

# Education without frontiers? International participation in an online astronomy program

**Margaret Mazzolini**

*Higher Education Division  
Swinburne University of Technology*

**Sarah Maddison**

*Centre for Astrophysics & Supercomputing  
Swinburne University of Technology*

Online programs that include international students among their cohort are becoming commonplace. As the leading international online astronomy program, Swinburne Astronomy Online (SAO) is distinctive in that students from the program's country of origin are in the minority among a cohort located in over 30 countries, taught by instructors who are also located around the world. We discuss factors that have helped make SAO successful internationally, plus issues that arise when teaching astronomy in an international context.

This international approach is not as general as it might seem: English is the SAO language of instruction and many of its far flung international students are expatriate English speakers, so non-native English speakers (NNES) are actually in a very small minority. SAO features primarily student lead discussion in asynchronous discussion forums with emphasis on assessment tasks that reward communication skills - design features that may not always be appropriate outside native English speaking cultures. We present results of a survey of NNES participants, plus analysis of their forum contribution rates and performance in assessment tasks. We conclude by briefly raising issues likely to be faced when offering online programs like SAO to international cohorts that include more linguistically and culturally diverse populations of participants.

**Keywords:** astronomy, online, international students, Swinburne Astronomy Online

---

## Introduction

As usage of the Internet grows worldwide, the goal for many educational providers will be to deliver online education across boundaries, languages and cultures. Swinburne Astronomy Online (SAO), the online astronomy program that the authors have coordinated over the last 6 years, classifies as an international program in that it is successfully delivered into over 30 countries. This success is based in large part on the way SAO was designed from the start for an international context, but although SAO successfully crosses geographical boundaries around the world, it is delivered in English, both the student cohort and the teaching team are dominated by native English speakers, and the program is promoted through English language media. In this context we were interested to investigate aspects of the participation of the small non native English speaker (NNES) cohort, both to monitor whether the learning environment was meeting their needs but also to start to look at what issues might arise if the program were to be expanded to take in a more linguistically and culturally diverse student cohort.

## Background

Swinburne Astronomy Online (SAO) is a fully online, postgraduate suite of Masters/Graduate Diploma/Graduate Certificate astronomy courses offered by Swinburne University of Technology, Australia. SAO involves a hybrid online delivery strategy, combining high bandwidth course content on CDs with access to online, asynchronous communication and web resources. The assessment mix is typically made up of computer managed short answer tests, essays, project work plus contributions to asynchronous discussion forums (Mazzolini, 2000; Mazzolini, 2002). In 2004, SAO is in its sixth year with enrolments of typically 250 students resident in over 30 countries. The authors are the current coordinator (SM) and the original designer and coordinator (MM) of SAO.

SAO students are generally articulate, enthusiastic, adult students (average age mid 40s), with males making up approximately 85% of the student cohort. Most SAO students have not had any prior experience of learning online. SAO student cohorts are typically made up of amateur astronomers, science teachers (school plus US community college level), science communicators (science museum and planetarium staff, NASA outreach staff, and science journalists), and more generally, mature adults (especially IT, engineering and military professionals) with a particular interest in astronomy and science issues generally. SAO complements the career paths and interests of these special interest groups as it was designed to teach students about fundamental concepts and topical issues in astronomy, rather than to produce professional research astronomers.

## **An international online program**

Although Swinburne Astronomy Online is based in Melbourne, Australia, at Swinburne University's Centre for Astrophysics and Supercomputing, "local" (Australian resident) students are a minority, comprising only 30% of the student cohort. Of the 70% of international students, the single largest national group among the SAO students are the US students, who typically make up roughly 40% of the total. Other countries which have been represented amongst the SAO student (and instructor) community are Belgium, Bermuda, Brazil, Canada, Chile, China, Cook islands, Costa Rica, Denmark, England, Finland, France, Germany, Holland, Hong Kong, Iceland, Israel, Italy, Japan, Lebanon, Lithuania, Malaysia, Malta, Mexico, Netherlands, New Caledonia, New Zealand, Paraguay, Peru, Portugal, Puerto Rico, Saudi Arabia, Scotland, Singapore, South Africa, South Korea, Spain, Switzerland, Turkey, Thailand and Uruguay.

