

NURTURING THE SCIENTIFIC LEADERS OF TOMORROW: ENGAGING THE YOUTH OF TODAY

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Abstract

The growth of innovation in science and technology is a vital factor to a nation's socio-economic growth. To achieve this growth, it is crucial that we look to the scientific leaders of tomorrow. Australia is currently experiencing a downturn of students interested and studying within the sectors of science and technology. An initiative to communicate biotechnology and biomedical engineering to students, as well as the general public in Australia, led to the formation of a special student interest group, the Australian Biotechnology Students Association (ABSA). ABSA was formed to help popularise biosciences to the youth demographic, and to provide a catalyst for networking youth to industry. ABSA's aims are to nurture future leaders in the scientific fields and to raise scientific awareness amongst the youth of today through its activities. The role of networking, information and careers development events, targeted at the youth demographic, and its potential effects on the popularisation of science to the wide Australian community has been examined in this paper. Different strategic issues and forms of communication used by ABSA for its activities are discussed in depth as a case study for a demographic-specific tool aimed at communicating the importance of science to the youth.

Keywords: Biotechnology education, biomedical engineering education, science communication & popularisation, science promotion, youth career development, networking.

1 Introduction

Innovation in science and technology plays an important role in a nation's economic and socio-economic growth. To ensure a strong and growing global scientific citizenship, it is crucial to nurture the scientific leaders of tomorrow. By encouraging scientific and technological development in the youth of today, we are likely to have a solid foundation to build our future upon. This goal can be achieved by the combined efforts of professionals and students in the disciplines of science and engineering, by actively engaging the public and youth to spark interest and awareness in science and technology. This aspect is important for influencing and encouraging the younger generations, who are the future leaders of scientific advancement and knowledge.

Here we present strategies and initiatives from the Australian Biotechnology Students Association (ABSA), Australia's sole student organisation that promotes biotechnology on a national platform. ABSA is an active network between practicing scientists, industry, academics, youth and the public within Australia. ABSA programs are set up in each state of Australia, with the Queensland and New South Wales' ABSA branches being very active with the programs that they run. The objectives of ABSA are to provide a supportive network for students in biotechnology and biomedical engineering who are career-savvy, industry-savvy and are willing to become the future leaders in science. In part, we hope that our work can engage the youth of today and turn around the trends of a lack of young scientists, engineers, and innovators in Australia.

Various initiatives that have been implemented include informal industry discussions and information nights called "Homebrew" and "Careers Nights" which focus on careers and hypothetical scenarios in the industry. At these events, practicing scientists, industry representatives, students and young professionals share insights about the industry. We have also implemented events incorporating site visit events, where students can get to see and understand the real time functioning of labs at research institutes as well as industry facilities. This will extend their insight into careers in

science, by providing a better understanding beyond what they are taught in their current tertiary or secondary education.

Each year we publish a bi-annual newsletter, featuring the latest in scientific and technological development and reports on conferences that the ABSA committee have attended. This newsletter is available on the AusBiotech website for students to view, and hard copies are available at ABSA events. The newsletter is an excellent media to excite and engage the youth of today in the current state of science and thereby encouraging studies in various scientific fields.

Two other initiatives promoting excellence in science and technology towards the opposite ends of youth spectrum have been implemented. The annual *National Student Excellence Awards* is aimed at university students doing research projects and providing them with an opportunity to present their research to academia, industry and the public. On the other end, the annual *Biofutures* event is a week-long camp which aims to provide secondary school students with an opportunity to interact with and learn about the cutting-edge advances in bioscience and biomedical engineering research.

These events not only encourage the nation's youth to pursue higher education studies in science and technology, but also aim to encourage the nation's youth to contemplate and consider the benefits that science bestows on our society.

2 Engaging the Youth

To be able to nurture the scientific leaders of tomorrow we need to be able to engage the youth of today to pursue a career path or even to develop an interest in science. In recent times, a downturn of secondary students choosing science and engineering for their tertiary education has been observed, resulting in a constant concern that Australia in the future will suffer from a lack in engineers and scientists. Thus a demographic-specific tool is needed to create a strong community of educated students who will hopefully feed into the future need for science and technology professionals in Australia.

