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Title	Quality assurance in higher education: A case study from Singapore
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Source	<i>International Conference on Higher Education: Global Challenges and Prospects</i> , 14 – 16 May 2007, Bangkok, Thailand

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Citation: Wong, K. Y. (2007, May). *Quality assurance in higher education*. Paper presented at the International Conference on Higher Education: Global Challenges and Prospects, Bangkok, Thailand.

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**Quality Assurance in Higher Education:  
A Case Study from Singapore**

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Presentation paper at  
the International Conference on  
Higher Education: Global Challenges and Prospects  
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# Quality Assurance in Higher Education: A Case Study from Singapore

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Invited paper presented at  
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## Abstract

The quality of an education institution can be conceptualised in terms of its structure and processes. The structure includes several different aspects: vision and mission; curriculum and programmes; benchmarks and assessment of outcomes; research and publication; community and professional services; human resource management, capacity growth, and networking; management and utilisation of physical resources. Each of these aspects may be targeted at different organisational levels: individual, departmental, institutional, and beyond institutional. This aspect-by-level structure is often used to define key performance indicators (KPI) as goals that will help to monitor the status quo of the quality of the institution at a given point of time. The processes used to achieve the KPI need to move beyond structure to address the dynamic and complex interactions of people, resources, and strategies. Different perspectives have been proposed to understand how these processes might work. In this presentation, I will describe some activities that have taken place at the National Institute of Education, Singapore to address the structure and processes issues in response to local and global challenges. An important insight is that the quality of an education institution is more than the sum of the quality of its constituent parts.

**Disclaimer:** The opinions expressed in this paper are my own and are not necessarily those of the National Institute of Education (NIE) or Nanyang Technological University (NTU), Singapore.

## Introduction: Needs for Quality Assurance

For the past few decades, quality is one of the most important considerations of education institutions all over the world. Educators and education administrators at all levels are constantly being reminded by different stake-holders to strive for excellence in education, and at the same time they are being challenged to provide data or performance indicators to show to what degree the target excellence has been achieved. This has led to enormous amount of time, resources, and energy expended by education professionals and consultants to develop quality assurance measures, to report the outcomes periodically, and to strategically plan for future goals. This has also spawned new quality assurance industries that try to apply techniques used for the business and management sectors to education (e.g., the Baldrige Award for Education in the US, see Arcaro, 1995, or <http://www.quality.nist.gov/>), to define benchmarking standards for the education sector, to change high level management of education institutions from academic leadership to executive roles, and to help the education sector manage risks related to future trends, such as changes in the nature and number of student population, curriculum and pedagogic innovations, professional training and so on. These changes have also affected higher education. One only needs to look at reactions to the rankings of universities published by different agencies using different criteria, for examples, international rankings by *Shanghai Jiao Tong University's Institute of Higher Education*<sup>1</sup> or the *Times Higher Education Supplement*<sup>2</sup>. Other reasons for attending to quality assurance include accountability for public funding of tertiary institutions, values for tuition fees paid by the students or their parents, competition for fee-paying

<sup>1</sup> <http://ed.sjtu.edu.cn/ranking.htm>

<sup>2</sup> <http://www.thes.co.uk/worldrankings>

undergraduate students or high calibre graduate students, and the satisfaction of belonging to “one of the best”, if not in overall ranking than at least in certain categories, such as technology or humanities.

