Award for Teaching Excellence 2009: Written Statement

Synopsis: *Assoc Prof Syed Mahfuzul Aziz has been teaching in the Electronics and Computer Engineering disciplines for over two decades. He has developed and taught courses on integrated circuit design and computer hardware design at both undergraduate and postgraduate levels. His teaching methods focus on the development of student independent learning, problem solving and critical thinking abilities. He assists students in developing these qualities in a self directed manner using an innovative project-based learning approach. He has used this method effectively to address students' academic and cultural diversity. Engaging students in lectures, tutorials and assessments has been a particular focus of his teaching. To assist students in appreciating the importance of disciplinary research and develop design skills using the latest technologies Dr Aziz has systematically integrated the outcomes of his collaborative research with leading European institutions into educational circuit design tools. His teaching resources are used in many institutions across the world. His research interests include high performance integrated circuit (IC) and computer hardware design, and testability and modelling of next generation IC technologies.*

Overview

This application is as much about my teaching initiatives and achievements as it is about the journey I have undertaken with my students, colleagues and peers. As I reflect on this journey I realise how much I have learnt through my interactions with all these people by keeping an open mind and by working on the basis of mutual respect. When I migrated to Australia in 1999, I was presented with a teaching context quite different from what I had been used to. It is the openness of mind and the willingness to change, reflect, learn and innovate that have assisted me significantly in my endeavours to *make a difference*.

As an academic in engineering I have always realised how important it is for our future engineers to develop *lifelong learning* skills in the context of rapidly advancing technologies of computer systems and microelectronic circuits. I am aware that this is challenging for academics and learners due to the increasing educational, cultural and language diversity among engineering students[1]. An ever increasing number of students at the University of South Australia (UniSA) come from overseas, and others from alternative pathways such as TAFE and mature-age entry. I have seen many students struggle with the idea of *independent learning*—a key skill required for adaptation to changes in professional practice and to develop as lifelong learners. As I adjusted to a new culture and a new teaching environment, I could relate to the social and educational adjustments the students experienced. My role as a teacher is to assist students in overcoming these barriers, and in developing the knowledge and skills required for their profession. I believe that these are best done if I *know my students well*, and know their backgrounds and aspirations. The most inspirational teachers I came across in my life achieved these objectives by *engaging students* in and outside the classroom through a respectful relationship.

To provide an inclusive learning environment for the diverse groups of students and support them to develop as independent learners, effective problem solvers and critical thinkers, I have taken, in the *last ten years*, a series of *student-centred learning (SCL)* initiatives. These initiatives have resulted in significant improvements in rankings in the course evaluations (Course Evaluation Instrument—CEI) and student evaluations of teaching (SET), and have placed my courses among the very top in the Division of IT, Engineering and the Environment (ITEE) of UniSA.

Universities have the noble mission of *creating and advancing knowledge* through educating graduates who are capable of applying that knowledge for social benefit. As an educator, I therefore ensure that my teaching is informed and continually enhanced by the outcomes of scholarly research. I deliberately incorporate into my teaching the latest technologies and tools that I

[1] Aziz, S. M. (2005). Internationalisation as a change dynamic in engineering education: Issues and Challenges. In *Proc. ASEE/AaeE 4th Global Colloquium on Eng. Educ*. (pp. 211/1-10). Sydney: AaeE.

develop[2] through collaborative research with a European institution. To assist students in developing further as independent researchers I engage them in applied research in collaboration with partner institutions. Many of my students have excelled in their project works, and earned university and external awards. I have received UniSA's top teaching awards, and recognition through national and international awards, most notably, the International Network for Engineering Education and Research *Achievement Award 2007, Carrick Citation 2007*, and the Australasian Association for Engineering Education *Citation 2007 as well as Teaching Excellence Award 2008 (highly commended).* I have developed collaborations with academics and industries internationally, with a view to sustaining the evolution of our teaching and learning programs in line with the professional practices worldwide.

1. Approaches to teaching that influence, motivate and inspire students to learn

Before joining UniSA in 1999, I had been used to teaching students of similar age, cultural and academic backgrounds, with comparable levels of academic ability. The first two years at UniSA were challenging and interesting times in my career because students not only had diverse educational and cultural backgrounds, they also had widely varying levels of academic ability. There were students from TAFE, mature aged group and form overseas. Many of them told me that they had difficulties with problem solving and in carrying out design oriented tasks independently. Yet one of the objectives of learning is to enable students to develop as *independent learners*. My observations and discussions with students and colleagues led me to conclude that a 'one approach fits all' strategy was not going to deliver the expected learning outcomes for my students. It was important for me to take a fresh look at how to best cater for the learning needs of diverse students. As I embarked on a new journey of change and reflection, I enrolled in the Graduate Certificate program in Higher Education in 2001 to further my understanding of learning and teaching.