SAO instructors are professional astronomers who are also drawn from a wide range of nationalities, but Australian (including expatriate) instructors are in the majority. Although members of SAO's Research Centre base have always taken an active part in teaching into SAO, right from the start of the program a significant proportion of SAO instructors have been distributed around the globe at research centres and observatories. While using only in-house staff may have had some advantages in terms of ease of coordination and quality control, it would also have caused staffing problems as student numbers grew. More importantly, the widely distributed cohort of SAO instructors is a key factor in placing the program in an international context, in terms of widening the teaching focus and also in relating to an international cohort of students. It also means that instructors have access to a wide range of up to date information and prominent contributors to the program. For example, the instructors for the SAO planetary science unit are both NASA planetary mission specialists. On a number of occasions, SAO has been able to follow up new discoveries in astronomy by using contacts that its instructors have established, to persuade members of discovery teams to make guest contributions in SAO on their discoveries.

Each semester approximately half of the instructor cohort is based outside Swinburne, teaching into the online program from observatories and research institutes around the world. Online teaching is generally the only practical way that these astronomers could gain experience as instructors while fulfilling their professional commitments, as even the Swinburne based instructors frequently need to be free to travel to observatories and conferences during teaching times. For some young SAO instructors, the online program is their first teaching experience, and when they start with the program, all are new to online education. While this all provides some special challenges for program coordination (Mazzolini & Maddison, 2003a, 2003b) it gives an international focus to the program that fits well with the international nature of most astronomy developments and discoveries.

When SAO was originally being designed, there were discussions about whether it should include an Australian astronomy focus at all, and even on whether Australian spelling variants (e.g. colour or color) should be used or not. SAO astronomy course material and discussions draw extensively on the work of the international astronomy community, but the decision was made from the start to feature Australian astronomy where appropriate. Australia is a prominent member of the international astronomy community, particularly in radio astronomy, and geography also helps – its southern hemisphere location mean that Australia has a spectacular view of centre of our galaxy, the Milky Way. Once the Australian astronomical community understood that SAO would feature their research activities when appropriate, they have generally been enthusiastic supporters of the program, and many Australian astronomers have contributed to the SAO coursework CD material or even taught into the program.

In SAO units, students are divided up into groups containing up to approximately 30 students per instructor, each group with its own set of discussion forums. Students typically study from SAO CD course material, textbooks and web references, undertake web based tests (originally multiple choice, but more recently short answer format), actively take part in asynchronous forum discussions with fellow students and their instructors, research and write essays, and carry out and produce reports on minor and major projects of their choosing. Learning outcomes of SAO units emphasise the development of communication skills, with a special focus on communicating astronomy concepts to non-specialist audiences as well as ability to explain concepts at depth. As the program is taught in English and involves no face to face or audio contact, students need to be able to express themselves clearly in written English, though leeway is allowed when it comes to grammar and idiom – the instructors are usually quick to point out that SAO ‘speaks’ Australian, American, British, South African, New Zealand and Singaporean English and other variants besides!

In each forum, students are required to post at least one question or ‘extension comment’ about current course material, plus answer at least one question posed by someone else. In the forum discussions, students clarify their own understanding of key concepts, and further develop their science communication skills by answering each other’s questions, often in considerable depth. At the end of the teaching semester, SAO students are asked to nominate which three of their discussion forum postings are to be assessed. The discussion forum component of the final grade (up to 30%) is made up of marks awarded for the nominated forum contributions, plus a smaller ‘regular participation mark’ component. The remaining 70% of the total grade is made up of online tests (20%), an essay (30%) and a project (30%).

Of necessity, discussion forums in SAO are run in asynchronous mode, as SAO students (and instructors) are located across the world’s time zones and tend to be busy people. Conversation ‘threads’ (topics) build up on the forums as geographically separated students come online in their particular time zones. Other online astronomy programs have used discussion forums mainly for social purposes if at all. Most SAO students respond extremely positively to the use of discussion forums to aid learning and for assessment, and it is evident that as well as providing an online venue to discuss the course material, a general sense of community builds up in these forums during the course of a semester.

