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# EDITOR'S NOTE

Welcome to this second edition of JIRSEA in 2009 and thank you to all contributors.

Indeed contributions to JIRSEA are coming in a steady fashion allowing the editors the pleasant task of bringing to you the readers a selected collection of articles that we think of high quality covering a number of aspects of Institutional Research.

Assuring Quality of higher education and tertiary institutions is the impetus of the paper by Nambiar et al. Indeed many papers have been written about quality in higher education and more are still expected given the proliferation of aspects in this area that continually multiply. Nambiar et al specifically covers the matter of Generic Narrative Grade Descriptors from their conceptualization to implementation.

Teay Shawyun expands the outlook on Quality Assurance in this edition by seeking some sort of convergence between the Internal Quality Assurance (IQA) and the External Quality Assurance (EQA). He shares with us his experiences from two distinctly different countries, Thailand and Saudi Arabia. Specifically he developed the *What* and *How* framework which includes a new methodology for institutions to prepare their IQA to approach the EQA.

Shah and Nair bring in the immediate output of higher education process by discussing the dynamism of feedbacks and what should be done and should be seen to be done to them. They advocate the feeding back of feedbacks to the stakeholders in order to improve quality overall and share their experiences at two universities in Australia.

Khasawneh et al have once again provided insights of quality in higher education in the Kingdom of Jordan. This time their paper is on *On-line Testing* of students in Hashemite University, Jordan and they found that there is an overwhelming support for such a method. This is of course encouraging given that almost every university that wishes to progress inevitably looks at ways and means of improving their teaching, learning and assessment methods. Extrapolating this will of course lead to quite a transformation in higher education assessments.

Capule and Valerio conclude this edition by taking us to the reality of mismatches between what employers expect of graduates and graduates' perceptions of what their employers want of them. Such mismatches of course point to the lack of quality awareness and perhaps consideration in assuring the *fitness for purpose* of the programs and courses of the higher education institution.

Happy reading,

Nirwan Idrus

Editor

# Generic Narrative Grade Descriptors for Quality Assurance in Tertiary Institutions: A Conceptualization Process

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## Abstract

This paper focuses on the issues involved in the process of conceptualizing generic narrative grade descriptors. Currently, tertiary institutions in Malaysia, like the University of Malaya, use a grading system which describes student performance in terms of marks which are equated to a letter grade that carries a grade point and only a brief descriptor such as *excellent* or *fail*. Clearly, this description does not give adequate information of the students' abilities to the students themselves or other stakeholders. The issues in conceptualizing these descriptors involve firstly, defining what generic narrative grades are; secondly, how to develop them especially when a 'top down' approach is not feasible as imposing a grade system on an already existing program is bound to be disruptive; thirdly, what methodology to adopt in the face of a relatively new research area, and finally who should make decisions regarding the manner of instituting the descriptors. This paper shows how the careful addressing of the different issues involved in the conceptualization of the study was necessary. The findings would serve as guidelines for developing generic narrative grade descriptors.

## Quality assurance and institutions of higher learning

With the current emphasis on globalization and the internationalization of education, institutions of higher education in developing countries like Malaysia are faced with real challenges to remain internationally competitive and, more importantly, relevant. Quality is not an option but is mandatory for any organization aspiring to be a market leader. Quality assurance and benchmarking are instruments by which the management monitors its performance, effectiveness and efficiency in all aspects of its core activities and to meet customers' needs. Simultaneously, it is imperative to formalize the promotion of accountability, transparency and ethical values in the governance of a university.

Quality assurance in Malaysian public universities is not a new phenomenon; tertiary institutions have always been practicing various measures, including the use of external examiners, as well as national and international peer evaluations of staff, to ensure the quality of their programs. However the rapid democratization of education within the country in the last two decades and the urgent need to be on par with other institutions of higher learning at the international level has necessitated a more formal and systematic approach towards quality assurance in tertiary institutions.

According to the Ministry of Education's Code of Practice for quality assurance in public universities, quality assurance consists of:

> *"…all those planned and systematic actions (policies, strategies, attitudes, procedures and activities) necessary to provide adequate confidence that quality is being maintained and enhanced and the products and services meet the specified quality standards* "(Ministry of Education, 2004:7).

Hence in the context of higher education, quality assurance is the "*totality of systems, resources and information devoted to maintaining and improving the quality and standards of teaching, scholarship and research as well as students' learning experience*" (Ministry of Education, 2004:7).

A clear indicator of the country's commitment to quality assurance is the setting up in 2001 of the Quality Assurance Division in the Ministry of Education as the national agent responsible for managing and coordinating the quality assurance system for public universities. The mission of this body is to promote confidence amongst the public that "the quality of provision and standards of awards in higher education are being safeguarded and enhanced" (Ministry of Education, 2004: 7). Some of the measures taken to promote public confidence is the regular conducting of "academic reviews to evaluate the performance of program outcomes, the quality of learning opportunities and the institutional capacity and management of standards and quality" (Ministry of Education, 2004:8). One area under the focus of academic review is the management of student assessment processes. Testing methods drive student learning and the results of the assessment is used as the basis for conferring degrees and qualifications. Hence, student assessment is a crucial aspect of quality assurance. It is thus imperative that methods of

assessment are clear and support the aims of the program. The Ministry requires institutions of higher learning to provide "formal feedback" to students on their performance "during the course in time for remediation if necessary" (Ministry of Education, 2004:50). One of the methods of this formal feedback is to provide and document student performance in terms of narrative evaluation.

Thus, in line with the Ministry of Higher Education's efforts to formalize quality assurance measures, the Faculty of Languages and Linguistics, University of Malaya, in 2006, embarked on a research project to investigate the feasibility of employing generic narrative grade descriptors (GNGD) for its undergraduate program. This paper is an outcome of the study. It discusses the issues involved in the process of conceptualizing these descriptors. While highlighting the benefits of employing GNGD to ensure quality in tertiary education, the researchers take into cognizance the notion that GNGD may only be a miniscule mechanism in the larger scenario of quality assurance.

## Benefits of generic narrative grade descriptors

Before examining the benefits that can be obtained from the use of generic narrative descriptors for grades, a look at the current system of grading in the local public universities is in order. Presently, the majority of tertiary institutions, including the University of Malaya, use a grading system which describes student performance in terms of marks which are equated to a letter grade. The grade carries a grade point and only a brief one or two-word descriptor such as *excellent*, *credit*, *pass*, *marginal pass* or *fail*. Implicit in the use of these descriptors is the notion that they are sufficient to convey all the qualities that are expected of specific grades. It is assumed that all qualities that are equated with that letter grade are universally understood without them being explicitly stated. Clearly, this description does not give adequate information of the students' performance and abilities to the students themselves or other stakeholders such as parents, fund providers and employers.

The benefits of employing a generic narrative grade description are manifold. In comparison to marks or single word descriptors, narrative descriptions provide more meaningful feedback for the stakeholders. Most teachers tend to return tests to students with a letter grade or a number score that merely show the number of right or wrong responses, giving absolutely no information of intrinsic interest to the student whatsoever (Brown, 1994). Brown states, "Grades and scores reduce a mountain of linguistic and cognitive performance data to an absurd minimum. At best they give a relative indication of a formulaic judgment of performance as compared to others in the class –which fosters competitive, not cooperative learning" (1994: 386). In other words, a more detailed evaluation of the student's performance will enhance beneficial washback, that is, the positive effect of testing on learning and teaching (Hughes, 2003).

Defining the numeric value of the grade in terms of knowledge, skills and performance also helps to establish employability. A case in point is the complaint to a local newspaper from a recruiter for a multinational company. He complained that although

only those who had scored an "A" in the Sijil Pelajaran Malaysia (Malaysian Certificate of Education) English language examination had been called for the interview, a mere 10%-15% were able to communicate fluently in English. The rest were stumbling and some could not even understand the questions (Rodrigues**,** 2006: N47). This complaint is a comment not only on the inconsistencies inherent in the "A" grade but also on the assessment processes. If the assessors had been provided with adequate narrative grade descriptors to assess the students, this inconsistency could have been reduced and potential employers would be able to gauge the value of an "A".

Other than contributing to aspects of feedback, there are other areas that closely tie a generic narrative grade (GNG) description to quality assurance. Narrative descriptions of grades facilitate institutional self-evaluation, fulfilling a condition clearly stated in the Code of Practice set out by the Ministry of Education (2004:5): "internal quality assessment is the responsibility of the university". Furthermore, transparency of criteria used (a prerequisite for GNGD) would promote public confidence as well as allow accreditation and review of programs by outside bodies. In addition, if a system of GNG description could be employed across the whole nation, it would not only allow for standardization but also facilitate credit transfers across universities.

## Conceptualizing GNGD

There is no doubt about the contribution of a GNG description to assuring quality in tertiary institutions; it is its feasibility that needs scrutiny. In our attempt to study whether a generic narrative description could be implemented across the undergraduate program, we had to first deal with a number of concerns. First we had to define GNGD; the next issue was one of how to develop GNGD. However before we could embark on that, we needed to review what other institutions, both local and international, had to offer in terms of GNGD. Having surveyed the literature, we were then in a better position to decide on the methodology to be adopted for the research. The final phase of our conceptualization was related to decision making - who should have a say regarding the manner of instituting the GNGD. Each of these concerns is addressed below in greater detail.

### Defining GNGD

The first issue that needed to be addressed was the definition of GNGD itself. In terms of conceptualizing generic narrative grade descriptors, two concepts – *generic* and *narrative* – had to be defined. While the former is implicit in our current grading system, the latter is not. The Cambridge International Dictionary of English (Proctor, 1995:587) defines "generic" as something that is "shared by, typical of or relating to a whole group of similar things rather than to any particular thing". Hence, a generic grade description would be one which is standard and nonspecific, one that encapsulates the common elements of a grade. The present grading system (e.g. A = 76-100 marks) applies to all courses; therefore, it is understood that an "A" in one course means the same "A" in another course. It can then be inferred that the grading system that is currently being used

is a generic one. However, although there is a one or two-word descriptor, there is no narrative description for each grade.