It is not possible to deal with these complex quality matters within this short presentation, and neither do I have the expertise or experience to do so. Instead, I will focus on quality issues in two areas: structure and processes. I will draw some examples from the practices at the National Institute of Education (NIE), Singapore, where I worked from 1986 to 1990 (formerly called the Institute of Education) and then from 2002 to the present. An important insight that I have learned from working at NIE, two Australian universities (Curtin University of Technology and Murdoch University), and Universiti Brunei Darussalam, and doing consultancy work at the Philippines and Hong Kong, is that the quality of an education institution is more than the sum of the quality of its constituent parts. Each constituent part must strive to achieve the highest possible quality at its level within its scope of activities, but the whole university needs to formulate an integrating system to extend the quality of the individual parts to reach greater heights. I will also include five questions for the discussion session for a compelling reason modified from what the witty French philosopher, Voltaire (1694 – 1778)<sup>3</sup>, had written: *Judge an institution by its questions, rather than its answers*. The questions an institution asks about its quality will show whether it is trying to solve problems or to seek new opportunities under unprecedented global and local changes and challenges. According to Naisbitt (2006), one should “look for and bet on the exploiters of opportunities, not the problem solvers” (p. 81). Higher institutions of learning should actively encourage these “exploiters”!

**Question 1.** How does your institution encourage and reward those who create new circumstances versus those who are good problem solvers?

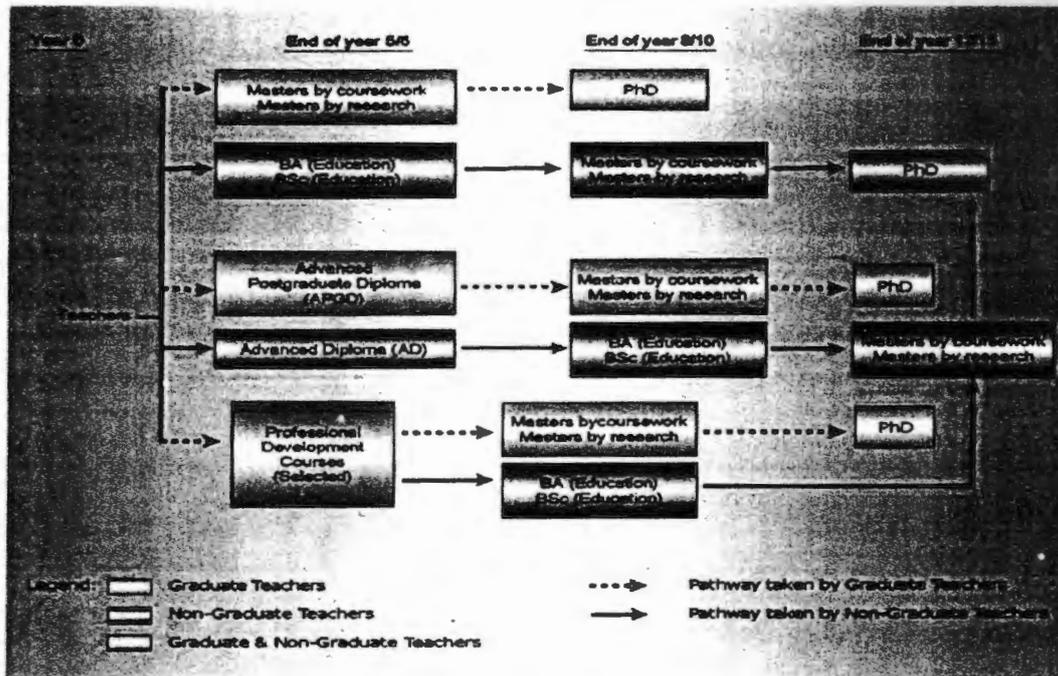
### NTU, NIE, MME: History and First Impressions

NIE is an autonomous institute of Nanyang Technological University (NTU), Singapore. NTU has its original root as Nanyang University (Nantah) founded in 1955 with contributions provided by the Chinese community. On 8 August 1980, Nanyang University merged with the University of Singapore to become the National University of Singapore (NUS). On the Nantah campus, the Singapore government established the Nanyang Technological Institute (NTI) in 1981. Ten years later, it merged with NIE to become NTU as the second public university in Singapore. In April 2006, NTU was corporatised as a not-for-profit company. Over the years, NTU has become a comprehensive, research-intensive university, ranked 61 internationally and 17 in Asia by the *Times Higher Education Supplement* in 2006. It has 2,500 teaching and research staff from more than 40 countries, 12 schools organised into the College of Engineering, College of Science, College of Business, and College of Humanities, Arts, and Social Sciences, and two autonomous institutes, namely, NIE and S. Rajaratnam School of International Studies. The NTU programs provide broad-based and practice-oriented learning experience to more than 19,100 undergraduates and 8,600 graduate students. NTU has established partnership with more than 300 institutions in about 45 countries, projecting a strong image of a great global university founded on science and technology.