Based on the research I had conducted during 2001-2003 and reflecting on the feedback I had received from students and colleagues, I developed a *new project-based learning* approach for my courses Computer Hardware Design (CHD) and Very Large Scale Integrated (VLSI) circuit Design. This approach encouraged students to *learn by doing* simple early projects using step-by-step project guides. This is the beginning of *independent learning*[3]. By the end of each of these projects students learned how to use relevant Computer Aided Design (CAD) tools and have the satisfaction of successfully designing a system that performs useful functions. This has been invaluable for student motivation and for developing their confidence. For students with less than the adequate level of background technical knowledge, the early projects are a way to revisit some of the fundamental concepts. These projects gradually engage students with problem solving and critical thinking by scaffolding more complex tasks. This enables diverse student groups to adapt to the notion of independent learning. Students with a more advanced level of knowledge are stimulated to attain higher goals at accelerated pace. The subsequent projects gradually increase in complexity (another level of scaffolding) requiring students to engage in deeper *problem solving* and *critical thinking*. The final capstone project requires students to apply their experience and skills to design a complex system. Student satisfaction with the overall quality of the above courses improved significantly–in the last four years, at least 92% of the students were satisfied with the CHD course; the *satisfaction rate* with the VLSI course increased from 64% in 2004 to at least 94% in subsequent years[4].

To further support students with their introduction to *independent learning*, *problem solving* and *critical thinking*, I introduced a *student-centred learning workshop* in 2006 in collaboration with staff from UniSA's Learning and Teaching Unit. The workshop was held a week after the students did the first project. Reflecting on their experience in that project the students participated in small group-based problem solving activities and presented their work at the end. Using UniSA's online survey instrument *TellUs2*, I developed a *questionnaire* to evaluate the workshop. In the last three years, 89% of the respondents on average said that they had found the workshop useful for learning. I developed a second *online questionnaire* to evaluate the effectiveness of the project-based learning (PBL) approach. In the last three years at least 97% of the respondents said that the projects had helped them to put the theory into practice, and

[2] Sicard, E. and Aziz, S. M. (2007). Conquering 45nm technology. *Magnitudesigns: Journal for Researchers* (pp. 8-12). India: ni2designs. 01.

[3] Aziz, S. M. (2005). Learner centric education in VLSI design. In W. Aung et al. (Eds.), *World Innovations in Eng. Educ. and Res.* (pp. 69-78). Arlington: iNEER.

[4] Unless otherwise specified the data presented here and elsewhere are % of students agreeing with the statements in UniSA's official evaluations (CEI and SET).

that they felt confident about doing projects similar to the capstone project *independently*.

- *"The project-based learning was very good, the first project had in depth instructions and it gradually backed off giving us time to adapt to the software and applying the theory"* (Student, VLSI course 2006).

Colleagues around the world have found my PBL approach useful for their teaching:

- *"Your project-based approach, technology models and design examples have assisted us enormously in teaching complex concepts in a relatively simple and intuitive manner"* (Prof A. BBB, W University of Engineering & Technology, Bangladesh).

By engaging students in problem solving and critical thinking through the self learning projects I have attempted to develop their *independent learning abilities* as well as *scholarly values*. I have drawn enormous enthusiasm from the way students have responded to the activities I have introduced to fulfil these objectives. Sharing this enthusiasm with my students has motivated them even further, as in one student's opinion:

- "*His tremendous interest not only on the subject but also on the students motivates me to achieve and learn more"* (Student, CHD course 2005).

In the evaluation of my courses in the last four years, more than 90% of the students said that I had shown a genuine interest in my teaching, compared to an average of less than 70% in the previous three years. Students have told me repeatedly that their participation in various learning activities was greatly influenced by the opportunities I had created for them in and outside the classroom. For example, I usually start my lecture with a summary of the concepts covered in the previous lecture – asking questions and facilitating interactions. I engage students further through small tasks, such as, short quizzes during lecture[5].

- *"(The best aspect is) Mahfuz would constantly involve the class by asking questions throughout lectures"* (Student, CHD course 2005).