ABSA has used the following strategies in achieving its aims of creating a supportive student network of young scientists and engineers with better industry knowledge and generic career skills. Thus nurturing the scientific leaders of the future, the following strategies have been implemented.

1. Use of a student network to create and develop relevant initiatives to target the youth sector (both to the public and to the tertiary sector) to popularise and communicate biotechnology/bioengineering as a career, and to raise its profile to youth in Australia, or
2. Specific targeting of university students via biotechnology/bioengineering seminars and career-relevant activities to help develop a network of young professionals with a common minimum interest in science (an Australian perspective), or
3. The organising and running of a "Biofutures" camp to educate secondary school students and the public about biotechnology and bioengineering and to raise its profile to youth, and to popularise science in particular biotechnology and biomedical engineering as a career choice.

2.1 Target Audience/Public/Community:

We at ABSA have aimed to target our communication towards the public, especially the younger generation that are yet to decide on their future studies. By engaging with the youth of today to spark their interest in science and technology we are helping to nurture a path for them with a scientific future. Tertiary students are also our primary target audience, so that they can continue on the path of becoming the scientific leaders of tomorrow. Tertiary students in science also act as an intermedial between the youth in different educational disciplines and those in the industry, and hopefully their youthfulness will help to engage the interests of the youth. ABSA is actively targeting the biotechnology and bioengineering industries in promoting themselves as the right choice in industry with better careers and futures to the students. This initiative and involvement with the industry is helping in building and supporting the future of our industry in Australia.

2.2 Nurturing Activities:

Throughout the year ABSA holds many events in order to advance the Science Communication process. Some of the events and communication mechanisms are Seminars, which has a specific topic and those who are experts in those fields are invited to talk to the students. Homebrew event is held no less than twice a year and it is a relaxing event where students are given a chance to talk to specialised personnel in a relaxing environment, talking about subjects ranging from skills needed for networking to intellectual property and various other industry issues. In 2005, through our workshops we discussed about Career planning and Job hunting today. Company representatives including a representative from a science recruitment company came to talk to students about how best to present themselves in their job application as well as during an actual interview. Important selection criteria, relating to how companies actually chose candidates for interview and eventually to recruit, were highlighted to attendees.

ABSA publishes a bi-annual newsletters to its member base and lets them know of the latest developments in the field of biotechnology and bioengineering. ABSA newsletters also include a summary of conferences attended by its committee. Most of the students and youth does not often get the opportunities to attend scientific conferences, thus this newsletter provides them with a way of keeping up to date with the various scientific events in the calendar year.

Currently ABSA Queensland has an on-going annual science camp, Biofutures, which is held in Brisbane, Queensland. However, starting in early 2007, an annual Biofutures camp in Sydney, by the New South Wales ABSA committee is scheduled. This camp is primarily aimed at secondary school students who have a keen interest in biotechnology and bioengineering. At Biofutures these students have the opportunity to meet with scientists and engineers in a wide range of area in biotechnology and bioengineering, and also take a close look into the future developments of these areas. Biofutures has incorporated different themes each year so that the students can understand different areas of Biotechnology and Biomedical engineering. It also helps students have a clearer understanding of what each area of science actually involves, for example nanotechnology, a term often used, but often not explained.

Apart from Biofutures, the annual careers night event has by far been the most successful event in engaging the industry with the students. This interface has been successful because the industry actively contributes funds towards the organising of this event. The industry views this event as very profitable because the careers night brings together the biotechnology, pharmaceutical and its allied industries under one roof showcasing the growth and opportunities of the industry amongst the industry itself and more importantly brings them in contact with a vast majority of potential employees who are the current graduates from across various universities in the respective states.