NIE is Singapore’s only teacher-training institute. Its origin was the Teachers’ Training College (TTC) established in 1950 to offer certificate courses in education for non-graduates. In the same year, a School of Education was established at the then University of Malaya (which later became the University of Singapore and then NUS) to train graduates for teaching. In December 1971, the School of Education was closed. On 1 April 1973, the Institute of Education (IE) was founded from TTC. In July 1984, the College of Physical Education (CPE) was founded. On 1 July 1991, both IE and CPE were merged to form NIE, which then became part of NTU. Currently, NIE has about 390 academic staff, about 15% of them are expatriates. It offers a whole range of pre-service, in-service, Masters, and PhD level programmes in education and academic disciplines to about 2,100 pre-service trainee teachers, 1,500 graduate students, and 14,000 in-service attendees. Three years ago, NIE worked closely with the Singapore Ministry of Education to develop a comprehensive Professional Development Continuum Model (PDCM)<sup>4</sup> for the professional development of the large number of school teachers in Singapore.

<sup>3</sup> <http://www.quotationspage.com/search.php3?homesearch=voltaire&page=4>

<sup>4</sup> <http://www.nie.edu.sg/gprica/pdcm.htm>



NIE has established an international reputation and now provides educational consultancy to several countries such as Indonesia, the Philippines, and Abu Dhabi, in addition to serving the needs of its main stakeholder, namely the Singapore Ministry of Education. It has exchanges with about 30 international institutions of higher learning.

The broad sketches of the history of NTU and NIE are relevant in highlighting that quality assurance matters do not arise from a vacuum. Quite often, measures taken to solve current problems or to exploit new opportunities are deep-rooted in traditions, past practices, and even unconscious mindsets of the staff and students of the institutions. These factors need to be brought to the open and debated continually to ensure that the institution stays relevant and keeps several steps ahead of competition from other sectors.

NIE is organised on a programme-driven matrix system with 3 programmes and 11 Academic Groups (AG or departments). Its Centre for Research in Pedagogy and Practice (CRPP)<sup>5</sup>, funded by the Singapore Ministry of Education, is the largest educational research centre in the Asia Pacific region.

	Foundation Programmes (FP) Diploma, Degree, PGDE	In-service & Graduate Programmes (GPR)	External Programmes (Knowledge Horizon)
11 Academic Groups (AG)	Pre-service trainee teachers	In-service teachers	Consultancy to non-local educators and teachers

Each of the three programmes is managed by a team headed by a Dean. The teams for pre-service and in-service programmes work closely with the Singapore Ministry of Education to recruit students, monitor their progress, make decisions about curriculum review and innovations, evaluate implementation of the respective programmes by gathering feedback from stakeholders, and publicise the programmes.

While the Deans of the programmes have overall responsibility about the quality of their programmes, the actual teaching and assessment of students are carried out by the academic staff of the AG. These AG cover academic disciplines, including languages, mathematics, science, education, social sciences, and performing arts. Every AG is managed by one Head, and all the AG staff are under the Dean/Academic. A unique feature of NIE's organisation is that the content experts, such as linguists, scientists, and mathematicians, are housed within the same AG with the educators in the respective discipline such as language educators, science educators, and mathematics educators. This arrangement is different from what is practised in many universities, where the content experts and educators belong to different faculties, for example,

<sup>5</sup> <http://www.crpp.nie.edu.sg/index.php>

mathematicians in the Science faculty and mathematics educators in the Education faculty. Under this more common system, these two groups of academicians rarely know one another or meet to discuss issues related to the same students who take their courses offered from the two faculties. On the other hand, the NIE arrangement has facilitated mutual understanding between these two groups of experts, eliminated competition for students under the two-faculty system, and resulted in fruitful collaboration in research and teaching that combine content and pedagogy. Eventually, students will benefit much more from this collaborative arrangement.