2. Development of curricula and resources that reflect a command of the field

I strongly believe that students are inspired to learn when the learning resources are stimulating, thought provoking and relevant to professional practice. Through numerous discussions with students in 2000 I realised that to support students in their learning my priority was to develop comprehensive resources for my courses. As a first step I developed online learning resources for the CHD and VLSI courses. These initiatives were recognised through UniSA *Supported Teacher Awards* in 2000 and 2001. Many students pointed out that the practical components of these courses did not provide opportunities for engagement with the latest industry technology and professional practice. In addition there was the overarching need to adopt approaches for engaging students in a way that would assist them to develop independence, problem solving and critical thinking skills. As a consequence, during 2001–2003 I engaged in the following projects for *redeveloping my courses*:

i. *Action research* on project-based learning using *Lewin's Cyclic Model*[6].
ii. C*urriculum design* to modernise courses[7].

During these projects I worked closely with the students, tutors and professional engineers from reputable companies in Australia and the US. It was clear to us that rapid development in hardware technologies and design practices conspired to date the courses. Consequently, I designed a new curriculum for the CHD course to fill the gaps and introduced the Field Programmable Gate Array (FPGA) technology due to the rapid proliferation of this technology in modern computer systems. I applied for and secured grants from leading FPGA vendors for the industry standard software tools and hardware platforms. Finally, to support the *project-based learning* philosophy I introduced a new set of practical projects in 2004 using an industry relevant hardware design language called VHDL (Very high speed integrated circuit Hardware Description Language). From the students' performance in that year it was clear that the lack of adequate experience with the VHDL language limited their ability to engage effectively with the projects. To provide further introduction to the language, I initiated an amendment to the Bachelor program in Computer Systems Engineering (CSE) in 2005, and redeveloped the Digital Devices and Systems course as a prerequisite for the CHD course. As I have indicated previously, the student satisfaction rate with the CHD course improved significantly since 2005. The following comments indicate that I acted upon a body of *up-to-date knowledge* in

[5] Harwood, W. S. (1996). The one minute paper. *J. Chemical Education* (pp. 229–230). 73(3).

[6] Lewin, K. (1946). Action research and minority problems. *J. Soc. Issues* (pp. 34-46).

[7] Aziz, S. M. (2004). Curriculum design in the context of internationalisation. In *Proc. of the Int. Conference on Eng. Education and Research (iCEER)* (pp. 493–500). Czech Republic.

redesigning the CHD course, and that the students found the course useful for developing industry relevant skills:

- *"The course is a great stepping stone to the work I am doing now using FPGAs at BAE Systems"* (Student, CHD course 2005).
- *"The course motivated me to specialise in this area, equipped me with knowledge and skills in line with industry and research practices, helped me to secure employment at DSTO and a PhD scholarship"* (Student, CHD course 2004).

For the VLSI Design course, I introduced two user friendly CAD tools, namely *Dsch* and *Microwind*, and continued to collaborate closely with the developer of the tools, Professor A. CCC of the National Institute of Applied Science (INSA) in Toulouse. Based on my contributions Prof CCC has enhanced the tools on a number of occasions. The latest semiconductor technology models we incorporated into these tools have enabled students to apply relevant industry technologies and design rules in their project works. This fulfils the learning objective that engineering graduates develop *practice-based design skills*. I am part of a small group of worldwide *beta testers* for both the design tools. This recognition has been possible through an effective *command of the field*. The capstone project guide I developed for the VLSI course was included as a chapter of a textbook published in 2007 by the reputable McGraw-Hill Publishers[8].

- "*This chapter would not have been possible without the able assistance and guidance of Dr Mahfuz Aziz*[8]*"* (Prof A. CCC and A/Prof A. DDD, INSA Toulouse, France, 2007).

The significant improvements in my course evaluations in recent years have been possible largely due to the *coherent project guides*. In one colleague's view:

- *"The learning resources Mahfuz has developed expose students to up to date technologies and design practices in a very stimulating manner"* (Assoc Prof A. EEE, Uni of X, 2008).

In a student's opinion:

- *"(The VLSI course) gives students a very good exposure to the up to date technology. It's a specialist course"* (Student, VLSI course 2006).

Assisting students in understanding the objectives and expectations for learning has been one of my priorities. My approach has been to continually reinforce these expectations, using examples from the work they have already done. In the evaluation of my courses in the last four years between 87% and 92% of the respondents said that they had a clear idea of what was expected of them, a significant improvement over previous years.