The concept of *narrative* is not as easy to define. It appears that a variety of terms – narrative evaluations, performance evaluations, rating scales, weighted rubric, performance bands and grade descriptors – have been used in the literature to describe an underlying construct. Brown (1994) considers *narrative evaluations* as feedback of test performance that goes beyond a score, a grade or a phrase. He feels the teacher should "respond to as many details throughout the test as time will permit", giving praise and constructive criticisms as well as giving "strategic hints on how a student might improve certain elements of performance" (p.386). A similar idea underlies the term *performance evaluation*. According to the University of California, Santa Cruz, (2006) performance evaluations, especially written ones, tend to "anchor a system that encourages students and instructors to get to know one another, that allows instructors to acknowledge and document the full range of student achievements, and that can provide much more information than do conventional transcripts". From these two descriptions, it can be assumed that they are referring to the same concept but by slightly different terms. What is more pertinent is that narrative or performance evaluations are meant as individual feedback for teacher-conducted classroom tests and more suited for small groups. They are more appropriate for formative assessment and not so practical for summative, standardized tests involving large numbers.

Hughes (2003) describes a *rating scale* in terms of the 'criterial levels of performance', that is, "the level(s) of performance for different levels of success" (p.61). What is meant is that the scale contains a series of ordered categories indicating different levels of ability. A similar concept is conveyed by the term *weighted rubric*, meaning the breaking down of a language skill like writing or speaking into categories and sub-categories and assigning a specific point value to each. When they come in the form of bands, they are known as *performance bands*. Rating scales/performance bands are often used as scoring guides by assessors, especially in the field of language testing. On the other hand, the term *grade descriptor* is very specific as it is linked to the grade. According to Greatorex (2001:451) grade descriptors "are the characteristics which are found in the performance of candidates at particular grades". A similar definition is available from the University College Dublin (UCD) website, which states that grade descriptors "show how a given level of performance will be reflected in a grade" (UCD Registrar's Office, University College Dublin, 2006).

Studying the definitions for all these terms, the existence of a central or underlying idea becomes evident. It can be inferred that rating scales/weighted rubrics which are used as scoring guides by teachers can be the basis for giving feedback to students or when the need for informing other stakeholders (for example, employers, parents and fund providers) about students' performance is required. In this case the rating scales function as performance bands. The rating scale takes on a slightly different role when it is used for the purpose of narrative or performance evaluation. It is then used to provide an individualized feedback of how a student has performed and it need not be tied up to a letter grade. On the other hand, a grade descriptor describes performance directly related

to the grade. Based on this analysis, we felt that our concept of "narrative grade descriptor" would be very similar to that of the grade descriptor. We conceived it as being generic in nature, providing a detailed description of the common elements of a grade which holds true for that specific grade across all courses in a particular program (in this case the undergraduate program at the Faculty). The GNGD has a function that is all encompassing in the sense that it serves as the scoring guide for assessors, the provider of detailed feedback for students and the descriptor of standards for the other stakeholders.

## A Survey of Narrative Grade Descriptors

In order to further understand the practice of adopting a narrative grade description, a literature search was conducted. Despite the fact that the Ministry of Higher Education has stipulated that narrative feedback should be provided to students as discussed above, an online survey of the websites of the 20 public universities in Malaysia showed that the majority do not provide grading schemes on their websites and the four that did, provided only one or two-word grade descriptors. An Internet search of some educational institutions revealed that grade descriptors were used in the United States of America schools systems as a means to give feedback to students (for instance, those of the Pennsylvania Department of Education, n.d.). As such, they are used with classroom-based formative assessments and targeted individual students. Reporting systems ranging from ticking in the boxes or spread sheets to computerized systems such as Taskstream's (n.d) Competency Assessment and Reporting Systems were available for producing profiles based on students' performance in the assessments. However, these were subject-specific.

At institutions of higher learning, grade descriptors have taken on other dimensions. It is a means of quality assurance. For instance, the University College Dublin has on its website a listing of grade descriptors approved by its Academic Council. Criteria for the six grades (A-G) awarded for the courses in this University are presented. These descriptors seem to cover both the cognitive and linguistic skills at two separate levels for each grade (a sample of grades A and B are provided in the Appendix). It is also interesting to note that parallels can be drawn between these descriptors and the descriptors given in the marking scheme of their programs (see http://www.ucd.ie/hispanic/marking_descriptors.htm). General descriptors for courses such as foreign language courses are also available.

The University of Sydney website features the grading system employed in each of its faculties. At the onset itself, the justification for this system is given so as to make students understand "… the way their work is assessed within the unit of the study and the broader policy framework within which their grades are distributed." (Department of Linguistics, University of Sydney, n.d.) Grade descriptors for the Linguistic Department from this University are presented at their website: (http//www.arts.usd.edu.au /departs/linguistics/undergrad/assessment.shtml).

Another relevant document that enabled us to appreciate the position of narrative grade descriptors, particularly within the framework of quality assurance, was the subject benchmark statement which is available from the Quality Assurance Agency for Higher Education (2001). It is stated here that "Subject benchmark statements provide a means for the academic community to describe the nature and characteristics of programs in a specific subject. They also represent general expectations about the standards for the award of qualifications at a given level and articulate the attributes and capabilities that those possessing such qualifications should be able to demonstrate" (ibid). It is the second part of this definition that sheds light on the relationships between subject benchmark statements and the narrative grade descriptors.

Within this framework, the benchmarking of academic standards for linguistics had been undertaken by a group of subject specialists drawn from and acting on behalf of the subject community. The membership listing at the end of this document reveals that they are representatives from well-established universities in the UK. Additionally, associations representing individuals with special interests in this area i.e. British Association for Applied Linguistics (BAAL), Linguistics Association of Great Britain (LAGB) and so on had also been consulted in drawing up the statement. The final document contains the following sections: *defining principles, subject skills and other skills, teaching-learning and assessment*. The last section is on *standards*.

Tan and Prosser (2004) in their phenomenographic study report on the different ways that academic staff understood and practised grade descriptors as forms of standards-based assessment. Four qualitatively different conceptions of grade descriptors were identified. Firstly, grade descriptors were described as *generic descriptors* as they depict achievement levels as descriptions of standards for generic purposes. Secondly, grade descriptors were understood as *grade distributors* as they focus on how students' work can be understood in terms of how they are distributed amongst different levels of achievement. Thirdly, grade descriptors were labeled as *grade indicators* since they indicate to staff and students what a piece of student's work might mean in terms of specific criteria. Finally, grade descriptors were labeled as *grade interpreters* since they are perceived as authentic bodies of intrinsic meaning as to what actual achievement levels are. In their study, Tan and Prosser (2004) seek to provide a basis for identifying and resolving different expectations for understanding and practising grade descriptors as well as clarifying the place of standards and criteria in assessment. Each of the conceptions is discussed in terms of providing a form of standards-based assessment. Suggestions for enhancing the use of grade descriptors as standards-based assessment are then made.

## Developing GNGD

Having obtained a relatively comprehensive understanding of how other tertiary institutions implement GNGD, the next step of our conceptualization process involved the issue of how to develop GNGD that would be applicable to our purpose. Only one study on the process of developing generic descriptors could be located. This was in the form of a research report that had been commissioned and funded by the National Asian

Languages and Studies in Australian Schools (NALSAS) Taskforce. Bringing together the experience of experts and information from students' test performance, this study proposes a model for developing "exit proficiency descriptors" for the Japanese language program which would be "grounded in actual student performance" (Scarino, Jenkins, Allen & Taguchi,1997:9). The attempt here is to "embody what the students are able to accomplish and show the degree depicting standards" (ibid). The study highlights two important issues in arriving at the descriptors, namely, the "level at which exit proficiency is pitched" and "the style of the descriptor" (ibid). It suggests that further development is "essential to create the necessary assessment resources, i.e. sample test tasks, test specifications, marking and reporting formats, and moderation procedures, which will be useful accompaniments to the descriptors" (ibid).

It needs to be emphasized that the focus of the NALSAS report was on the development of new courses and course material, which is contrary to the focus of our study which looks at developing a narrative grade descriptor system that will have to be imposed on the existing structure of courses that have already been offered at the Faculty for the last ten years. In other words, the NALSAS study took a "top-down" approach for instituting generic descriptors as theirs was a program yet to be implemented, but we preferred not to. While appreciating the contribution of the NALSAS model, we realised that we needed to take a different approach to the problem at hand. Imposing GNGD on an already existent program was bound to be disruptive and complicated. Furthermore, since our study was meant to be a feasibility study, we concluded that we should adopt a "bottom-up" approach, that is, examine the existing assessment system to see whether it could support a GNG description. In order to reflect this approach, our first research question was formulated as:

- What are the elements in the current assessment system at the Faculty of Languages and Linguistics that affect the possibility of deriving a GNG description?

Underlying this question was the belief that if the findings showed there existed enough common elements or patterns in the assessment practices currently employed, these could form the basis for deriving narrative descriptors for the grades. In other words, we wanted to know whether there existed a standardized approach to assessment for all the courses offered in the undergraduate program and whether there were sufficient commonalities in it on which a generic narrative description could be anchored. We were cognizant of the fact that the assessment practices which include the grading scheme, vetting and moderation procedures, marking formats, etc. could also be affected by the program structure such as the different categories of courses, course pre-requisites, and contact hours, to name a few. Hence all of these would have to be examined for commonalities which could then form the bases for our GNGD.

As part of our bottom up approach, we also recognized that we should tap into the perceptions of the instructors teaching the different courses as to what they believe is implicitly stated when they assign grades to students. Thus the second research question of our study was conceived as:

- How do the perceptions of assessors regarding the meaning of a particular grade (for instance, grade A) affect the possibility of arriving at a generic narrative grade description?

If the majority of the assessors had a common perception of what a particular grade meant or embodied, then it would be possible to use that commonality as a basis for deriving GNGD. On the other hand, if there were variations in responses, what would that entail? This was an issue that needed careful reflection. Initially, in order to elicit assessors' perceptions of what a grade meant to them, the idea was to get the respondents to choose from a list of characteristics or descriptors of the grade prepared by the researchers. Such a list would have made the task of analyzing the responses easier as the data would have been more quantifiable. More important, the list, being a carefully thought-out product would have incorporated most of the significant characteristics of the grade as perceived by the researchers. However this idea was rejected in favour of an open-ended questionnaire requiring respondents to state in their own words their perceptions of what the grade embodied. This was done to capture the authentic thoughts of the assessors which may have been influenced if a list prepared by the researchers had been provided. Having made that decision, the researchers had to be prepared for the variability that was bound to occur in the responses due to the apparent 'creativity' of each respondent. In other words, due to the qualitative nature of the data, variations were bound to occur. The challenge for us was to determine whether these variations were only at the surface level, i.e. they were differences in expressions of the same ideas or whether the differences were truly reflections of variations in assessors' beliefs and practices. If it was the latter, then the notion of a generic descriptor would be hard to arrive at. In other words, the bottom-up approach for deriving a GNG description would not be feasible.