For several years the authors have used the extensive SAO discussion forum archives to carry out research and evaluation studies into the way teaching and learning take place in SAO, and the results of this research have been used to improve the support and advice provided for both new and experienced SAO instructors. As a side effect, when students are surveyed as part of these studies, they often comment that they appreciate the interest taken in their opinions on the program. Recently we have used the SAO discussion forum archives plus Swinburne subject evaluation survey responses to conduct a major study (Mazzolini & Maddison 2003a) of how students and instructors interact in online discussion forums. We have also carried out smaller studies comparing female students’ participation rates and assessment outcomes with their perceptions of how they took part in SAO (Mazzolini & Maddison 2002), and looking at measures of forum participation to evaluate whether student use of discussion forums has been affected as the program has grown in size (Mazzolini & Maddison 2003b).

SAO was originally launched within a semester of the independent development of another online Masters program in astronomy in Australia, and online certificate programs in Astronomy were also introduced in the UK at around the same time. While SAO continues to thrive, the other Australian program has now closed even though it was initially the larger and better known of the two programs, and the UK programs have not yet progressed beyond the certificate stage. No similar complete online astronomy postgraduate programs have since started up elsewhere to our knowledge (including in the US), although there are some online offerings in the related field of space science.

From the perspective of the course developers and coordinators, the international success of SAO has been helped by its clear focus on delivering specified educational outcomes. SAO was designed from the beginning to teach students about key concepts and current issues in astronomy, and it has always been made very clear that the aim is not to produce professional astronomers. It is the opinion and experience of the SAO team that the latter would be very difficult to achieve through online education. This market focus attracted a wide audience for SAO while also making sure that students do not enter the program with unrealistic expectations, and has also helped SAO gain wide support in the Australian astronomical

community, a professional community which is understandably cautious about the way students are prepared for a highly demanding research career area where positions are already in short supply. This targeted focus also removed the need for SAO to develop large amounts of mathematical support material, which would have significantly increased the cost of course development and maintenance and would also have limited the range of prospective students to those with strong mathematics backgrounds.

The emphasis on using professional astronomers as instructors has always been an advantage in making the learning context in SAO as authentic as possible, and is an aspect of the program clearly appreciated by SAO students. SAO instructors are encouraged to post to SAO discussion forums on their experiences while observing at telescopes in places like Chile and Hawaii, or while collecting data from the Hubble Space Telescope, and students can undertake observing projects and image analysis using real research techniques, or run simulations on the Swinburne Supercomputer – students see these insights into the world of practicing research astronomers as highlights of SAO.

Right from the start of the program, the SAO CD course materials have been designed with an international audience in mind. While SAO course content features Australian research and amateur astronomy where appropriate, the program developers have always been careful about the use of Australian idiom and situations. On the other hand, astronomy textbooks (including those used in SAO) are typically authored in the US and are likely to be written and illustrated from a northern hemisphere viewpoint and tend to feature American space and astronomy developments almost exclusively. Also, many fundamental concepts in astronomy are hemisphere related: for example, the way the Sun's position moves in the sky during the year, the seasons, visibility of constellations and details of navigation by the stars. An international approach to teaching astronomy has to take these issues into account, and also be careful to feature notable research, telescopes, space missions and other developments from strong centres of astronomy and space science outside the US – for example from Europe, Japan and the former USSR as well as Australia. Although it might seem at odds with its international emphasis, the policy of featuring Australian astronomy where appropriate has been a positive one for SAO. Northern hemisphere SAO students are curious about Australia, both generally and in terms of astronomy of the southern skies. Establishing good relations with the Australian astronomical community (which is always looking for ways to promote its research activities to the public) has resulted in rich input into the SAO course material in terms of first hand accounts of local discoveries and developments and often international ones too, given that Australian astronomers are extensively involved in international collaborations.

From the point of view of monitoring and maintaining teaching standards, a fully online program has advantages – in that almost all interactions are recorded on discussion forums and through emails – but also significant disadvantages, in that truly representative feedback is hard to obtain in a medium where you can't easily talk to the people 'muttering among themselves in the back of the class'! SAO has always had a strong commitment to careful quality assurance, including establishing an atmosphere where students feel that they know the coordinator well enough to email her with concerns, and this shows up in the enthusiastic support our international cohort of SAO students give the program through university survey responses and unsolicited comments.