As the program director of UniSA's Computer Systems Engineering (CSE) discipline during 1999-2007 I provided academic leadership for the *development of curricula* at the *program level* in line with industry trends. I played a leading role for the successful accreditation of our redeveloped programs in 2001 and 2005. UniSA is committed to ensuring access to and equity within its programs for students from diverse backgrounds. To realise this commitment I have been working closely with colleagues in the TAFE sector since 2000. I developed the *first two pathways* for TAFE graduates in Electronics and Computer Engineering disciplines to enter the Bachelor of Engineering programs in UniSA. This was endorsed by UniSA as a model for developing TAFE articulations. These pathways enabled many TAFE graduates to realise their educational aspirations through UniSA degrees in the last nine years.

In my role as the inaugural Academic Director of UniSA's common first year engineering program since 2007, I have provided leadership to enable academic staff across the Division of ITEE to implement *practice-based learning* strategies. My *project-based learning* resources are being used as models for developing resources to enhance student engagement. I have been providing leadership in developing questionnaires for scholarly evaluation of student experience early in the first year. I have assisted staff in addressing student concerns by realigning the *PBL resources* with the learning needs of around 250 first year students. These initiatives have contributed to significant improvement in student satisfaction with the quality of first year courses, the satisfaction rate increasing from 40% in 2008 to 66% in 2009.

3. <u>Approaches to assessment and feedback that foster independent learning</u>

In 2002, I taught a large first year course titled *Principles of Computer Systems* with nearly 200 students. The majority of students were still adjusting to a relatively unfamiliar university environment. My interactions with the students led me to realise that it was necessary to develop stimulating resources to support students to *test*

[8] Sicard, E., Ben Dhia, S., Aziz, S. M. (2007). A very simple microprocessor. In E. Sicard and S. Ben Dhia, *Advanced CMOS Cell Design* (pp. 36-66). New York: McGraw Hill.

their learning. I developed *interactive quizzes*[9] using UniSA's online learning environment *UniSAnet*. The questions were designed in a way that required students to apply the relevant concepts before they could answer them. In case students answered the questions incorrectly, the automatic feedback mechanism I had developed guided them through the relevant concepts and pointed them to the relevant learning resources. In the evaluation of the quizzes using a specially developed questionnaire, the majority (>70%) of students said that they had found the quizzes useful for testing their learning and for focusing on important topics. Colleagues in UniSA's Civil Aviation program considered my online quizzes to be a good model for providing opportunities for *self assessment* in their discipline.

UniSA emphasises the use of assessment schemes that engage students and assist them in developing important *graduate qualities*, for example problem solving, critical thinking, lifelong learning and team work skills. In the CHD and VLSI courses, every student is expected to demonstrate his/her individual attainment of knowledge, problem solving and design skills – even within the group work context. Students expressed the view that the assessment of projects based primarily on written reports would not allow them to demonstrate their learning in a meaningful way. Many said that assessment schemes focusing on *face to face demonstration* of the projects were most helpful. Indeed, their views were in tune with my own realisation that engineering design projects must have a strong *face to face assessment* component. In particular, the face to face demonstration of a group project allowed me to ask members of the group to demonstrate their work individually and also ask conceptual questions individually. This enabled me to judge every individual's learning attainment and contribution to group work, and then assist the students in further advancing their learning. Therefore, to align the assessment strategies in my courses with the objectives of developing the *UniSA graduate qualities*[10], I have assessed student learning in the projects *on a continuing basis* throughout the semester leading to the assessment of the capstone project. The following evidences demonstrate the effectiveness of this approach:

- In the evaluation of my courses in the last four years, between 90% and 100% of the respondents said that *the courses had enabled them to develop and/or strengthen a number of the qualities of a UniSA graduate*.
- *"With gentle, empathic persistence, Dr Aziz leaves no stone unturned in checking student understanding of complex problems and theory"* (A. FFF, Learning Adviser, Uni of X)

The *face to face assessment* strategy enabled me to provide immediate feedback on student designs and on their progress. This was evidenced in student comments that the direct feedback on their designs and discussions on alternative design styles improved their understanding. In the evaluation of my teaching (SET) in the last four years on average 84% students said that *I had given them helpful feedback on how they were going*.

- *"I found the face to face assessment of projects to be very useful for enhancing my learning as you provided immediate feedback on my designs and answered my questions"* (Student, CHD and VLSI course 2007).