## Methodology

In line with our objectives and the particular approach that we had decided upon, our study adopted an "emergent design" (Denscombe, 1998:217) where conceptualization occurs simultaneously with data collection and preliminary analysis. A number of instruments such as questionnaires, interviews, analyses of students' results and inspections of documents were employed to gather data.

We started off with an exploratory study of the different courses offered for the undergraduate program via inspection of documents (such as the faculty handbook) which then led to a questionnaire administered to the total population to find out which courses were being offered by which instructor. The information gathered from the faculty documents and the findings from the first questionnaire resulted in the design of the second questionnaire. The purpose of the second questionnaire was to gather information about the courses taught, the evaluation process used by the assessors of those courses, the criteria used by assessors to arrive at grades and assessors' perceptions about narrative grades. Analysis showed that more data was required on assessor's perceptions about narrative grade descriptors such as what would characterize an 'A' student, resulting in the need for another instrument – the third questionnaire. This

questionnaire adopted open-ended items in order to elicit respondents' authentic perceptions of what a grade meant to them. For purposes of triangulation, interviews were conducted with teaching staff regarding assessment procedures.

In the context of this study, the data collected from the first two questionnaires represented factual data about the prevailing situation in the undergraduate program. The data from the third questionnaire comprised assessor perceptions about an 'A' student across all courses in the program. The responses were subjective in nature and there was a need for the data to be scrutinized carefully to determine the extent of commonality and/or variability in the assessor's perceptions of the 'A' grade. Categorization of the data was done according to the three different course types and the language of response (i.e. English and Malay). Frequency lists were generated using Wordsmith Tools version 3.0 (1999). Concordance patterns were drawn for frequently occurring words which indicated concepts relating to 'A' students. The 10 most frequently occurring words that indicated overlapping concepts were placed in clusters and word clusters that were conceptually related were placed according to concept categories. A total of 12 word clusters were placed in 7 concept categories according to each course type in the program. This approach to data organization enabled the identification of criterial features in terms of ability, performance and personal attributes that would be used as input for drawing up a GNGD.

**Decision makers**

The final issue that needed to be addressed was who should make the decision regarding how to institute a GNG description. As observed in the case of The Quality Assurance Agency for Higher Education (2001) mentioned earlier, a number of people from different backgrounds had been involved in benchmarking - subject specialists, individuals as well as representatives from well-established universities in the UK. This composition of people reflects the extent benchmarking and quality assurance is given prominence in the UK. In our case, the management had taken the first step by appointing a team of academics to research on the feasibility of introducing GNGD for the undergraduate program. Although we realize that ideally all stakeholders such as students, parents, fund providers and employers should also be involved in this process, time limitations and other practical constraints did not allow us this privilege. However we were able to tap into the perceptions of the course assessors (see section 3.3) as we believed they should have a say in how GNGD should be developed since they are the course designers as well as instructors.

## Summary of Findings

The careful addressing of the different issues involved in the conceptualization of the GNGD helped to ensure that the findings of the study were valid. The findings with reference to the first research question showed commonalities in a number of the current assessment practices such as the university grading scheme and a common structure of assessment at the faculty level which involved uniform apportionment of marks, systematic vetting and moderation procedures on which the GNGD could be anchored.

However, there were also other factors like the varied structure of certain courses of the undergraduate program which necessitate further standardization or restructuring before a generic narrative description could be drawn up and implemented. Where the second research question was concerned, the findings reveal a recurrence of certain salient characteristics in the assessors' perceptions of what constitute a grade. It was found that a grade:

- is a measure of students' ability to perform
- is a measure of observable performance
- is an indication of possession of skills and knowledge
- accounts for students' attributes such as intellectual skills, motivation and leadership qualities
- allows for caveats (even 'A' students are given leeway for minor errors)
- must be contextualized (within the context of a particular course or program).

These salient characteristics suggest three basic criterial features that could be used to draw up a GNG description for the undergraduate program, The criterial features for any GNG description for the Faculty should include in its description a *measure of student abilities to perform*, *observable performance of these abilities* and *personal attributes of the student*.

## Conclusion

The process of conceptualizing a generic narrative grade description for a tertiary program unfolded its multi-faceted nature. Not only are standardized assessment practices vital for the development of a GNGD, but teacher perspectives of grades are as important. The next step would be the realization of such a GNG description based on the three criterial features which emerged from this study. In the course of conceptualizing a GNG description, institutional self-evaluation was facilitated, fulfilling one of the conditions for ensuring internal quality assurance. In addition, awareness was created among academia of the crucial role of a generic narrative grade description in tertiary institutions.

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## APPENDIX

### Sample Grade Descriptors

Grade descriptors allow module coordinators to set out in advance how a given level of performance will be reflected in a grade. They act as guidelines for student & coordinator. Here are some examples:

| Grade | Criteria more relevant to levels 0, 1 and 2- Knowledge, understanding, application | Additional criteria more relevant to levels 3, 4, and 5 – Analysis, synthesis, evaluation |
|---|---|---|
| A | **Excellent** A comprehensive, highly-structured, focused and concise response to the assessment task, consistently demonstrating:<br>▪ an extensive and detailed knowledge of the subject matter<br>▪ a highly-developed ability to apply this knowledge to the task set<br>▪ evidence of extensive background reading<br>▪ clear, fluent, stimulating and original expression<br>▪ excellent presentation (spelling, grammar, graphical) with minimal or no presentation errors | A deep and systematic engagement with the assessment task, with consistently impressive demonstration of a comprehensive mastery of the subject matter, reflecting:<br>▪ a deep and broad knowledge and critical insight as well as extensive reading;<br>▪ a critical and comprehensive appreciation of the relevant literature or theoretical, technical or professional framework<br>▪ an exceptional ability to organise, analyse and present arguments fluently and lucidly with a high level of critical analysis, amply supported by evidence, citation or quotation;<br>▪ a highly-developed capacity for original, creative and logical thinking. |
| B | **Very Good** A thorough and well-organised response to the assessment task, demonstrating:<br>▪ a broad knowledge of the subject matter<br>▪ considerable strength in applying that knowledge to the task set<br>▪ evidence of substantial background reading<br>▪ clear and fluent expression<br>▪ quality presentation with few presentation errors | A substantial engagement with the assessment task, demonstrating:<br>▪ a thorough familiarity with the relevant literature or theoretical, technical or professional framework<br>▪ well-developed capacity to analyse issues, organise material, present arguments clearly and cogently well supported by evidence, citation or quotation;<br>▪ some original insights and capacity for creative and logical thinking. |

From: UCD Registrar's Office, University College Dublin. 2006. *Sample Grade Descriptors*. Retrieved 09/07/07, from http://www.ucd.ie/regist/modularisation_and_semesterisation/images/gradedescriptors.pdf

# Strategic Balancing of the IQA = EQA Equation

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**Abstract**

***Accreditation*** has become the buzz word of the 21st Century. This created dilemma for the HEI (Higher Education Institutes) as to "what to" and "how to" respond to the imperatives and implications of Accreditation in order to address the requirements of the EQA (External Quality Assurance) by the IQA (Internal Quality Assurance). To develop the IQA = EQA equation, the researcher proposes a two-tier approach, the "What" and the "How" of the challenge. In this equation and challenge, the HEI represents the IQA and Accreditation, the EQA.

The "What" and "How" framework will explore the requirements of the "What" aspects of the IQA and EQA equation. The "How" aims at proposing alternative methodology the HEI can use to develop its IQA to "balance" the EQA. The "What" aspects will tackle the Standards, Criteria or KPI (Key Performance Indicators), and the audit and assessment methodology as required by the EQA part of the equation.

In developing the IQA of an institution, the basic statutory National Accreditation Standards must be met. This paper traced the development of the quality systems at King Saud University of Saudi Arabia and Assumption University of Thailand to show how they met and exceeded the respective country's national accreditation standards. Based on the 4 "As" of quality, the solid foundation that IQA is built upon are "Audit and Assessment leads to Assurance and later Accreditation".

**Key words:** IQA, EQA, Accreditation Standards, Criteria and KPI requirements,

## Introduction

In the fast moving dynamic changes (Brand, 1993, p. 7) and pace of development in the education arena, all HEI (Higher Education Institutions, note that in this paper, all academic institutions or universities are classified as HEI) are trying to outdo each other and get a bigger piece of the local, international and global education market (Currie and Newsom, 1998; Scott, 1998). With many players offering more programs to different target markets based on purchasing power, the education industry has become too commercialized affecting the quality of education due to declining resources and more competitive market players (Brand, 1993; Zemsky, Massy, & Oedel, 1993) and a vicious cycle of papers chasing. A key tool in the vast arrays of its armaments to compete and to be competitive is the quality mechanism that is subsumed to "assure the quality of the educational products and services offerings". This quality assurance also needs certification in the form of accreditation by an external agency that can affect its target marketing meeting market expectations and academic ranking. In finding a balance between academic excellence and market expectations, Trout (1997a), said "*In the marketplace, consumerism implies that the desires of the customer reign supreme . . . and that the customer should be easily satisfied. . . . When this . . . model is applied to higher education, however, it not only distorts the teacher/student mentoring relationship but renders meaningless such traditional notions as hard work, responsibility, and standards of excellence*". In this dilemma, three of the main challenges identified as basic issues that should be addressed in pursuing excellence in higher education are (Ruben, 2003):

- Increasing our understanding of the needs of workplaces
- Becoming more effective learning organizations
- Integrating assessment, planning, and improvement

In pursuing education excellence, accreditation has become the buzz word of the 21st Century. This has brought upon a big dilemma to the HEI not only in the Kingdom of Saudi Arabia but to the Middle East countries and also the developing nations that have just embarked on the Quality Education path and journey, The main question in mind is to find answers to "what to" and "how to" respond to the imperatives and implications of Accreditation. Practically, every HEI tries to find the panacea or the holy grail of Quality Assurance. It is posited that the search should begin with an understanding of the Accreditation aspects that forms the EQA (External Quality Assurance) part of the EQA = IQA Equation. In this equation and challenge, the HEI represents the IQA (Internal Quality Assurance). The key question is "what to and how to" address the requirements of the EQA by the IQA. To address the IQA = EQA equation, this paper proposes a two-tier approach, the "What" and "How" of the challenge.

