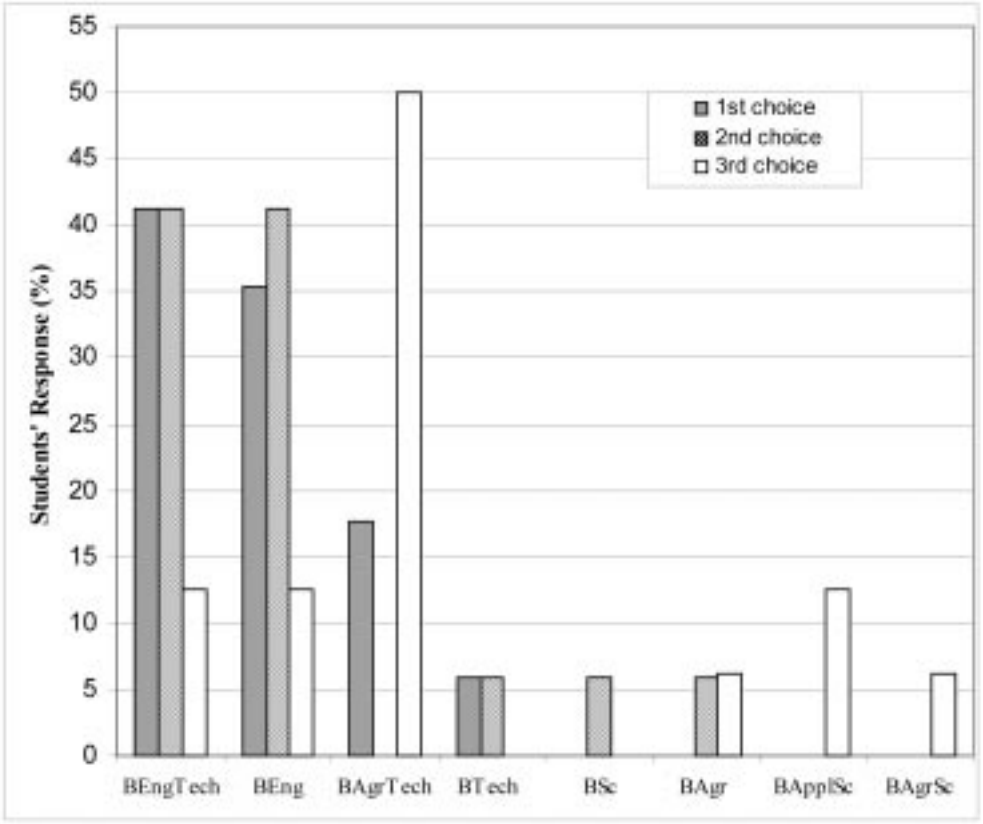

Fig. 6. Students' preferred title of degree to be awarded with a major in Agricultural Engineering.

appeal of agricultural engineering among prospective students, it was recommended that advertising and publicity campaigns should be launched targeting students in high schools and those attending the pre-degree intensive English language program at the university. Students also recommended that faculty should actively engage in community outreach and extension programs to address important engineering problems facing the Omani society, particularly in the agricultural and marine sectors.

Students expressed high preferences for both a degree title and discipline/major name that incorporate the word 'engineering' or 'technology', rather than 'agriculture' or 'science'. They also showed a very strong dislike of alternative discipline names that included variants of the word 'biology'. The low appeal of discipline names connected with biology among the students was attributed to the high prestige enjoyed by the engineering profession in the wider society. as well as a strong connection made by students between engineering and 'machines', and between engineering and maths/physics, instead of engineering and biology.

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