Many students told me summative and formative *in-class tests* were helpful for them to assess their learning and to prepare for *problem solving* in an exam setting. I have routinely discussed the students' performance in the class tests after handing out the marked test papers and addressed student queries immediately. This assisted students to evaluate their performance and determine how they could improve. The following comment substantiates this claim:

- *"(I like his way of) finding out where each student lack and help them with positive feedback"* (Student, VLSI course 2006).

One of the concerns I had in the CHD course was the low student attendance in tutorial sessions. Students pointed out that they did not find the tutorial sessions interesting because the activities did not engage them deeply with the issues they were facing in their design projects. To engage students, in 2005 I developed problem-based tutorial activities that would reinforce the concepts required to undertake the design tasks in the projects. I introduced *group activity based problem solving* during the tutorial sessions. It was further refined during 2006-2007 through the introduction of group problem solving ahead of the tutorial sessions followed by student presentations and class discussions during the tutorial sessions. These strategies increased *student participation* and fostered *student ownership of learning* as is evident from the following representative comment:

[9] Aziz, S. M. (2004). Online technology for enhancing student learning in a microcontroller course. In W. Aung et al. (Eds.), *Innovations 2004: World Innovations in Eng. Educ. and Res.* (pp. 281–290). Arlington: iNEER.

[10] Biggs, J. (1999). *Teaching for quality learning at university* (pp. 24-32). Buckingham: SHRE.

- *"During the tutorial sessions you engaged the class in lively discussions on our work. We felt that the feedback generated and the learning that occurred was our own creation"* (Student, CHD and VLSI course 2007).

The *face-to-face assessment* of projects further enhanced the project-based learning approach through close personal interaction and clarification of student performance. Students from all backgrounds (local and international) benefitted from this approach. A student with a Non-English Speaking Background commented:

- *"As a woman I feel that your project-based learning strategies enabled me to develop independence in my learning in a way that would not be possible otherwise. I particularly liked the face to face assessment of group projects in the lab as it allowed me to demonstrate my own work directly to you"* (Student, CHD and VLSI course, 2007).

4. <u>Respect and support for the development of students as individuals</u>

I am concerned that students are not disadvantaged because of their socioeconomic backgrounds or family/work commitments. In my PBL approach, students have flexibility to install the design tools on their own computers at no cost and work on the design projects anytime anywhere. My conviction, as a teacher, is to ensure that all students have the opportunity to fulfil their learning aspirations through active participation. I find many students often shying away from expressing themselves. Understanding their backgrounds, speaking to them about the issues they face and encouraging them are some elements of my approach to support these students. My PBL strategies have been successful, largely due to spontaneous student participation in various learning activities fostered by a supportive atmosphere:

- *"You were able to create a friendly atmosphere where the students would enthusiastically participate in the discussions. This was an example of student engagement and collaborative learning at its best"* (Student, CHD and VLSI course 2007).

In 2000, I supervised a group of students in their final year project, sponsored by Motorola Australia Software Centre. One of them was pursuing a degree with honours and was required to write an honours paper. I encouraged him to turn the honours paper into a refereed publication – despite an initial lack of his confidence. My close working relationship with him, coupled with the trust I had placed in his ability, eventually contributed to a successful publication. I have supported students from diverse backgrounds in this manner ever since. In the last nine years, my undergraduate project students have published a total of 15 book chapters and refereed papers in major international conferences. This includes two papers by German exchange students. One of them commented:

- "*Working on an industry sponsored project and writing a report in English have been new and challenging experience. Your consistent support and inspiring dialogues enabled me to complete both. Now I am more confident about my ability to work as an independent professional"* (Exchange student 2002).

Many overseas students pursue *Masters by coursework* programs in UniSA. Despite high academic achievements many of them perceive their apparent lack of prior experience in research and in writing professional reports as obstacles to success in the minor thesis component. The fears of uncertainty of research and writing in a foreign language worry students most. As a teacher, my conviction is to eliminate these fears through close mentoring and support. Confidence and trust in my students to pursue their own ideas has been an important part of reaching out and demonstrating value. I have witnessed the transformation of many students as they become capable and proud individuals. For example, one of the students reported feeling uncomfortable in communicating with health professionals in one of our collaborative projects at a local rehabilitation centre. The main reason was he did not see his engineering skills as adequate for understanding the needs of the rehabilitation centre. My trust in his ability, respect for his decisions and our mutually supportive relationship played a vital role in overcoming these barriers. The student won the UniSA Academic Excellence Award 2007 for the best overall performance in the Master of Engineering program. He also received our School's minor thesis prize 2007 for outstanding performance. He commented:

- *"Your trust and guidance enabled me to excel in the minor thesis and successfully use the medical instrument I designed in the clinical trials at the rehabilitation centre"* (Masters graduate 2007).