Part 1 of the paper is aimed at "***Balancing the IQA = EQA Equation: Determining the EQA requirements*****"** which deals with the "What" that will explore the requirements of the "What" aspects of the IQA and EQA equation. The "How" proposes the methodology the HEI uses to develop its IQA to "balance" the EQA. The "What" aspects will tackle the Standards, Criteria or KPI, and the audit and assessment methodology as required by the EQA. It is proposed that the "What" of existing accreditation frameworks across

different countries and continents do not differ as to its fundamentals and principles. On the contrary, there are more similarities in the fundamentals or principles through which the Standards, Criteria or KPI are created that are based on the same platform. It is proposed that the generic strands leading to quality education "fit for purpose", revolves around key areas of teaching – learning – research, student – centric and learning outcomes focus, stakeholders, communities and social service centric focus, learning facilities and resources support, strategic and tactical mission, goals and objectives centricity, human and organizational resources development and information and metrics centricity. This represents the EQA "What to" part of the IQA = EQA equation. This EQA platform is aimed at certifying the "fit for purpose" of quality in the IQA based on a set of similar standards, criteria or KPI.

Part 2 of the paper is aimed at "***Balancing the IQA and EQA Equation: Developing the IQA requirements*****"** addresses the focus of the "How to" of the IQA of the HEI. In developing the IQA of one's institution, one must meet the basic statutory National Accreditation Standards. In developing the IQA of the HEI, it is proposed that the HEI go beyond the National Accreditation Agency's requirements. Based on the 4 "As" of quality, the solid foundation IQA is built upon are "Audit and Assessment leads to Assurance and later Accreditation" (certification of "fit for purpose").

In a nutshell, the paper's aims are as follows:

- To determine the constituents of the existing accreditations frameworks, collectively called the EQA approaches, standards and criteria. It is aimed at providing an overall synopsis of Quality basic requirements in relation to EQA Standards and Criteria, their assessment mechanism capped with the summary basic similarities of the QA principles from a diverse perspective in terms of their principles, standards and criteria.

- To concentrate on a hands on pragmatic approach that the HEI can take or use in developing their own IQA system that will deal in-depth with the details of the IQA frameworks or approaches that the HEI can use in terms of its Standards, Criteria, Items that are the Process-based Values criterion and KPI (Key Performance Indicators) that are the Results-based Values criterion. It also discusses the organization of the IQA in the HEI in the development of its self-study and assessment through a Scaled Scoring Performance Guidelines of its Process-based Value and Results-based Values performance assessment.

## Part 1 Balancing the IQA = EQA Equation: Determining the EQA requirements

"*QUALITY*" is an ever elusive and evolving, omnipotent and ubiquitous powerful business mechanism that has been used and manipulated by organizations to convince consumers that its product and service offers has achieved a level of acceptance based on

certain standards and criteria. Even the education industry has not escaped from this quality syndrome and all HEIs are bent on having their educational products and services achieve a certain level of acceptable standards and criteria that finally leads to its being certified "fit for purpose". The key question is "what is quality in education?" Experts and exponents have searched and researched high and low for a definitive definition that constitutes "quality education".

Vroeijenstijn (1991) said "it is a waste of time to define quality" as it is a relative concept, but does this mean that we do not action on Quality? Rather than trying to define "quality education", one can start with the HEI's purpose or mission underpinning national and social development through skilled manpower through 2 activities and actions on these key activities which are:

- Producing competent and qualified graduates to meet the organizational needs in all sectors

- Pushing forward the frontier of knowledge via research

This would mean that one would need to understand the context of the HEI's mission which represents its "reason for existence" or its very purpose of the HEIs'. What the HEI does or sell must "fit for purpose" (Teay, 2007). This inevitably means that Quality in education is implicitly and explicitly about:

- The outputs and outcomes of education which is of use that is fit for some purpose
- The stakeholders of "the provider" and "the user" of education
- The move forward towards improvements or innovations in education
- The actions and activities in doing something in education effectively and efficiently.

Since the late 80's and into the 1990's Quality in Higher Education and key literature in Quality in Higher Education (ENQA – European Association for Quality Assurance in Higher Education, 2005; Greene, 1994; Teay, 2005, 2006 and 2007) has reiterated that Quality in Higher Education had been, is and will always be about and actioned through:

- ✓ Traditional quality definition of benchmarking to the best. This might not be within the same context or content. As such, benchmarking to the best in an appropriate way based on the internal and external context.
- ✓ Conformance to Specifications or Standards which is static in nature as the criteria used to set the standard is unclear and that they are easily measurable and quantifiable which is not the case in higher education. Under such a situation, Conformance and Compliance to Specifications or Standards normally use proxy measures and assessment methodologies for the subjective quality educational performance measure qualitatively and quantitatively.

- ✓ Fit for Purpose – emphasis on specifications based on the "mission or reason for the existence" of the HEI that is developmental as it recognizes that their purpose might change over time thus requiring a revaluation of appropriateness of the specifications.
- ✓ Quality as effectiveness in achieving institutional mission and goals.
- ✓ Quality as meeting customers' stated or implied needs.

To meet the basic principles of HEI and its quality requirements as noted above, key education standards and criteria worldwide that has a valid accreditation process must effectively address the quality of the institution or program in the following areas:

- ✓ Success with respect to student achievement in relation to the institution's mission, including, as appropriate, consideration of course completion, State licensing examination, and job placement rates.
- ✓ Curricula.
- ✓ Faculty.
- ✓ Facilities, equipment, and supplies.
- ✓ Fiscal and administrative capacity as appropriate to the specified scale of operations.
- ✓ Student support services.
- ✓ Recruiting and admissions practices, academic calendars, catalogs, publications, grading, and advertising.
- ✓ Measures of program length and the objectives of the degrees or credentials offered.
- ✓ Record of student complaints received by, or available to, the agency.
- ✓ Record of compliance with the institution's program responsibilities, the results of financial or compliance audits, program reviews, and any other information pertaining to quality assurance

Fundamentally, five standards of quality assurance, that any education institution must address (Schray, 2006) are that it:

1. Advances academic quality;
2. Demonstrates accountability;
3. Encourages purposeful change and needed improvement;
4. Employs appropriate and fair procedures in decision-making; and
5. Continually reassesses accreditation practices.

**Table 1: The 4 'A"s of Quality and Accreditation**

| **EQA = IQA** | |
|---|---|
| | ***QUALITY*** **=** ***AUDIT*** **+** ***ASSESSMENT*** **+** ***ASSURANCE*** |
| ***ACCREDITATION***= Certification of "Fitness of Purpose" | ***AUDIT*** **=** Ensuring that the system and documentation are developed and in place and in conformance and compliance with Standards and Criteria |
| | ***ASSESSMENT*** **=** Ensuring that the system is performing or determining the level of performance based on the Standards and Criteria |
| | ***ASSURANCE*** **=** Ensuring that performance is developmental bringing about improvements and innovations |
| **ACCREDITATION "twinned concept" QUALITY** | |

In this paper, it is posited that to offer quality education products and services, one must balance the IQA and EQA equation. As noted in Table 1, EQA is the highly touted accreditation and the IQA is a composite set of audit, assessment and assurance that leads to accreditation in what one can term it as the 4 "A"s of Quality. Quality as represented by the IQA and accreditation as represented by the EQA are inseparable as a Siamese Twin, leading to the "twinned concept" of quality and accreditation. An issue is that many people believe that audit and assessment and the assurance of quality in education are subjective (Callan, Doyle, and Finney, 2001). These lead to questions:

- How can we assess the quality of education offered by a college or university? , and
- How can we know reliably whether or when learning is taking place?

Bennet (2001 and 2008) has researched into some of the valid assessment mechanisms that can be summarized as:

1. **Value Adding** that calls for the determination of what is improved about students' capabilities or knowledge as a consequence of their education. In measuring the value addition, value requires the assessments of students' development or attainments as they begin college, and assessments of those same students after they have had the full benefit of their education at the college. Basically, Value added is the difference between their attainments when they have completed their

education and what they had already attained by the time they began. Value added is the difference a college makes in their education. The constituents of value are in the Dimensions of Value Addition which is *Customer Value in Education (CV) = {Product Quality (PQ), Service Quality (SQ), Image (I), Relationships (R)} / Cost (C)* (Gale, 1994)

2. **Outcomes** that evaluate the students at graduation (or shortly after) on the skills and capabilities they have acquired or the recognition they gain in further competition. In addition, the evaluation of the Input (I), Processes (P), Outputs (O) leading to the OUTCOMES is the imperative.

3. **Expert Assessment** that gives impartial and independent opinions of experts and their views on the performance assessment.

4. **Self–Study** by asking stakeholders and is based on the stakeholders' assessment.

5. **Ask the students.** The intent is to measure whether students are educated through processes that research has shown do in fact add value to students' attainments.

The end sum game of assessment in Quality Education is Performance, Performance and Performance. Ultimately in the assessment that affects Quality Assurance in Higher Education, there are three major changes in the current environment that had affected the quality drive: 1) Growing demand for increased accountability – as over commercialization has downplayed the importance of accountability to the students, stakeholders and society; 2) Reduced funding and rising costs and pressures to find more cost-effective solutions in every aspect of higher education that had short-circuited the quality and value of a holistic approach of quality education products and services. 3) Changing structure and delivery of higher education including new types of educational institutions and the increasing use of distance learning that allows institutions to operate on a national and global scale. This meant that easier and more access to better education without a strong and quality set of infrastructure to deliver, that normally leads to the educational product offer being offered first and then only developing and setting up the QA system to assess and assure the presumed quality education, is a "too little and too late" in most instances.

The above fundamental QA principles, assessment methodology and major changes have identified three major sets of questions and issues that all HEIs should and must address through its IQA. They are:

- **Assuring Performance** – How can the IQA system be held more accountable for assuring performance, including student-learning outcomes, in the institutions and programs?
- **Open Standards and Processes** – How can IQA standards and processes be changed to be more open to and supportive of innovation and diversity in higher education

- **Consistency and Transparency** – How can IQA standards and processes be made more consistent to support greater transparency and greater opportunities for credit transfer between accredited institutions?