The Mathematics and Mathematics Academic Group (MME), of which I am the current Head, is one of the largest AG at NIE. It has 12 mathematicians, 21 mathematics educators, and 5 academicians who are well versed in both mathematics and mathematics education. MME manages 5 mathematics laboratories and 5 computer laboratories used for teaching purposes.

The first impressions about the quality of an institution may be strongly affected by its physical buildings and virtual webpages. Surprisingly, these two features are seldom mentioned in quality audit. Visitors to NIE are often impressed by the expansive sense of the immense structure softened with landscaped plants and lawn, as shown in diagram (a). The teaching rooms are specially designed to match specific pedagogies. For example, the mathematics laboratory shown in (b) has cabinets stocked with teaching aids and trapezium-shaped tables that can be readily joined together for group activities. This arrangement will facilitate mathematics communication among the trainee teachers so that they will be better prepared to conduct similar activities in their own teaching to complement teacher exposition most commonly used in traditional mathematics classes. A different pedagogical emphasis may lead to different designs of the teaching rooms. Indeed, the physical infrastructure can send strong messages about the intended instructional strategies advocated by the institution.



(a)



(b)

On the virtual environment, the NIE webpage has been re-designed recently so that it has a more user-friendly interface that carries the corporate image. Each AG or department of NIE is expected to ensure that its own webpage matches seamlessly with this corporate image. Establishing some consistency among constituent parts of an institution helps to project common messages strongly to the outside world. This is an important quality assurance aspect not to be neglected.

**Question 2.** To what extent do you agree with the need for favourable first impressions in terms of physical and virtual environments for quality audit of an institution? Have you come across examples where the first impressions from these two aspects seem to contradict the institution's vision and mission?

#### **Structure: Aspect-by-Level**

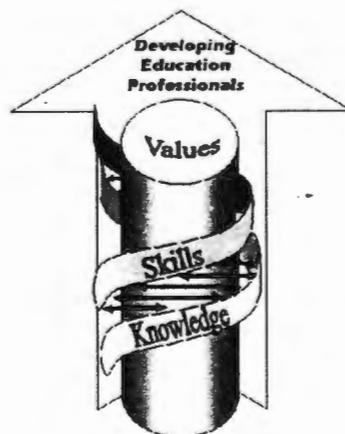
The structure of an education institution includes several key aspects: vision and mission; curriculum and programmes; benchmarks and assessment of outcomes; research and publication; community and professional services; human resource management, capacity growth, and networking; management and utilisation of physical resources. Each of these aspects may be targeted at different organisational levels: individual, departmental, institutional, and beyond institutional, which may be national and global.

Almost all institutions nowadays have some statements of vision and mission. These statements for NTU, NIE, and MME are given below together with the respective logos. These statements at three different levels convey similar messages about the core education business of the University and its constituent parts, in particular, the message of making an impact globally. The consistency across levels helps to strengthen the key message.

Organisational Units	Vision	Mission
	To be a great global university founded on science and technology.	To nurture creative and entrepreneurial leaders through a broad education in diverse disciplines.
	To be an institute of distinction.	To excel in teacher education and educational research.
	To strive to be a leader in the field of Mathematics Education.	MME is committed to the professional preparation and development of mathematics teachers and educators in Singapore and beyond within a rapidly changing and increasingly technological environment.

For any education institution, its quality depends heavily on the nature and delivery of its curriculum. Teacher education programmes in many countries typically contain courses in educational psychology, sociology, methodology in specific school subjects, subject matter knowledge (e.g., mathematics), and practicum (or school-based practice). These teacher education programmes seldom articulate the philosophy and theoretical basis of the combination of courses offered to the trainee teachers. This shortcoming has led to the perception that teacher education is not a coherent discipline, and trainee teachers often complain about the weak theory-practice link in the courses.