I have assisted my students in understanding the importance of good communication and presentation skills for developing as successful professionals. I have supported them to develop these qualities to the best of their abilities. For example, two final year undergraduate students I supervised in 2006 ranked at the top in their project presentations in UniSA's School of Electrical &

Information Engineering (EIE). They contested in the 2006 student paper presentation of the Institution of Engineering and Technology, UK (SA and NT Branch) and won a prize. One of them commented:

- "*The encouragement and support you have given us have been crucial to our success*" (UniSA graduate 2006).

The relatively high attrition rate of engineering students has been a major concern in Australia. Many studies[11] have found that the students' social experience in first year is correlated to success and retention. Success in early assessment is also an important factor influencing student confidence and motivation, and consequently retention. Since 2007 I have provided leadership to ensure a fully supported learning and social environment for UniSA's commencing engineering students. In 2009, together with UniSA's Learning Advisers and teaching staff, I led the introduction of QED (Quest for Engineering Disciplines), a unique, holistic approach to orientation for first year students. It involved problem-based activities designed to induct students to the five pillars of university life – learning, colleagues, career, campus and school. Student survey, conducted after the orientation, revealed that 94% of the respondents found the QED helpful for transition to university. The QED is one in a wide range of initiatives which I have led to improve student confidence and success:

- "*Dr Aziz has provided outstanding support for our transition to uni and for our continuing success. He often comes to the first year learning space, makes himself available to students and is willing to talk about any issue"* (Student, first year engineering 2009)
- "*Mahfuz has greatly assisted the academic, cultural and social development of first year students. He has led initiatives which identify and support students at risk, provide active forms of orientation and teaching which are more engaging to students"* (A/Prof A. GGG, Dean T&L, Uni of X).

I have worked closely with many students in the last ten years to assist them in consolidating their achievements and skills for professional recognition and employment. The fact that students remember me and contact me even after graduation is a fulfilling experience:

- *"I had been looking for jobs since I graduated in 2006 until I found one in mid 2007. Those were uncertain times for me and you supported me so passionately. As my teacher and mentor you are one of those few who have made a real difference in my life"* (Masters graduate 2006).

5. Scholarly activities that have influenced and enhanced learning and teaching

Developing independence among diverse students has been the central philosophy behind my educational initiatives over the last ten years. The PBL approach, learning resources, provisioning of latest technologies and face-to-face assessment were all aimed at realising this philosophy. These initiatives have contributed to marked enhancement in student learning. For the question "Overall I was satisfied with the quality of this course", the aggregated mean of agreement scores for my courses in four years (2005-2008) was 72 in a range of -100 to +100, compared to 42 and 33 for UniSA courses in the Electrical Engineering and Computer Science disciplines respectively. This represents a significant improvement over the aggregated mean of 39 for my courses in the previous two years. Only one student failed the VLSI course in the last three years and nearly 60% of the students achieved a grade of C or better compared to 42% in 2005. The overall pass rate in the CHD course increased from 80% in 2004 to nearly 90% in subsequent years. My initiatives and achievements were recognised through a *UniSA Teaching Grant* in 2005, *three UniSA Teaching Awards in 2006*, *four teaching awards in 2007* including national and international awards, and *three teaching awards in 2008*.

I made sustained efforts to modernise UniSA's Computer Systems Engineering (CSE) program during my directorship (1999-2007). This program was accredited by Engineers Australia in 2001 and 2005. In line with the body's requirements for project-based and industry focused learning, my PBL approach will situate us well for the accreditation of our programs in 2010. The outcomes of my PBL approach informed UniSA's teaching and learning strategies, which foster practice-based skills. As I stated previously, I was appointed the inaugural Academic Director of UniSA's common first year engineering program in 2007 through a competitive selection process. In this role I provide leadership in the Division of IT, Engineering and the Environment (ITEE) for active student engagement. I lead a team of academic developers, learning advisers and teaching staff

[11] Wilcox, P. Winn, S. and Fyvie-Gauld, M. (2005). 'It was nothing to do with the university, it was just the people': the role of social support in the first-year experience of higher education. *Studies in Higher Education* (pp. 707-722). 30(6).

from five schools across the Division. This appointment is recognition of my contributions and their impacts, both locally and internationally. My PBL approach is being used as one of the models for enhancing student engagement and learning in the first year. In 2007, academic staff of the Division elected me as their representative to UniSA's Academic Board for 2 years.