## Part 2 Balancing the IQA and EQA Equation: Developing the IQA requirements

### Case Studies of AU and KSU in addressing IQA

Cases from Assumption University (AU) of Thailand and King Saud University (KSU) of the Kingdom of Saudi Arabia (KSA) are used as case studies of the "How to" approach to address the IQA part of the IQA = EQA equation. These two cases differed in that Thailand started with the definition of the Standards and KPI for IQA first and will move onto accreditation in the year 2012, while KSA started with the EQA Accreditation's definition of the standards and criteria.

In either case, the HEIs are left with the question of "how to" set up their IQAs to address their own IQAs as well as to address the EQA requirements.

The following case studies illustrate the ordeal alluded to above. They represent two extremes that posed challenges to the researcher who had to develop and set up the QA systems.

### Case Study 1: Assumption University (AU)

### 1.1 The AU and Thailand QA Scenario and Dilemma

The nine years of QA in Thailand between 1999 and 2008 were tumultuous for all HEIs in the country. This is the period when they embarked on the never ending journey towards the holy grail of "education excellence" as the hall mark and beacon of achieving better quality education for students.

The QA movement started with the identification of the CHE's (Commission on Higher Education) initial 9 sets KPI in 2000 and the introduction of the ONESQA's (Office of National Educations Standards and Quality Assessment) 7 standards in 2006 (ONEC 1999 and ONESQA 2006). In May 2007 represented the year whereby the CHE developed its 44 sets of sub-KPIs. The year 2007 also represented the year when the Baldrige National Quality Program issued its 2007 Education Criteria for Performance Excellence.

In 2007 the CHE also produced its 15-Year Plan (2008 – 2022). Regrettably it was not aligned with that of ONESQAs which created further strive for the HEIs in setting up their own IQAs. The emphasis was on measurements rather than a holistic approach towards a well-planned management of the whole university systems. These changes highlighted the discrepancies between planning and assessment based on data and evidence.

As a result, this instigated the evolution of an internal system that advocates the triangulation of planning-information-quality being managed holistically rather than independently (Teay, 2008). The emphasis on "management through measurement" highlighted the "chicken-egg" issue of what comes first. Sadly, the practice has been measurement first. This created the problem of mismatch between planning and measurements. In reality, management should precede measurement.

## 1.2 The AU Approach in addressing the IQA part of the EQA requirements

As AU aims for the Thailand Quality Class (TQC) and Thailand Quality Award (TQA) in the coming years, AU's existing QA system in use for 5 years between 2003 and 2007 was completely overhauled and revamped. Based initially on an adapted version of the MBNQA 7 Criteria and integrated into the CHE 9 guiding KPIs, the system is now tuned towards a higher level of challenge and a higher level of performance.

As all the 3 sets of performance criteria from 3 different systems (CHE, ONESQA and MBNQA) were different, it was a Herculean task to integrate them into AU's own unique system without losing the basic criteria, KPI and essence of all the 3 systems. In order not to lose the essence, the basic instruments were adapted with minimal changes from all the 3 systems to reflect and represent the internal requirements of AU's.

The result is the AUQS 2000 QMIPS (QMS) (Teay, 2007) that was launched as the standard and beacon and AU's QA standard bearer to support AU performance measurement and management. This QMS retains a non-prescriptive approach as the ultimate definition of the systems and mechanisms. The tools and techniques to be used for the school performance is the sole jurisdiction of the school. The National and AU QMS framework form the minimum requirement standard. This QMS became the heart and soul of AU's strive and never ending journey towards continuous quality improvement.

The MBNQA description for each of the Standards were used in the case of the Process-based Value criterion (Table 2.1) while the CHE and ONESQA KPIs plus a new assessment methodology developed by the researcher were used for the Results-based criterion (Table 2.2) This resulted in a larger number of 132 sets of KPI to be assessed. The assessment follows a modified version of the MBNQA ADLI (Approach, Deployment, Learning, Integration) and LeTCI (Level, Trend, Comparison, Integration) as discussed in the second case study below.

In conclusion, the IQA was derived and developed based on an internationally accepted MBNQA model as only the KPI were identified by the CHE and ONESQA. This approach was nationally recognized by being awarded an IQA Award by the Commission on Higher Education in 2009.

## Table 2.1 Standards and Scoring for Process Based Value Criteria

| KPI | Indicators | Scoring Criteria | Standard Criteria | Point Values | Score | Percent 0-100 % | Dev | Effective | Score |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **Vision Mission & Strategic plans** | | | **80.00** | **62.53** | **78.17** | **1** | **1** | **3** |
| 1.1 | ***Vision & Mission*** | | | **20.00** | **8.93** | **44.67** | | | |
| 1.1.1 | Faculty Vision & Mission are in line with AU vision and mission | | Faculty vision and mission are used as guidelines for faculty development planning | 6.67 | 1.20 | 30.00 | 0 | 0 | 1 |
| 1.1.2 | Faculty member participated in confirming the faculty vision and mission. | | A review committee is set up, having an annual review system in place | 6.67 | 3.87 | 30.00 | 1 | 1 | 1 |
| 1.1.3 | Faculty members, Staff, and students are aware of and understand the faculty vision and mission. | | Training and communication of vision and mission are carried out every semester to foster the awareness | 6.67 | 3.87 | 30.00 | 1 | 1 | 1 |
| 1.2 | ***Strategic Plans*** | | | **40.00** | **40.00** | **100.00** | | | |
| 1.2.1 | There is a planning system for one-year and five-year plans | | | **8.00** | **8.00** | **100.00** | | | |
| | | | The plans are in line with the faculty's vision and mission, and all plans implementations achieve the set objectives. | 4.00 | 4.00 | 100.00 | 1 | 1 | 3 |
| | | | Strategic objectives are balanced, and meet the requirements of learners and of other stakeholders. | 4.00 | 4.00 | 100.00 | 1 | 1 | 3 |
| 1.2.2 | There is a systematic process for the strategic plan analysis and evaluation system | | | **8.00** | **8.00** | **100.00** | | | |
| | | | The strategy development process is clearly defined and documented. | 2.67 | 2.67 | 100.00 | 1 | 1 | 3 |
| | | | The process of analysis and strategy making is reviewed during and after each plan implementation. | 2.67 | 2.67 | 100.00 | 1 | 1 | 3 |
| | | | The analysis could indicate the achievement level of each objective of the implemented plan. | 2.67 | 2.67 | 100.00 | 1 | 1 | 3 |

**Table 2.2: Integrated KPI of CHE and ONESQA and performance assessment of Results-based Value Criterion**

| KPI | Indicators | Scoring Criteria | Standard Criteria | Point Values | Score | Percent 0-100 % | Dev | Effective | Score |
|---|---|---|---|---|---|---|---|---|---|
| 2.6 | Number of full-time equivalent students in proportion to the total number of full-time lecturers (percentage as deviated from the standard) (C 2.4 and O 6.2) | | Number of full-time equivalent students in proportion to the total number of full-time lecturers. | **7.50** | **7.50** | **100.00** | 1 | 1 | 3 |
| | | ≥+10% or ≤ -10% of the standard | | | | 0.00 | | | |
| | | 6-9.99 % or - 6 - (9.99) % the standard | | | | | | | |
| | | (-5.99 )-5.99 % of the standard | | | | | | | |
| 2.7 | The proportion of the full-time lecturers holding bachelor, master, and doctoral degree or equivalent to the total number of fulltime lecturers. (C 2.5) | | The proportion of the full-time lecturers holding bachelor, master, and doctoral degree or equivalent to the total number of fulltime lecturers. | **7.00** | **7.00** | **100.00** | 1 | 1 | 3 |
| | | 1 | Doctoral degree among 1-19 % **or** doctoral degree among 20-29% **but** Bachelor degree more than 5% | | | | | | |
| | | 2 | 1. Doctoral degree among 20-29% and<br>2. Bachelor degree equal to or less than 5%<br>**Or**<br>1. Doctoral degree more than or equal to 30% and<br>Bachelor degree more than 5% | | | | | | |
| | | 3 | Doctoral degree more than or equal to 30% and | | | Y | | | |

## Case Study 2: King Saud University (KSU)

### 2.1 The KSU dilemma

The Kingdom of Saudi Arabia and King Saud University (KSU)'s QA dilemma arose when the NCAAA published its 11 Accreditation standards carrying hundreds of criteria in 2003.

The mind boggling criteria were reaffirmed in 2008 when the NCAAA requested the HEI to go for accreditation. The chicken and egg dilemma surfaced when the HEI embarked on a journey towards accreditation without fully realizing that the foundation for successful accreditation was a strong and robust IQA. The situation left the HEI wondering "what and how" to address the EQA requirements.

### 2.2 The KSU options for an IQA

In addressing this IQA issue, KSU has a choice of 1) full adoption of the EQA requirements without any changes, 2) creating a completely new IQA system not based on the EQA requirements but that can fulfill the requirements, and 3) adoption of the EQA standards but setting up its own internal approach within the local and international context.

### 2.3 The KSU's choice

Early in January 2009, the KSU QA Committee settled on option 3. The rationale for this is that:

- the adoption of the NCAAA standard without any changes will minimize the impacts of the existing KSU – QMS IQA standards and criteria (Teay, 2009).
- The adoption of an internationally accepted organizational performance assessment methodology, MBNQA (NIST, 2007 and 2009) will use the ADLI for its process based criteria and LeTCI for its results based criteria assessment.

In not reinventing the wheel and in conformance and compliance to the EQA equation, KSU applied the National Accreditation Agencies Standards and Criteria as the blueprint of its IQA Standards and Criteria. The rationale was that if a different set of Standards and Criteria were used for the IQA system, it would complicate, confuse particularly new users and compromise the IQA system, By adhering to its simplicity and sophisticated philosophy, KSU maintained the basic standards and criteria by combining the NCAAA institution and program standards and criteria into a generic simplified and standardized set applicable to the institution, colleges, programs or administrative units so that the institution's, schools' and programs' Standards and Criteria are aligned internally and externally (Table 3). This identifies three specific requirements at the Standard, Criteria and Item levels.