The Foundation Programme at NIE has recently taken the step to address this lack of theoretical foundation for pre-service teacher education. This exercise provides an example of the aspect-by-level conceptualisation of quality that might be of interest to the conference participants. In 2003, Dean of Foundation Programme initiated a review of the curriculum for all the pre-service teacher education programmes at NIE, with feedback obtained from the Academic Groups. The review committee discussed the desirable attributes of a beginning teacher and developed the “DNA” model shown below.



The DNA imagery portrays that the pre-service curriculum is alive and dynamic. It classifies the desirable attributes into Values, Knowledge, and Skills, as shown in the table below.

Values	Knowledge	Skills
<ul style="list-style-type: none"> <li>• Belief that all pupils can learn.</li> <li>• Care and concern for all pupils.</li> <li>• Respect for diversity.</li> <li>• Commitment and dedication to the profession.</li> <li>• Collaboration, sharing and team spirit.</li> <li>• Desire for continuous learning, excellence and innovation.</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of educational contexts.</li> <li>• Knowledge of content.</li> <li>• Knowledge of curriculum.</li> <li>• Knowledge of pupils.</li> <li>• Knowledge of pedagogy.</li> <li>• Knowledge of self.</li> </ul>	<ul style="list-style-type: none"> <li>• Pedagogical skills.</li> <li>• Interpersonal skills.</li> <li>• Reflective skills.</li> <li>• Personal skills.</li> <li>• Administrative and management skills.</li> </ul>

These attributes are established at the programme level. Then the AG try to translate this framework at the course level. For example, MME lecturers have examined to what extent the contents of the mathematics and mathematics methodology courses and their delivery can support this framework; e.g., *How are reflective skills inculcated when the trainee teachers complete an analysis of students' mathematical errors? How is respect for diversity catered for when the trainee teachers belong to different ethnic groups?* Lists were produced showing the links between items of the framework with individual courses, and these lists were shared across the AG. However, the crucial part of this quality enhancement exercise is not in producing these lists because they will change in response to changes in the contents and the course coordinators and tutors. More importantly, it is the opportunity for academicians to discuss these issues among colleagues and to reflect on their practices under the guidance of a unifying framework that is quite comprehensive.

The final level, also the most basic one, of this curriculum review relates to the individual tutors. A fervent hope is that they are able to teach the courses in ways that reflect the philosophy of the framework. This requires the application of appropriate "training pedagogy". I have formulated five principles of this pedagogy for teacher training (Wong, 2005):

- Spiral and Developmental Principle.
- Coherence Principle.
- Activity Principle.
- Local Relevance and Global Perspective Principle.
- Guidance and Constructivist Principle.

The progression from programme → AG → individual tutors shows that in other contexts, issues of quality assurance at each organisational level can take on different forms. These forms may subsequently result in quite different impacts on the target recipients. Key performance indicators (KPI) have to be developed to monitor these impacts.

**Question 3.** Consider one aspect of quality assurance relevant to your institution. Discuss the functions of a coherent framework and how it might be interpreted by the affected parties at different organisational levels.

The aspect-by-level structure can be used to define key performance indicators (KPI) to monitor the status quo of the quality of the institution at a given point of time against explicit standards or benchmark. NIE has developed a complex KPI system at the institutional and AG level. It covers areas such as the qualifications of staff (e.g., number of PhD holders), number of publications in international refereed journals, number of funded projects, feedback received from international educators, external examiners, and alumni, and innovative practices in teacher education. At the individual level, every teaching staff is required to obtain students' written feedback on at least one of his/her courses per semester. The ratings on this student feedback are often used as one of the measures to determine the quality of the staff's teaching, whereas the written comments suggest areas for improvement. Quality assurance needs to find ways to combine KPI at these different levels to depict a meaningful image about the whole university.