My initiative in PBL was recognised in 2001 in the final report of the ICT-Ed project, funded by the Department of Education. My work has inspired colleagues in my discipline and in other disciplines:

- "*Inspired by the effectiveness of the PBL approach, we have introduced this approach in the course Introduction to Electrical Engineering"* (Prof A. HHH, Uni of X, 2006).
- *"Your student centred learning strategies have inspired me to reflect and improve on my teaching of first year students in accounting. I was awarded a Special Commendation for my teaching and learning approaches"* (A. III, Lecturer in Accounting, Uni of X, 2008).

I have supported colleagues in other Australian universities with their scholarly approaches to learning and teaching:

- *"…this*[12] *being my first refereed publication in T&L. Your inspiration and critical feedback have been very valuable for this"* (Dr A. JJJ, Sen. Lecturer, Z. Univ., Victoria).

My collaborative work with Prof CCC has led to many enhancements of the design tools *Microwind* and *Dsch*. The technology models we have developed[2] have been incorporated in the commercial versions of the tools. These tools and the associated *software application notes* are used in 500 educational institutions worldwide. The French organisation for National Coordination in Micro- and nanoelectronics Training (CNFM) accepted a presentation[13] on our work in its Pedagogical Days in 2006.

- "*Your project-based course resources have assisted us greatly to enhance our educational program in Microelectronics. The projects have been fully integrated as student assignments in our Microelectronics subject–ELE 533"* (Prof A. KKK, Dean, Faculty of Engineering, University Y, Malaysia).

Colleagues around the world have acknowledged my contribution in the field, as is evident from the lead author's comment upon reviewing his book titled *Semiconductor Modeling*:

- *"Dr. Aziz proved to be an outstanding reviewer in terms of the depth of his knowledge of semiconductor modelling. His suggestions were invaluable in furthering the book's goals"* (Author, Company Name, USA).

I continually reflect on my teaching and use a variety of scholarly approaches to evaluate my strategies. I have published twenty-four *scholarly papers* in learning and teaching in the last six years, including contributions to the archival book volumes *World Innovations in Engineering Education*. I have reviewed scholarly papers for these volumes since 2003. One of my publications[14] is used by Associate Professor A. LLL as a learning resource in a graduate course at the California University of Pennsylvania. It is also used in Universiti Teknologi Malaysia for research on linking laboratory work to students' skill development and assessment using the Psychomotor domain[14]. I have been member of the International Committee of the annual *International Conference on Education* since 2006 and was approached to present invited papers in 2006 and 2009. In 2007, I was on the Scientific Committee of the *International Conference on Engineering Educatio*n held in Portugal. I am on the Program Committee of the *Eighth European Workshop on Microelectronics Education* to be held in Germany in 2010, a premier biannual event on microelectronics education.

My contributions over the last ten years have influenced and enhanced learning and teaching, both locally and internationally. My experience during this period has transformed my teaching, which is now more focused on *what the student does*[10]. My greatest satisfaction is in seeing my students achieve their goals in life. I feel proud for their achievements. I gratefully acknowledge the inspirations I derived from students and colleagues, who worked with me and gave me critical feedback. These interactions will be integral to my future endeavours in learning and teaching.

[12] Kamruzzaman, J. and Aziz, S. M. (2006). Framework for an agent assisted virtual group-work environment using newsgroup platform. In *Proc. 17th Annual Conf. AaeE* (pp. 49/1-8). Auckland: *AaeE*.

[13] Sicard, E., Ben Dhia, S. and Aziz, S. M. (2006). Student projects in CMOS cell design using Microwind in 65nm Technology. In *Proc. Ninth Educational Workshop of CNFM* (pp. 223-229). St Malo: CNFM.

[14] Ferris, T. L. J. and Aziz, S. M. (2005). A Psychomotor skills extension to Bloom's taxonomy of education objectives for engineering education. In *Proc. Int. Conf. Eng. Educ. and Res.* (pp. W14/1-6). Taiwan.