## Table 3: KSU Standard, Criteria and Item requirement

| KSU – QMS Standards, Criteria and Items | Explanations |
|---|---|
| ○ Standard 1: Mission and Objectives | STANDARD Requirement |
| 1.1 Appropriateness of the Mission | 1.1 CRITERIA Requirement |
| 1.1.1 The mission for the school and program should be consistent with the mission of the institution, and the institution's mission with the establishment charter of the institution. | 1.1.1 ITEM details Requirement |
| 1.1.2 The mission should establish directions for the development of the institution, schools or programs that are appropriate for the institution, schools or programs of its type and be relevant to and serve the needs of students and communities in. | 1.1.2 ITEM details Requirement |
| 1.1.3 The mission should be consistent with Islamic beliefs and values and the economics and cultural requirements of the . | 1.1.3 ITEM details Requirement |
| 1.1.4 The mission should be explained to its stakeholders in ways that demonstrate its appropriateness. | 1.1.4 ITEM details Requirement |

The differentiating point begins in its being sophisticated by looking at it from an organizational performance perspective based on its process and results. Based on the Malcolm Baldrige 2009 Education Criteria (NIST, 2009), it builds up a systemic and systematic, innovative but yet generic approach to its audit and assessment organization and scoring criteria to determine the performance level using a set of standardized scoring criteria of A (Approach), D (Deployment), L (Learning) and I (Integration) as show in Table 3.1 and Table 3.2. This is supported by a set of qualitative and quantitative indicators that serve as measures of performance that identify its Le (Level), T (Trend), C (Comparison) and I (Integration) as shown in Table 4.1 and Table 4.2. The choice of using the ADLI and LeTCI scoring criteria is that a set of process-based criteria leads to a set of integrative and comprehensive set of outcome results which is measured using the ADLI and LeTCI respectively. It is noted that these scoring guidelines are more comprehensive and definitive as opposed to most systems that use a "Yes or No or Relevance" or a "Star Scoring" system.

**Table 3.1: Performance Scoring of Process-based Standards and Criteria**

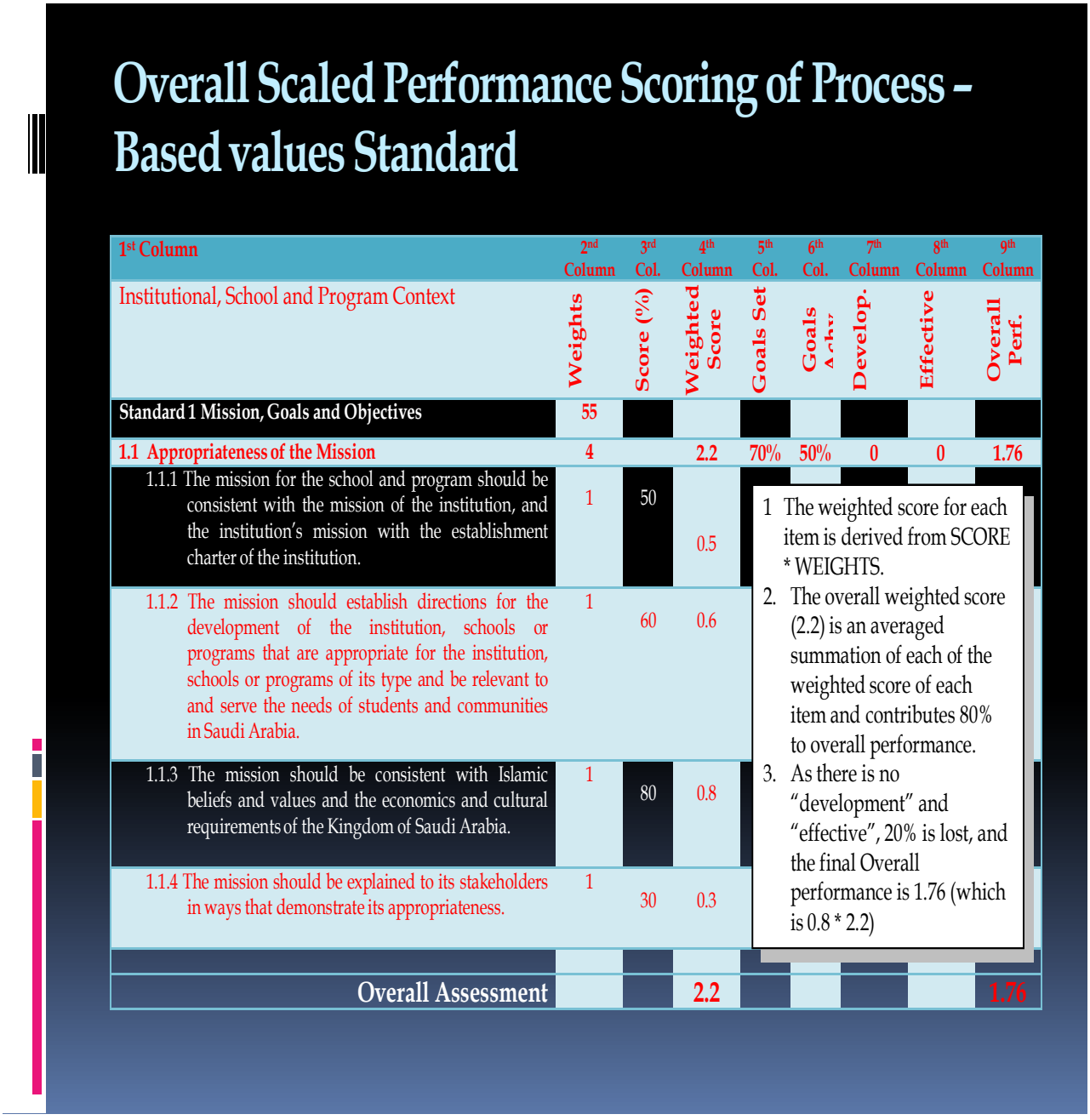


**Table 3.2: Performance Scoring Guidelines (ADLI) of Process-based Standards and Criteria**

## Process – Based Values Criterion Scoring Guidelines

| SCORE | PROCESS – based Performance Scoring Guidelines |
|---|---|
| 0% or 5% OR No Star | The practice, though relevant, is not followed at all based on the following:<br>❑ No SYSTEMATIC APPROACH (methodical, orderly, regular and organize) to Standards requirements is evident; information lacks specific methods, measures, deployment mechanisms, and evaluation, improvement, and learning factors. (A)<br>❑ Little or no DEPLOYMENT of any SYSTEMATIC APPROACH (methodical, orderly, regular and organize) is evident. (D)<br>❑ An improvement orientation is not evident; improvement is achieved through reacting to problems. (L)<br>❑ No organizational ALIGNMENT is evident; individual standards, areas or work units operate independently. (I) |
| 10%, 15%, 20% or 25% OR 1 Star | The practice is followed occasionally but the quality is poor or not evaluated based on the following:<br>❑ The beginning of a SYSTEMATIC APPROACH (methodical, orderly, regular and organize) to the BASIC REQUIREMENTS of the Standards is evident. (A)<br>❑ The APPROACH (methodical, orderly, regular and organize) is in the early stages of DEPLOYMENT in most standards or work units, inhibiting progress in achieving the basic requirements of the Standards. (D)<br>❑ Early stages of a transition from reacting to problems to a general improvement orientation are evident. (L)<br>❑ The APPROACH is ALIGNED with other standards, areas or work units largely through joint problem solving. (I) |
| 30%, 35%, 40% or 45% OR 2 Stars | The practice is usually followed but the quality is less than satisfactory based on the following:<br>❑ An EFFECTIVE, SYSTEMATIC APPROACH, (methodical, orderly, regular and organize) responsive to the BASIC REQUIREMENTS of the Standards, is evident. (A)<br>❑ The APPROACH is DEPLOYED, although some standards, areas or work units are in early stages of DEPLOYMENT. (D)<br>❑ The beginning of a SYSTEMATIC APPROACH (methodical, orderly, regular and organize) to evaluation and improvement of KEY PROCESSES is evident. (L)<br>❑ The APPROACH is in the early stages of ALIGNMENT with the basic Institution, College or Program or Administrative Unit needs identified in response to the Institution, College or Program or Administrative Unit Profile and other Process Standards. (I) |
| 50%, 55%, 60% or 65% OR 3 Stars | The practice is followed most of the time. Evidence of the effectiveness of the activity is usually obtained and indicates that satisfactory standards of performance are normally achieved although there is some room for improvement. Plans for improvement in quality are made and progress in implementation is monitored.<br>❑ An EFFECTIVE, SYSTEMATIC APPROACH (methodical, orderly, regular and organize), responsive to the OVERALL REQUIREMENTS of the Standards, Criteria and Items is evident. (A)<br>❑ The APPROACH is well DEPLOYED, although DEPLOYMENT may vary in some standards, areas or work units. (D)<br>❑ A fact-based, SYSTEMATIC (methodical, orderly, regular and organize) evaluation and improvement PROCESS and some organizational LEARNING are in place for improving the efficiency and EFFECTIVENESS of KEY PROCESSES. (L)<br>❑ The APPROACH is ALIGNED with the Institution, College or Program or Administrative Unit needs identified in response to the Institution, College or Program or Administrative Unit Profile and other Process Standards. (I) |
| 70%, 75%, 80%, or 85% OR 4 Stars | The practice is followed consistently. Indicators of quality of performance are established and suggest high quality but with still some room for improvement. Plans for this improvement have been developed and are being implemented, and progress is regularly monitored and reported on.<br>❑ An EFFECTIVE, SYSTEMATIC APPROACH (methodical, orderly, regular and organize), responsive to the MULTIPLE REQUIREMENTS of the Standards, Criteria and Items is evident. (A)<br>❑ The APPROACH is well DEPLOYED, with no significant gaps. (D)<br>❑ Fact-based, SYSTEMATIC (methodical, orderly, regular and organize) evaluation and improvement and organizational LEARNING are KEY management tools; there is clear evidence of refinement and INNOVATION as a result of organizational-level ANALYSIS and sharing. (L)<br>❑ The APPROACH is INTEGRATED with the Institution, College or Program or Administrative Unit needs identified in response to the Institution, College or Program or Administrative Unit Profile and other Process Standards. (I) |
| 90%, 95% or 100% OR 5 Stars | The practice is followed consistently and at a very high standard, with direct evidence or independent assessments indicating superior quality in relation to other comparable institutions. Despite clear evidence of high standards of performance plans for further improvement exist with realistic strategies and timelines established.<br>❑ An EFFECTIVE, SYSTEMATIC APPROACH (methodical, orderly, regular and organize), fully responsive to the MULTIPLE REQUIREMENTS of the Standards, Criteria and Items is evident. (A)<br>❑ The APPROACH is fully DEPLOYED without significant weaknesses or gaps in any areas or work units. (D)<br>❑ Fact-based, SYSTEMATIC (methodical, orderly, regular and organize) evaluation and improvement and organizational LEARNING are KEY organization-wide tools; refinement and INNOVATION, backed by ANALYSIS and sharing, are evident throughout the organization. (L)<br>❑ The APPROACH is well INTEGRATED with the Institution, College or Program or Administrative Unit needs identified in response to the Institution, College or Program or Administrative Unit Profile and other Process Standards. (I) |