As well as being promoted in Australia through a range of media and forums, SAO is advertised through large circulation international astronomy magazines published in the US and distributed (in English) throughout the world. When the Masters program was launched, 200,000 copies of a special promotional SAO CD were distributed with one of these magazines. SAO students are also key promoters of the program: many 'spread the word' through membership of amateur astronomers clubs around the world, or through internet astronomy chat forums. The potential downside of these international connections is that any shortcomings of the program could also quickly become general knowledge, which is another reason why maintaining effective quality control in SAO has been so important.

## **Participation of non-native English speakers in SAO discussion forums**

While non-native English speakers (NNES) are currently a small minority group in the SAO student cohort, astronomy in general is appreciated by a wide international audience, including members of networks of amateur astronomy groups in many countries. If the SAO program is to grow further, one strategy would be to focus on attracting larger numbers of non-native English speaking astronomy enthusiasts. For this reason we were interested to see how the current NNES within the SAO student

cohort respond to the program, and, in particular, perceive their performance in terms of course participation and assessment outcomes. We surveyed current NNES, and also used our database of discussion forum postings and assessment outcomes to contrast the perceptions of NNES to independent measures of how they actually fare.

In Semester 2, 2002 we carried out a general online survey of all enrolled SAO students, with Ethics Committee permission. As part of that survey, we asked NNES to identify themselves and respond to the series of questions described below. Of the 215 students enrolled in the program at that time, 85 responded, and of those, only 10 (12%) identified themselves as NNES. While we don't have overall statistics on the number of NNES enrolled in Semester 2, 2002, this figure is consistent with the general Swinburne subject evaluation surveys for this program for that semester, in which 14% identified themselves as NNES (out of a 55% response rate). The small numbers make it very hard to draw any general conclusions from their responses, but on the other hand the fact that they represent a tiny cohort in a sea of native English speakers is one of the particular aspects of SAO that motivated this survey.

Asynchronous discussion forums are a central part of the learning and teaching strategy in SAO and also count for 30% of the assessment weightings in most units, and so we would be concerned if NNES found this aspect of the program highly problematic. It is commonly assumed in online education that the use of asynchronous discussion forums is likely to be an advantage to NNES as compared to face to face or synchronous discussions, because asynchronous discussion allow students extra time to compose their answers. However it may also be true that the number and size of postings in forums of enthusiastic students (such as the SAO cohort) could present a huge barrier to participation of NNES, because of the sheer time and effort involved in translating enough of the postings to keep up with the discussions.

In this survey we asked the following questions of the 10 SAO participants who identified themselves as NNES:

- How often do you think that you post to SAO discussion forums, as compared to native English speakers in your discussion forum(s) this semester, on average? (much less, less, same, more, much more)
- How often do you think that you respond to others' questions and comments on discussion forums, as compared to native English speakers in your discussion forums(s) this semester, on average? (much less, less, same, more, much more)
- Do you expect to perform in your discussion forum assessment as compared to the native English speakers in your discussion forums(s) this semester, on average? (much worse, worse, about the same, better, much better)
- From your observations, how articulate do non-native English speakers tend to be in discussion forums as compared to native English speakers on average? (much less articulate, less articulate, about the same, more articulate, much more articulate)
- What do you think of this statement: "Discussion forums are more helpful for non-native English speakers than are face to face discussions, because posting to forums allows students extra time to compose their answers in English"? (strongly disagree, disagree, neither agree nor disagree, agree, strongly agree)

As part of the survey, students were also given the opportunity to add other comments. Note that not all 10 students answered every question.

### **Survey responses, posting rates and forum assessment outcomes**

Of the 8 NNES who responded to Question (A) in our survey (see above), none believed that they posted more than native English speakers on average. The response rates (frequency indicated in brackets) were 'much less' (2), 'less' (3), and 'same' (3). When we investigated the actual posting rates that semester for these students and compared them to the average posting rates for their entire classes, we found that these 8 students posted an average of 3.5 postings to their forums in each 2 week period. This compares to an overall class average of 4.3 postings per 2 week period (with 95% confidence level for the mean to be between 3.9 and 4.7). Although the small number of NNES respondents means that result is not statistically significant when applied to a more general population, our focus here is on the perceptions of this specific NNES cohort. These particular students were accurate in their responses to Question (A) –

the group of 5 students who believed that they posted less than native English speakers were correct, and the 3 students who believed that they posted at the same rate as the native English speakers were also correct.