## Processes

The processes used to achieve the KPI need to move beyond structure to address the dynamic and complex interactions of people, resources, and strategies. These processes are hard to define precisely but may include the following:

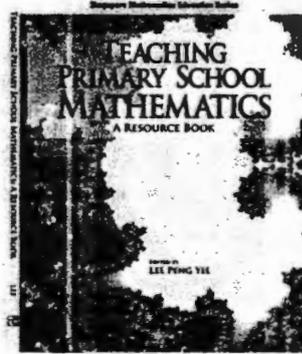
- Links to past practices; what aspects to change and what to retain or refine?
- Engage the individuals to “buy in” the new initiatives.
- Implementation strategies, e.g., top down, bottom up, or a hybrid?
- Monitor by using various forms of formal and informal feedback. “Critical” events need to be documented and attended to.
- Maintain the fidelity of the initiatives and look out for improvement.
- Repeat the cycle.

These processes require changing people’s minds about their beliefs and practices. Howard Gardner (2004) describes seven levers to do this: *reason, research, resonance, representational redescription, resources and rewards, real world events, and resistances*. These levers may work in tandem or in conflicts for a specific situation. Quality assurance processes that can take advantage of the positive effects of these levers will likely to be successful. For example, when staff at NIE understand that the educational landscape has changed in Singapore and globally (the *real world events* lever), they are more likely to consider making changes to how they might teach their courses. However, most processes take considerable amount of time and require modifications coordinated by different people to achieve the intended goals. Two examples will be briefly described below.

The first example continues with the “DNA” framework above. The Foundation Programme office, together with the AG, has produced enhanced versions of the Diploma, BA/BSc (Ed), PGDE (Primary), and PGDE (Secondary) teacher education programmes that attempt to satisfy the spirit of the framework. These programmes were first introduced with the July 2005 cohorts. One crucial factor for successful implementation is that lecturers from different AG and hence teaching different courses must understand what the lecturers from other AG are also teaching. The process to deal with this issue was to hold working sessions attended by lecturers from different AG to discuss plausible solutions, for example, how to enhance theory-practice link. A current activity is to deal with how different courses are being assessed, including the number and timing of assignments given to students, the weightage of different assessment components, linkage to the framework, and so on. The first step has been taken in March 2007, when each AG conducted its own Assessment Day to discuss its responses to these and other assessment issues. Then on 11 May 2007, a forum for all the AG will be held, hopefully to find better practices and to exploit new opportunities. These activities make use of the *reason* and *representational redescription* levers to bring about mind change. Eventually it is hoped that all the lecturers will develop *resonance* with the new framework.

The second example relates to exploiting opportunities to enhance staff publication. The issue is that MME has to teach mathematics methodology courses to large cohorts of several hundreds of trainee teachers in the PGDE (Secondary) programme. It is not easy, though desirable from the quality assurance perspective as well as arising from comments by the external examiner, that the seven or eight lecturers teaching these courses should achieve a high degree of consistency in content coverage and assessment requirements. The actual delivery, however, is harder to “standardise” because tertiary teachers should be encouraged to teach in ways that are professionally sound and personally most authentic. To address the issue of content coverage, several lecturers had joined force to produce a collection of notes and worksheets for the trainee teachers, and this collection was dubbed the *Green Book*. This remained so for about four years. Then a senior mathematician managed to exploit the opportunity by mobilising the lecturers to rewrite the notes and worksheets to a better quality and to add new chapters so that this collection of notes finally became a coherent book about how Singapore secondary mathematics teachers are trained. This was published in 2005 and an updated version will be released soon (Lee, 2007). This book has received good review and is used by a New Zealand university. In-service teachers also find good teaching ideas in the book. After this experiment has proved to be intellectually and financially successful, a similar book for trainee teachers in the primary education programmes was published (Lee, 2006), and books on mathematics content knowledge, use of ICT in mathematics teaching, and teaching of statistics are now in the preparation stage. This example illustrates how a quality assurance issue (consistency across lecturers teaching the same courses) has been transformed into an opportunity for publication, leading to the new *Singapore*

*Mathematics Education Series* by McGraw-Hill Education (Asia).<sup>6</sup> It would be appropriate to rephrase Naisbitt's recommendation cited at the beginning thus: *An education institution should provide the environment to turn problems of quality assurance to opportunities for innovations.*



**Question 4.** Do you know of other examples of turning problems of quality assurance to opportunities for innovations? What are the factors that can facilitate this turn-around?