**Table 4.1: Performance Scoring of Result-based Standards and Criteria**

## Overall Scaled Performance Scoring of Results – Based values KPI (Key Performance Indicators)

| Institutional, School and Program Context | Weights | Score (%) | Weighted Score | Goals Set | Goals Achv. | Develop. | Effective | Overall Perf. |
|---|---|---|---|---|---|---|---|---|
| Standard 1 Mission, Goals and Objectives | 55 | | | | | | | |
| 1.6 Key Performance Indicators or Benchmarks | 15 | | 4.5 | 20% | 30% | 1 | 1 | 4.5 |
| 1.6.1 Level of stated institution's, schools' or programs' philosophy or commitments; processes to formulate strategy and plans, and plans are implemented; development of KPI achievement to measure the plans, implementation and achievements in all missions. *(Levels)* | 5 | 40 | 2 | | | | | |
| 1.6.2 Level of institution's schools' or programs' strategy map alignment achievement with the national HE strategies *(Levels)* | 5 | 0 | 0 | | | | | |
| 1.6.3 Percentage of institution's, schools' or programs' goal achievements according to the operational indicators that is set. *(%)* | 5 | 50 | 2.5 | | | | | |

1 The weighted score for each item is derived from SCORE * WEIGHTS.
2. The overall weighted score (4.5) is an averaged summation of each of the weighted score of each item and contributes 80% to overall performance.
3 As there is both "development" and "effectiveness", representing 20% the final Overall performance is 4.5 (which is (0.8 * 4.5 + 0.2 * 4.5)

**Table 4.2: Performance Scoring Guidelines (LeTCI) of Results-based Standards and Criteria**

## Results – Based Values Criterion Scoring Guidelines

| SCORE | RESULTS – based Performance Scoring Guidelines |
|---|---|
| 0% or 5% | ❑ There are no organizational PERFORMANCE RESULTS or poor RESULTS in the standards and areas reported.<br>❑ TREND data are either not reported or show mainly adverse TRENDS.<br>❑ Comparative information is not reported.<br>❑ RESULTS are not reported for any standards, criteria or items or areas of importance to the Institution, College or Program or Administrative Unit KEY MISSION or Institution, College or Program or Administrative Unit requirements. |
| 10%, 15%, 20%, or 25% | ❑ A few organizational PERFORMANCE RESULTS are reported; there are some improvements and/or early good PERFORMANCE LEVELS in a few standards, criteria or items or areas.<br>❑ Little or no TREND data are reported, or many of the TRENDS shown are adverse.<br>❑ Little or no comparative information is reported.<br>❑ RESULTS are reported for a few standards, criteria or items or areas of importance to the Institution, College or Program or Administrative Unit KEY MISSION or Institution, College or Program or Administrative Unit requirements. |
| 30%, 35%, 40%, or 45% | ❑ Improvements and/or good PERFORMANCE LEVELS are reported in many standards or areas addressed in the Standards requirements.<br>❑ Early stages of developing TRENDS are evident.<br>❑ Early stages of obtaining comparative information are evident.<br>❑ RESULTS are reported for many standards, criteria or items or areas of importance to the Institution, College or Program or Administrative Unit KEY MISSION or Institution, College or Program or Administrative Unit requirements. |
| 50%, 55%, 60%, or 65% | ❑ Improvement TRENDS and/or good PERFORMANCE LEVELS are reported for most s standards, criteria or items or areas addressed in the Standards requirements.<br>❑ No pattern of adverse TRENDS and no poor PERFORMANCE LEVELS are evident in standards, criteria or items or areas of importance to Institution, College or Program or Administrative Unit KEY MISSION or Institution, College or Program or Administrative Unit requirements.<br>❑ Some TRENDS and/or current PERFORMANCE LEVELS – evaluated against relevant comparisons and/or BENCHMARK – show standards or areas of good to very good relative PERFORMANCE.<br>❑ Institution, College or Program or Administrative Unit PERFORMANCE RESULTS address most KEY student, STAKEHOLDER, and PROCESS requirements. |
| 70%,75%, 80%, or 85% | ❑ Current PERFORMANCE LEVELS are good to excellent in most standards, criteria or items or areas of importance to the Standards requirements.<br>❑ Most improvement TRENDS and/or current PERFORMANCE LEVELS have been sustained over time.<br>❑ Many to most reported TRENDS and/or current PERFORMANCE LEVELS—evaluated against relevant comparisons and/or BENCHMARKS—show areas of leadership and very good relative PERFORMANCE.<br>❑ Institution, College or Program or Administrative Unit PERFORMANCE RESULTS address most KEY student, STAKEHOLDER, PROCESS, and ACTION PLAN requirements. |
| 90%,95%,or 100% | ❑ Current PERFORMANCE LEVELS are excellent in most standards, criteria or items or areas of importance to the Standards requirements.<br>❑ Excellent improvement TRENDS and/or consistently excellent PERFORMANCE LEVELS are reported in most standards, criteria or items or areas.<br>❑ Evidence of education sector and BENCHMARK leadership is demonstrated in many standards, criteria or items or areas.<br>❑ Institution, College or Program or Administrative Unit PERFORMANCE RESULTS fully address KEY student, STAKEHOLDER, PROCESS, and ACTION PLAN requirements. |

**Part 3: Imperatives of a Strategic Performance Management System (SPMS) for HEI**

Quality Management System (QMS) that is implemented without proper Planning Management System (PMS) and Information Management System (IMS) or that they are not aligned are the main reasons for QA system's failures. Such a system is paying lip-service to QA at best or is going through an annual or a 5-year audit and assessment cycle without bringing any improvements and innovations (Teay, 2007 and 2009). QA that brings no improvements and innovations, or that does not bring about learning and systems integration is poor as shown in Fig. 1 (Teay, 2007 and 2009). To capitalize on QA, it should be linked to the planning and information management systems through the strategic performance management framework laying the foundation for continuous improvements and innovations based on management through measurement and an evidenced-based mechanism as shown in Fig. 2.

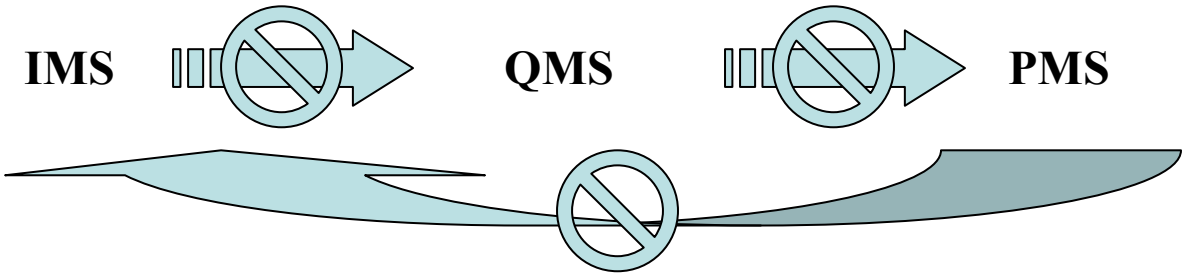
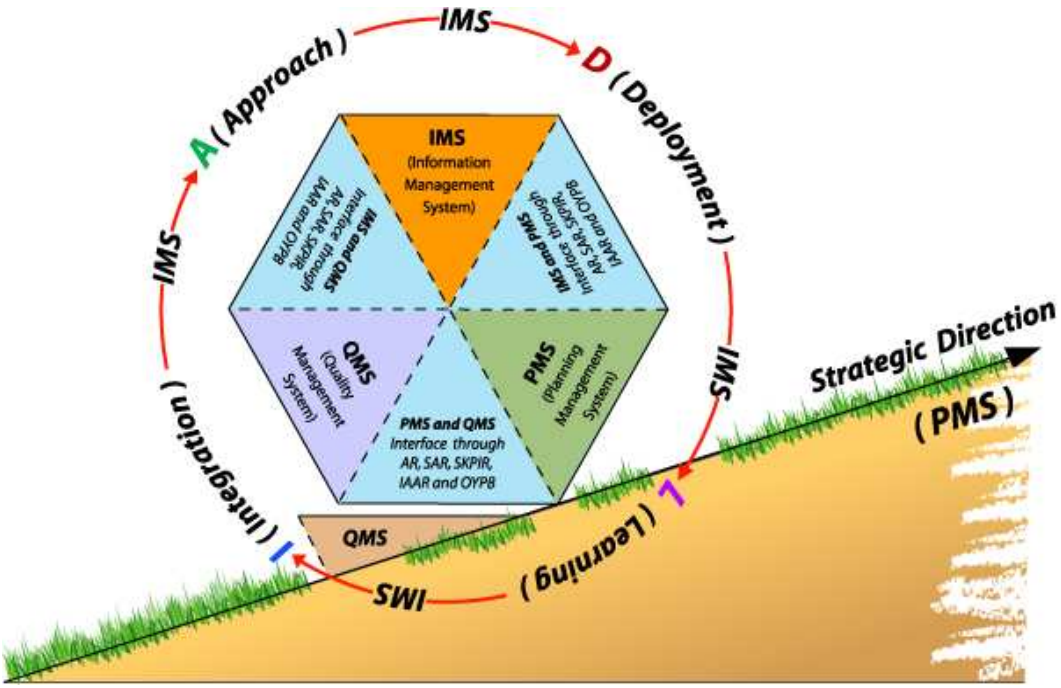



**Figure 1: Non-aligned IMS, QMS and PMS**

This led to the triangulation alluded to earlier and the need to consider the three components in concert and not independently. The emphasis on "management through measurement" however highlighted the "chicken-egg" dilemma of what comes first. Management or Measurement? Sadly, the answer is measurement, and this had caused the non-alignment between planning and measurements as illustrated in Case Study 1.