Independent postings alone do not make a successful online discussion – an interactive discussion thread is built up of responses from the participant group. NNES may be able to compose lead postings by choosing topics which involve English terminology within their comfort zone, but if they find it too hard and time consuming to work through postings by others and find ones to which they can reply, then their reply rates will drop off and their participation will not be effective.

Of the 8 NNES who responded to Question (B), none believed that they responded to others questions and comments more than native English speakers on average. Three students believed that they responded as often, but the rest believed that they responded less often (3) or much less often (2). Investigation of the actual response rates that semester for these students and their entire classes suggest that they were right. The overall class average for posting responses was 3.1 responses per 2 week discussion forum (with 95% confidence level for the mean to be between 2.7 and 3.4), but these 8 students only posted an average of 2.3 responses per 2 week period. Again, the groups of students who believed that they posted responses less (or much less) often than their classmates were correct, as were the 3 students who believed that they posted responses as often as the native English speaker cohort.

From these results, it seems that our small group of NNES do not see themselves as highly active forum participants, even though participation in SAO discussion forums forms a significant part of the SAO assessment mix. However when we asked them about their expectations concerning forum assessment in Question (C), 4 believed that they would perform as well as native English speakers in their forum assessment, and the others were equally distributed between believing that they would perform worse (2) and believing that they would perform better (2) as compared to the native English speaking cohort. Clearly these students are neither unduly pessimistic nor optimistic about their forum assessment outcomes, despite their (accurate) perceptions as not being particularly highly active forum participants. The actual forum assessment results for that semester show that the average overall forum mark for these classes was 77.6% (with 95% confidence level for the mean to be between 73.7% and 81.5%). Our small group of 8 NNES scored an average of 72.8% (with 95% confidence level for the mean between 62.3% and 83.3%). Clearly their quiet confidence about their forum assessment results was well founded.

It is interesting to compare the responses and performance of our NNES to those gathered from an earlier study of another minority group in SAO - women participants (Mazzolini & Maddison 2002) who make up approximately 15% of the total student cohort. The women tended to believe that they contributed to forums less often than men, and posted less replies than did the men on average. These are similar to the perceptions that our admittedly very small sample of NNES have about their posting and response rate (see above). The difference is that the statistics showed that the women's pessimism was unfounded – whereas our NNES were accurate in their perceptions.

### **Do non-native English speakers regard participation in asynchronous forums as advantageous?**

We included Question (E) in the survey in order to see if our NNES cohort agreed with the commonly held assumption in online education that they will find the use of asynchronous discussion forums an advantage as compared to face to face or synchronous discussions, because asynchronous discussion allow NNES extra time to compose their answers. The response rates were 'strongly disagree' (0), 'disagree' (1), neither agree nor disagree (1), agree (3), strongly agree (5). It is clear that this NNES cohort's responses to Question (E) are strongly skewed to the opinion that participation in discussion forums is more or much more helpful than are face to face discussions, "because posting to forums allows students extra time to compose their answers in English".

Like all Swinburne University students, SAO students complete a confidential university survey that asks them a variety of questions about their satisfaction with their courses and instructors, seeking to establish what they liked and what they didn't. As part of this survey in Semester 2, 2002, SAO students were asked to respond to the comment "I found the newsgroups useful". (Note that asynchronous discussion forums are usually referred to as newsgroups, in SAO terminology.) The responses for NNES as

compared to native English speakers are shown in Table 1 below, and compared to the responses of women versus men, where they are rated according to the Likert scale 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly agree. (Note that a total of 119 students responded, but two students didn't provide their gender and another three did not indicate their native language.) As can be seen from Table 1, survey responses from NNES indicated that they found the forums significantly more useful than did native English speakers. For comparison, the opinion of our previously studied minority group, women participants, was not significantly different to that of the male majority.