### Concluding Remarks

NIE has morphed over the past fifty years from a local teacher training college to an internationally acclaimed teacher education institution. Strenuous attempts have been made over this relatively long period of time to enhance the quality of many aspects of the institution under local and global environments that shift constantly and unexpectedly. Currently, NIE is positioning itself to build on past achievements to develop strategic plans for the next five years to cope with the changing education landscapes, including: overseas universities setting up branch campuses in Singapore, trainee teachers with relatively weak or inadequate content knowledge, serving an international clientele, applying educational research to stimulate innovative practices, leading the use and research of ICT in teacher education and school pedagogy, and helping the Singapore Ministry of Education to upgrade all teachers to graduate level by 2015. Any measures taken to deal with these issues will invariably change the landscapes themselves, and this mutual interaction adds to the complexity of quality assurance. Indeed, the timing of these challenges cannot be predicted or controlled. But the reactions from each and every party concerned can be very significant indeed.

The above sections have provided only a few examples to illustrate the applicability of the conceptualisation of quality assurance in terms of structure and processes. Is this conceptualisation applicable to other tertiary institutions? This is best left to individual participants to reflect on.

**Question 5.** Any attempt at quality assurance is expensive, time consuming, and stressful. Do the outcomes of the exercise justify the enormous cost, with reference to what has happened at your university?

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<sup>6</sup> <http://www.mcgraw-hill.com.sg/html/titleDetail.jsp?isbn=9780071258555.html>

## New Model of Teacher Education in Korea and Its Quality Assessment: Case of KNUE

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Korea National University of Education (KNUE) was established in 1985 to educate teachers who will be the center of Korea's future in education. Its educators as a whole are carrying out their duties on their mission to guide and enhance Korean education.

As the background of the foundation of KNUE, this paper will outline briefly development of Korean society in the 20<sup>th</sup> century and will designate as two main propellers for the development, an educational desire of people and higher education in science/engineering and education areas where had launched from 1967 by Korean government.

Education is the most important factor to understand Korean Society. Korean parents has been willing to submit themselves to their children's education for a long time. In 1962, President Park made a plan of the first 5 years National Plan for Economy Development. The success of the plan needed huge numbers of scientists and engineers. He issued new policy to cultivate scientists and engineers and founded Korea Institute of Science and Technology in 1967, Korea Advanced Institute of Science in 1971 and Korea Educational Development Institute in 1973.

After his tragic death in 1979, President Jeon followed in the footsteps of President Park and founded Korea Advanced Institute of Science and Technology in 1984, Science Schools in 1983 and Korea National University of Education in 1985.

As a unique comprehensive university of teacher education, KNUE collectively prepares kindergarten, primary school, and secondary school teachers. It also provides continuous teacher education and conducts comprehensive educational research for which it has established a well-deserved reputation. In addition, with its concentration on education, it is a revolutionary university.

In 2005, large scale Quality Assessment was done to evaluate what KNUE had achieved for 20 years. The assessment used about 1000 persons of Professors, students, alumni and employers of KNUE alumni and surveyed five items: Curriculum, Students activities, Teaching activities, University Organization activities, University administration and finance. The results showed that KNUE had achieved very well but, it remains so many problems.

KNUE also faces new challenges never experienced in its history in aspects of the failure of the construction of new vision, students' evasion of science/engineering and education tracks, conversion of National university system to the corporate organization and falling behind of man power and facilities.