The student excellence awards are more intellectual events with students given the opportunity to communicate with fellow students, industry and others in the public about their research skill and potential benefits to the wider community. It improves the communication skills of the various students from the undergraduate honours level to research higher degree students doing their PhD. The event is sponsored on a national level by the industry and so far it has been sponsored by Glaxo SmithKline. Such sponsors just indicate the quality and importance of such events even appreciated by the industry and who are encouraging more such collaborations.

Throughout all these activities we at ABSA have been the organising and steering committees. We have collaborated and worked together with AusBiotech, universities, the biotechnology and biomedical engineering industries, relevant government sectors and respected research institutes such as Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Garvan Institute of Medical Research. We have aimed to provide a networking group and a greater process of science communication for the ABSA members.

In summary, communication mechanisms include public outreach and communication activities and events such as:

- Seminars
- Careers Nights
- Student Excellence Awards
- “Homebrew” events
- Newsletters/emails
- The “Biofutures” annual camp/forum for high school students

Involvement and relationships between those involved include:

- The ABSA organising/steering committee
- ABSA members
- AusBiotech
- University departments
- Industry organisations

The ABSA organising/steering committee liaises with each of the involved groups to coordinate events. The degree of interaction with each group is variable depending on the activity to be run. The activities that ABSA runs are mindful of engaging the youth about the importance of science and to encourage and develop an interest in science. Through these events, we are looking at fostering the leaders of the scientific world of tomorrow.

2.3 The Problem

One major drawback is the low understanding of the importance of science and technology industries in Australia. There has been a lack of supportive network for biotechnology and biomedical engineering students. ABSA network solution by providing the youth of today an avenue by which they can go beyond what they learn in school or university, an environment is created where they can foster their interest in science and technology.

2.4 Identified Objectives & Reasons:

ABSA’s objectives include:

1. Reaching out to youth in the general public to communicate science (specifically biotechnology and bioengineering) and to promote it as a career path, and
2. To support students in biotechnology and bioengineering with various activities and services to create a network of young members who are career-savvy, industry-savvy, informed and skilled.

ABSA thus aims to make effective communication of science and technology (specifically for biotechnology and bioengineering) targeting the youth sector of Australia, in order to encourage them to become the future leaders of the scientific world. Our initiatives are aimed at creating and fostering an involved, pro-active, and supportive network of young scientists.

In terms of communication of science, the reasons for our objectives are:

1. To educate the public about biotechnology and bioengineering
2. Make science interesting and an interesting career choice for students
3. Create and foster a network for university students with industry
4. Provide initiatives to help develop members' networking skills and opportunities to learn other skills

The guiding aims are to make the student experience much better, and to expose students to what's out there and to integrate into their education industry knowledge and networking skills.

3 Evaluation

Results of ABSA's initiatives have included the successful running of:

- Networking seminars;
- Careers information seminars;
- Industry involvement with the events, which raises the public profile of participating organisations;
- Opportunities for students to meet and network with industry representatives;
- Informing students of the opportunities within the Australian industry;
- Being able to recruit pro-active students to the ABSA committee, and more students being informed about ABSA's activities.
- Biofutures;
- University support for our events;
- Undergraduate Research Opportunity Program (UROP) – industry/student work experience (mainly for high performing 2nd year university students)
- AusBiotech support;
- Industry support and sponsorship for our events.
- "Student Excellence Awards" to let the industry know how good and innovative students in Australia are



Diagram 1. Logo for Biofutures 2005.

A successful program which started in 1999, which has the support and sponsorship of many Qld universities and also Qld State government support.