**Table 1: Swinburne survey student responses to the statement 'I found the newsgroups useful'**

	Number of Responses	Response to "I found the newsgroups useful"	95% Confidence Interval for Mean	
			Lower Bound	Upper Bound
<b>Non-native English Speakers</b>	17	4.5	4.1	4.9
<b>Native English Speakers</b>	99	3.7	3.5	4.0
<b>Women Participants</b>	26	3.7	3.1	4.3
<b>Male Participants</b>	91	3.9	3.6	4.1

Clearly NNES in SAO found discussion forums particularly useful compared to native English speakers, and this correlates well with their survey responses favouring the opinion that participation in discussion forums is more or much more helpful than are face to face discussions.

### Feedback from non-native English speakers in SAO

NNES participants made a range of comments on the survey. The following quotes are a representative sample of the ranges of opinion expressed that were relevant to the issues discussed in this paper:

1. My overall response is very positive - I believe that it is certainly easier for ESL [English as a second language] students to participate online than face to face. When you're face to face, you cannot put the discussion on hold for a minute to consult a dictionary or use a spell checker, both of which are great tools to help express yourself and understand others when studying online.  
On the other hand, in a face to face discussion you can always ask right away if you don't understand something. You cannot really do that when reading and posting messages in a newsgroup. The major issue is with the subtleties of the language. It is not the technical or field specific terms that cause trouble - the postings are often informal in style and problems come from the use of casual language, idioms, sayings and other expressions that are used in the spoken language but not thought at school or found in a dictionary. Worse, they vary from an English dialect to another.  
I have found that native speakers tend to simply not notice when they are using words or structures that will be difficult to understand by ESL speakers as simply do not exist in many other languages.
2. I have noticed that I have improved my skills about both reading and writing in English, although the latter not as much as I would have expected. I still often need the dictionary. Nevertheless, I like to read in English. ... My particular performance in an equivalent English face to face astronomy course would be worse, no doubt about it. On the other hand, if the same course were in Spanish, whether on line or face to face, my performance would be much better.
3. Putting aside the skill in English, I think that both the native English speakers and the ESL group have similar performance regarding the matter that is taught in the courses ... Regarding

the "extra time to compose the answer in English": I am able to produce an answer in English with no big hassle (however, having a clear idea about the technical side of the question), but the problem is just in the written form of the posts. I stick to the Latin proverb "Verba volant, scripta manet" - it means very extensive checks of syntax and grammar in my texts before I post them. I am quite confident in, say, 90% - 95% of my text, but the checks on the remaining 5 - 10% can take an awful lot of time. Personally, I would be happier with face to face discussions.

4. Newsgroups CAN and MUST be an unvaluable resource for students; they can keep the interest high and on topic and they will help to congregate students in a body. As they are now, the newsgroups are like an avenue where poor immigrants stay put in a corner, trying to stay alive, while whealty [sic] locals stroll up and down, telling each other alien tales and staring at the immigrants with a compassionate glance. I know I'm strongly biased, but this is how I feel and I think is my duty to report to you. In other words, it is difficult to learn something in a newsgroup.

Apart from displaying an interesting range of opinions, these comments from NNES participants in SAO also show how extraordinarily proficient these students are with their written English. For example, when applying a Flesch-Kincaid Grade Level readability test (which compares the writing level to averages for school year levels in the US), three of the above quotes score a level of 12, which is the same as the score for this paper. Of the 10 NNES who responded to our survey, 2 live in an English speaking country, and 3 live in countries that are essentially bi-lingual (including English on an almost equal footing with the native language). Clearly these students have a sophisticated command of English, whether dictionary assisted or not.

In our survey of women participants (Mazzolini & Maddison 200a), the women saw themselves (inaccurately) as posting less often than men, but they also believed that they were as, if not more, articulate than male participants. We asked our NNES students about the same issue in Question (D) of our survey. The responses on how articulate they felt they were compared to native English speakers in their forums were much less (1), less (3), about the same (5), more (0) and much more (1). Again, the numbers are very small, but it is suggestive that the NNES responses are skewed towards a pessimistic response to this question, whereas the survey of women participants produced a more positive response. Rather than seeing a simple reaction from small minorities to the feeling of being outnumbered, we may be seeing a more direct response by the NNES to their lack of comfort in communicating in English, even though, the written English they do produce is usually of a very high standard.

## **Cross cultural issues and asynchronous learning**

As described above, our study of the posting rates and perceptions of our small cohort of NNES students found that they posted and replied less often than did native English speakers and had a tendency to be pessimistic about how articulate they were in forums, even though they scored as highly in the forum assessment as did the native English speakers. In SAO wide surveys, NNES students rated the usefulness of the forums more highly than did their native English speaking classmates. However the range of comments quoted above indicate that these NNES students are capable of expressing themselves with a high level of sophistication in English, and almost half have a background which involves extensive exposure to spoken English. Clearly this NNES cohort is not typical of the range of NNES students one would expect to find in an online program that reaches far outside the Western education tradition.

If programs like SAO are to expand their boundaries to take in a more general international audience, then a whole range of cross cultural issues will affect their successful online delivery (see for example Ciano 2003; McIsaac 2002; Northover 2002). English proficiency will continue to be a key factor in any English language based online program that rates written communication skills highly and where NNES students mix in online classes with highly articulate native English speakers. However other less immediately obvious cross cultural factors will be important to the success of the program, and in the case of SAO, working with geographically dispersed instructors to build up the necessary skills to tackle these often quite subtle issues could be quite challenging.

Cross cultural issues associated with computer mediated communications are being increasingly studied from a sociological context – see for example Morse (2003) and Tylee. In particular, cross cultural interaction in the online environment involving Western native English speakers and NNES Asian participants is a complex issue which is being studied in terms of analysis of issues such as perspectives of social presence, Western versus Asian educational mores, high versus low context, collectivist versus individualistic approaches, and cultural issues of learning styles (see for example Biesenbach-Lucas 2003; Ishikawa 2002; Pan et al 2003; Tu 2001). Studies in particular cultural contexts are valuable guides, however delivering programs like SAO across multiple cultural boundaries rather than into specific cultural groups will still represent significant challenges.

## Summary

Swinburne Astronomy Online (SAO) is indeed an international program in terms of teaching across geographical frontiers, with ‘local’ (Australian resident) students in the minority, and its success has been aided by specific design and marketing factors which were built into the program from the beginning with an international audience in mind. However SAO is still limited by language and cultural frontiers. Members of its small non-native English speaking (NNES) cohort are capable of expressing themselves with a high level of sophistication in English, and almost half of those who responded to our survey have a background which involves extensive exposure to spoken English. The NNES cohort in SAO is not typical of the range of NNES students one would expect to find in an online program that reaches far outside the Western education tradition.

Despite their proficiency in written English, according to our (admittedly limited) survey the SAO NNES cohort still take part in forum discussions less, or at the same rate at best, as compared to native English speakers. This is despite university survey results indicating that these NNES students find the forums particularly useful as compared to native English speaking participants. These results should also be seen in the context of survey responses favouring the opinion that NNES students find participation in forums to be more or much more helpful than are face to face discussions, because forum discussions allow them extra time to compose their responses. Clearly extending a discussion forum centred program like SAO to a more general NNES audience who do not have such high levels of English proficiency and who are situated in non-Western cultural contexts is likely to cause issues that will need careful consideration, and this needs to be supported by a wider range of educational and sociological research.

## Acknowledgements

The authors would like to thank the SAO team, the Swinburne Centre for Astrophysics & Supercomputing and the Swinburne School of Biophysical Sciences and Electrical Engineering for their continued support in this research, as well as the Swinburne Foresight, Planning & Review Unit for providing their survey data, with Ethics Committee permission.

## References

- Biesenbach-Lucas, S. (2003). Asynchronous discussion groups in teacher training classes: Perceptions of native and non-native students. *Journal of Asynchronous Learning Networks*, 7(3), 24-33.  
[http://www.aln.org/publications/jaln/v7n3/v7n3\\_biesenbach-lucas.asp](http://www.aln.org/publications/jaln/v7n3/v7n3_biesenbach-lucas.asp)
- Ciano, L. (2003). Special Considerations When Teaching Non-Native English in an Online Environment. *TCC online conference 2003*.  
<http://makahiki.kcc.hawaii.edu/tcc/2003/conference/presentations/ciano.html> [viewed 2 Aug 04]
- Ishikawa, L. (2002). Intercultural Aspects of CMC. Dmst 4503 Seminar in Internet Communication.  
<http://www.du.edu/~jrutenbe/4503/intercultural.htm> [viewed 31 July 04]
- Mazzolini, M. (2000). Assessment Techniques in an Online Astronomy Course. *Publications of the Astronomical Society of Australia*, 17(2). 141-144
- Mazzolini, M. (2002). The Use of Online Discussion Forums as a Learning and Teaching Tool in Astronomy. *Publications of the Astronomical Society of Australia*, 19(4), 448-454.
- Mazzolini, M. and Maddison, S. (2002). Does Gender influence Discussion Forum Participation in Online Education? In A. Williamson, C. Gunn, A. Young & T. Clear (Eds), *Proceedings of the 19th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education, ASCILITE 2002*, (pp. 421-430). Auckland NZ UNITEC Institute of Technology Dec 2002.