Diagram 2. Peter Doherty, Nobel Prize Laureate, the Keynote speaker at Biofutures 2005

Evaluation and assessment measures to gauge how well results were achieved include:

- Critical review meetings critiquing organisation process,
- student feedback (via written and oral feedback) after attending events,
- industry/organisation representative feedback (via written and oral feedback),
- committee evaluation of the success of sticking to timelines
- internal reviews and evaluations of performance and achievement of organisational roles and tasks
- Counting of student and public attendances of events
- Counting of students and the public who join ABSA

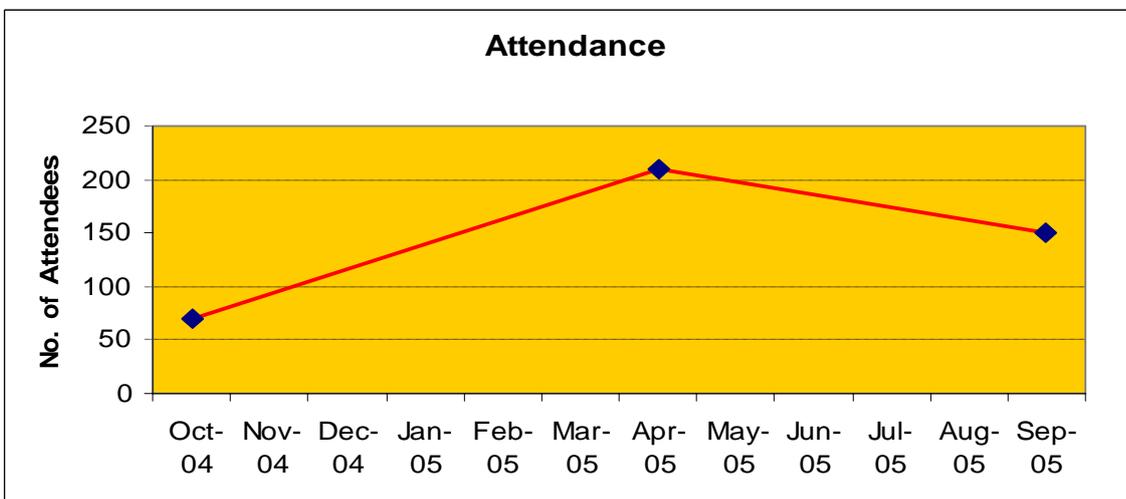


Figure 1: The graph above represents the number of students attending our various workshops from 2004 until 2005.

ABSA organised its first workshop late 2004, and managed to attract over 70 attendees. The event included many undergraduate and postgraduate students who were keen to learn more about the industry as well as those who were interested in finding out what ABSA was about. “The Hypothetical Biotechnologist” which was held at the Garvan Institute of Medical Research, was also attended by many industry and academics who were keen to present their ideas and opinions to students about the industry presently and what is in store for it in the future. In addition, the presenters all from different backgrounds from academia to new industry as well as very experienced industry members discussed and provided students with hints on how best to go about planning their careers, as well as what will be in store for them in the biotechnology sector.

Since its inception in late 2004, ABSA managed to recruit more members and plan for larger scale workshops targeting again at university students as well as recent graduates. In early 2005, ABSA held its first workshop, 'Homebrew - Ace the Recruitment Process' at the University of New South Wales Roundhouse, aiming to provide university students with useful job hunting skills. Through its growing reputation, ABSA managed to recruit more members into its executive committee who were committed to bridging and enhancing the link between students and the industry. Therefore, with more manpower, ABSA was able to organise a larger scale event which managed to attract over 200 attendees. Also, by then, through its strong marketing campaigns, ABSA had already managed to gain more recognition amongst university students and recent graduates.

Following the large scale workshop held earlier in the year, ABSA decided to organise our yearly Careers night with a stronger focus on Biomedical Engineering students but without totally leaving out other Biotechnology areas. In September 2005, ABSA held its 2nd Careers night, "Careers Evening – 2005" at the University of Sydney – Stephen Roberts Theatre. Biomedical companies that attended used this opportunity to recruit students into their companies on a full time basis, as well as for those looking for industrial experience to satisfy their degree requirements. Also by then, companies were starting to recognise the work of ABSA and many companies sent their representatives to attend our workshop (not as presentees) but purely as an opportunity to get to know students at a closer level.

On the whole, since our first event in 2004, attendance at the various ABSA events has been steadily increasing. The following graph shows the percentage satisfaction that attendees felt about each event. The percentage satisfaction refers to the fraction of students who indicated as part of their feedback, and would be interested to attend future workshops organised by ABSA which focussed on strengthening ties between students and industry for the Biotechnology sector.