- Mazzolini, M. and Maddison, S. (2003a). Sage, Guide or Ghost? The Effect of Instructor Intervention on Student Participation in Online Discussion Forums. *Computers & Education*, 40(3), 237-253.
- Mazzolini, M. and Maddison, S. (2003b). Widening the circle: Managing discussion forums in a growing online program. In G. Crisp, D. Thiele, I. Scholten, S. Barker & J. Baron (Eds), *Proceedings of the 20th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education, ASCILITE 2003*, University of Adelaide, p. 322-331, Dec 2003.  
<http://www.ascilite.org.au/conferences/adelaide03/docs/pdf/322.pdf>
- McIsaac, M.S. (2002). Online Learning from an International Perspective. *Educational Media International*, 39(1), 17-21
- Northover, M. (2002). Online Discussion Boards – Friend or Foe? In A. Williamson, C. Gunn, A. Young & T. Clear (Eds), *Proceedings of the 19th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education, ASCILITE 2002*, (pp. 4771-484). Auckland NZ UNITEC Institute of Technology Dec 2002.  
<http://www.ascilite.org.au/conferences/auckland02/proceedings/papers/193.pdf>
- Morse, K. (2003). Does One Size Fit All? Exploring Asynchronous Learning in a Multicultural Environment. *Journal of Asynchronous Learning Networks* 7(1). [http://www.sloan-c.org/publications/jaln/v7n1/v7n1\\_morse.asp](http://www.sloan-c.org/publications/jaln/v7n1/v7n1_morse.asp) [viewed 2 Aug 04]
- Pan, C.-C., Tsai, M.-H., Tsai, P.-Y., Tao, Y. & Cornell, R. (2003). Technology's Impact: Symbiotic or Asymbiotic Impact on Differing Cultures? *Educational Media International* 40(3-4), 319-330.
- Tu, C.-H. (2001). How Chinese Perceive Social Presence: An Examination of Interaction in Online Learning Environment. *Educational Media International*, 38(1), 45-60.
- Tylee, J. (year unknown). Cultural issues and the online environment.  
[http://www.csu.edu.au/division/celt/resources/cultural\\_issues.pdf](http://www.csu.edu.au/division/celt/resources/cultural_issues.pdf) [viewed 2 Aug 04]

**Dr Margaret Mazzolini**, Project Manager, Curriculum Framework Project, Higher Education Division, Swinburne University of Technology, PO Box 218 Hawthorn VIC 3122 Australia.  
 mmazzolini@swin.edu.au

**Dr Sarah Maddison**, Course Coordinator, Swinburne Astronomy Online, Centre for Astrophysics & Supercomputing, Swinburne University of Technology, PO Box 218 Hawthorn VIC 3122 Australia.  
 smaddison@swin.edu.au

**Please cite as:** Mazzolini, M. & Maddison, S. (2004). Education without frontiers? International participation in an online astronomy program. In R. Atkinson, C. McBeath, D. Jonas-Dwyer & R. Phillips (Eds), *Beyond the comfort zone: Proceedings of the 21st ASCILITE Conference* (pp. 606-615). Perth, 5-8 December. <http://www.ascilite.org.au/conferences/perth04/procs/mazzolini.html>

Copyright © 2004 Margaret Mazzolini & Sarah Maddison

The authors assign to ASCILITE and educational non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ASCILITE to publish this document on the ASCILITE web site (including any mirror or archival sites that may be developed) and in printed form within the ASCILITE 2004 Conference Proceedings. Any other usage is prohibited without the express permission of the authors.