Although not indicated by any graphs, students who felt that they benefited from ABSA, were keen in joining the committee and helping to promote the committee and its activities, as well as in achieving its set out objectives.

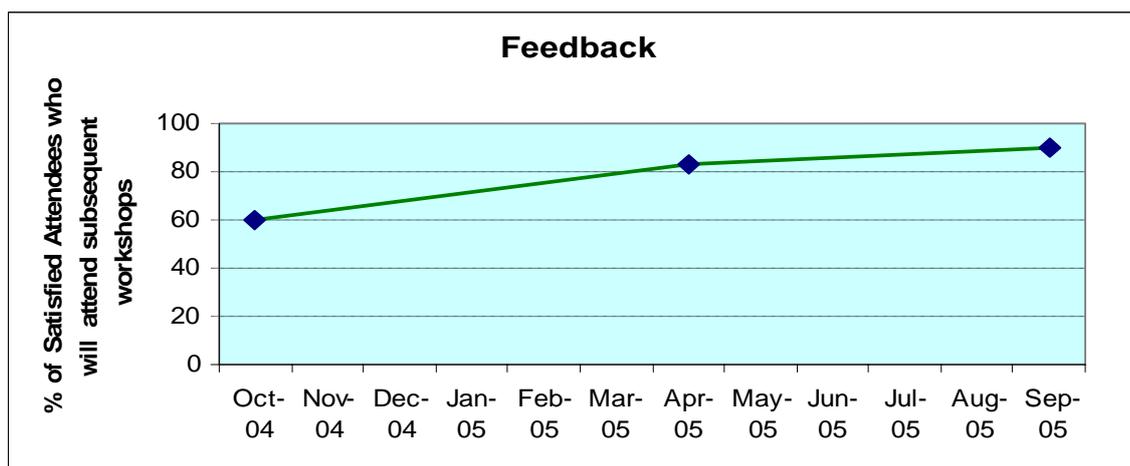


Figure 2: The graph above represents the percentage of student satisfied with each event.

4 Discussion

The situation in Australia is that science and technology is not as attractive a career option as other fields. This is partly the reason why we are seeing a downward trend in the recruitment and retention of students in these fields. Another reason is that the sciences and engineering disciplines can be seen as a rather static and purely individual and technical field. Thus brings a need of nurturing to the youth to let them realise the potentials of studying science and technology as a possible career path.

ABSA is doing a small part to help create a community of young professionals who can think outside their taught university courses, and are knowledgeable in industry and career matters. Our science communication processes have been aimed at not only being technical and generic skills focused, but also importantly focused on fostering a sense of community amongst students and help promote the environment for the growth of a future scientific leaders. ABSA's activities have aimed to promote the dynamic nature of the biotechnology and biomedical engineering fields to students and the public.

In doing so we hope to advance the public perception that science's and technologies, like biotechnology and bioengineering, is an exciting field to be in the 21st Century. Through various ABSA activities, it is hoped that the students studying this field have the chance to grow and become excited by the future of science and technology, and are being nurtured into the scientific leaders of tomorrow

5 Conclusion

From the active science communication activities of ABSA that is aimed at supporting the youth demographic's development in industry and career related issues, it is a step in the right direction to creating a future generation of intelligent multi-dimensional career-savvy and networked scientists and engineers. This is certainly a step in the right direction to reversing the often wrong public perception of an all too boring, static and impersonal field.

There are constant concerns that Australia is lacking in engineers and scientists, and suffering from a brain drain, as some of Australia's top scientists seek greener pastures overseas. By allowing the scientists and future scientists of Australia to have a place where they could network with fellow scientists, and pushing for a public knowledge of the advancement of science in Australia, it is hoped that the Brain drain will stop. That Australian scientist does have the potential to be world leaders of tomorrow. The demographic-specific tools which ABSA uses hopes to create a strong community of educated students that will hopefully feed Australia's need for science and technology professionals.

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