Source: Teay, S., (2009), Strategic Performance Management System (International Edition, 3rd Edition, January 2009), Assumption University Digital Press, Bangkok, Thailand

**Figure 2: The mechanics and alignment of the PMS – IMS – QMS**

With these changes and to resolve the "chicken-egg" issue, the HEI needs to streamline and align all its planning and budgeting operating procedures to identify and produce data and evidence for the assessment of the performance outcomes to make them less tedious and chaotic, more efficient and effective in terms of time and efforts through a standardized and disciplined well-planned approach. To dispel the issue of alignment of the key systems critical to the success of an IQA, Figure 2 tries to show the inter-linkages of the 3 main sub-systems in the Strategic Performance Management System (Teay, 2007 and 2009). This meant that a full-blown SPMS (Strategic Performance Management, System) needs to be created and put into operation to ensure the linkages and interactions of the QMS, the IMS and the PMS are fully aligned and are congruent with each other.

Used in conjunction and in tandem with each other, the QMS and the PMS with the IMS as the evidence based mechanism; the SPMS will serve as the foundation of the performance management and the governance systems of the HEI. The SPMS is designed to be non-prescriptive, generic in nature so that the academic and administrative units can use them as the minimum guiding principles in strategically managing their units but are aligned in the same strategic direction to achieve the HEI's mission and commitment to

the students and society. The journey to achieve quality performance will be tough but if it is well-planned and approached through basic management fundamentals, the tough and tumultuous journey can be softened and heightened to reach higher heights and more lofty aspirations.

The SPMS framework as discussed below is aimed at achieving a common linkage across the PMS-IMS-QMS to achieve the HEI "management through measurement" approach. It is also meant to be a pragmatic approach to show how the HEI can use this as a guideline to create their customized performance management system. It is hoped that this framework will help all HEI in their pursuit for "education excellence" through the performance management system that is managed strategically.

- The PMS represents the strategic direction of the HEI. It specifies the key vision, mission, goals and objectives that are achieved through its strategies. These defines clearly and specifically the strategic direction that the HEI intends to achieve in its 15-years strategic plan supported by its OYPB (One-Year-Plan-Budget) that continuously evolve to achieve its strategic direction. The goals identify its "what to achieve based on its mission" and the objectives identify its "what are the measurement of its achievement".
- The IMS represents the networks and database system developed to collect, collate, store, process and disseminate key data, facts, information that reflect the evidenced based decision making and the measurement based on its defined goals and objectives. It will be noted that the IMS serves as the rotating PDCA concept of Plan – Do – Check – Act that has evolved into the newer ADLI concept of Approach – Deployment – Learning – Integration as expounded in the 2007 and 2009 MBNQA Education Criteria for Performance Excellence (NIST, 2007 and 2009) and discussed below as to the process and results of the QMS.
- The QMS serves as a wedge to avoid the slippage back to square one. It is based on the MBNQA framework that has 2 main areas of Process and Results leading to an overall audit and assessment of the performance measurement and management as defined in the PMS. As seen above the QMS acts like a wedge that prevents the HEI's performance to slip and the ADLI leads to its continuous journey up the slope towards its strategic direction. The "Process" refers to the methods the HEI uses and improves to address the Item requirements. The four factors used to evaluate process are Approach, Deployment, Learning, and Integration (ADLI) as follows:

    - "*Approach*" refers to
        - the methods used to accomplish the process
        - the appropriateness of the methods to the Standard, Criteria and Item requirements used to implement the QA
        - the effectiveness of the use of the methods
        - the degree to which the approach is repeatable and based on reliable data and information (i.e., systematic)

- "*Deployment*" refers to the *extent* to which
  - The HEI approach is applied in addressing Item requirements relevant and important to the HEI
  - The HEI approach is applied consistently
  - The HEI approach is used by all appropriate work units

- "*Learning*" refers to
  - refining the HEI approach through cycles of evaluation and improvement
  - encouraging breakthrough change to the HEI approach through innovation
  - haring refinements and innovations with other relevant work units and processes in the HEI

- "*Integration*" refers to the *extent* to which
  - The HEI approach is aligned with your organizational needs identified in the HEI Organizational Profile and other Process Items
  - The HEI measures, information, and improvement systems are complementary across processes and work units
  - The HEI plans, processes, results, analyses, learning, and actions are harmonized across processes and work units to support organization-wide goals

- "*Results*" refers to the HEI's *outputs and outcomes* in achieving the requirements in the processes above. The four factors used to evaluate results are LeTCI:

  - Level (Le) – The HEI current level of performance
  - Trend (T) – The rate (i.e., the slope of trend data) and breadth (i.e., the extent of deployment) of the HEI performance improvements
  - Comparison (C) – The HEI performance relative to appropriate comparisons and/or benchmarks
  - Integration (I) – The linkage of the HEI results measures (often through segmentation) to important student and stakeholder; program, offering, and service; market and strategic challenges as defined in the HEI Organizational Profile and in Process Items.

## Conclusion

The pursuit of education excellence and the search for the elusive Holy Grail of education excellence to overcome the ailments of "questionable education practices" have complicated the complex but ever evolving quality syndrome that hopefully will help the HEI in meeting its market expectations via "quality" education products and services. In

the aftermath of the chase for quality practices over the last few decades of accreditation exercises that are multifaceted and multifarious, certain key fundamentals have been maintained as follows:,

- EQA education standards know no border and have basically evolved and revolved around a few basic principles and fundamentals that are common across the universally accepted education principles. The only difference is in the packaging and repackaging, the labeling and re-labeling and the sales pitch of the same basic education principles which instead of simplifying the fundamentals and principles, it makes the "what to" of EQA more complicated and complex to the layman.

- With the great diversity in the EQA, there is no singular "best system" but certain "best practices" can be identified. The author does not recommend the straight adoption of any system nor reinventing the wheel, but to think out of the box creatively and adaptively within the context of the nation and the HEI. Successful QA is not in the development but the implementation of an acceptable system that brings about improvement and innovations through the learning and integration aspect as espoused in the SPMS. This is illustrated with the 2 cases in 2 different continents as to the "how to" of IQA.

In conclusion, the success of a quality HEI is not in just having any IQA system, but in ensuring that the IQA = EQA to meet the minimum requirements. The paucity in most IQA systems is in the capacity and the capability to be more strategic than operational, which is not the scope of this paper. What this paper had done is to identify the "what of" EQA and the "how to" of IQA in order to strategically balance the IQA = EQA equation.

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# Using Student Voice to Improve Student Satisfaction Two Australian Universities the same Agenda

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## Abstract

The paper outlines the practices used at the University of Western Sydney (UWS) and Monash University with regards to survey management and improvement. As part of ongoing quality assurance, both universities conduct various surveys targeted at stakeholders including students, staff, employers and the general community. Feedback from students can inform decision making in universities and be part of the students' role in university management. The challenge for universities is not to gather feedback from stakeholders, but rather to implement improvement projects as a result of stakeholder feedback and to communicate the actions/improvement to all stakeholders. Stakeholders should see that their feedback is not only value-adding to the university but that the university is taking appropriate and timely action to enhance student experience in academic and support services areas.

## Background

The University of Western Sydney (UWS) and Monash University are different in their make-up but yet approach ways to address feedback from students in different but yet with similar overtones. Monash University is a member of the Group of Eight (Go8) Universities and is a large research-intensive and highly internationalised institution that is home to more than 53,000 students from over 100 countries. Though Monash commenced as an exclusively Australian institution it has evolved over the years into one that is both Australian and international. The diversity of Monash's operation is that it operates across six Australian and two international campuses (Malaysia and South Africa) and offers many courses in partnership with institutes in countries such as Singapore, Hong Kong and Indonesia. For the offshore campuses it is also subject to regulation and the quality assurance processes in each of those jurisdictions. Monash aspires for its students to have the opportunity to become truly internationalist in their thinking.

This aspiration is reflected in Monash's highest level planning documents (e.g, Monash University, 2004, Monash University 2005-Monash Directions 2025). These documents outline that Monash's goal is to strive to provide opportunities for students to understand different cultures, study at a range of international locations, and develop an international outlook.

UWS is a largely undergraduate institution established in 1989. It aims to *'bring knowledge to life'* by educating students for professional employment and applying research to contemporary problems through mutually enriching partnerships.
A key mission of UWS is to transform the lives of people and communities, especially those of Greater Western Sydney. This region is one of the fastest growing and most culturally diverse in Australia.

UWS is one of the largest universities in Australia with more than 35,000 students and almost 2,600 staff operates across six campuses covering urban western Sydney and rural regions of New South Wales. Domestic students at UWS reflect the diversity of the region with the 2005 cohort drawn from more than 170 countries and with international students from more than 100 countries.

## Introduction

Quality has been the buzz word in the Australian higher education sector since the inception of the Australian Universities Quality Agency (AUQA) in 2000. AUQA is an independent body established by the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) to audit teaching, learning, research and administration in Australian universities on a five yearly cycle.

The resultant effect of this is that universities now regularly participate in quality reviews in which they are required to demonstrate that they have clear procedures and processes in place to ensure quality for their students, not only in learning and teaching but also in the learning environments. Research in the last decade has consistently confirmed a strong correlation between classroom environments, learning and satisfaction (Ramsden, 2005). Ramsden (2005) published detailed findings of research into student learning and highlighted the importance of intellectual challenge, clear goals and creating an environment where the students take responsibility for their own learning. He has also pointed out the significance of encouraging cooperation between students and concern and respect for students as learners and people. Further, he found that giving a lot of feedback on learning, continuous monitoring of the effects of one's teaching in order to improve it, seeing teaching as a dialogue rather than a transmission process, and understanding teaching as a process of enabling learners rather than a set of recipes, also played a significant part in quality improvement.

A key element of any quality assurance process is evaluation and improvement. Many universities have approached the process of better understanding and meeting the needs of their students through student evaluations which serve numerous purposes. These include: diagnostic feedback to faculties about their teaching that will aid in the development and improvement of teaching; research data to underpin further design and improvements to units, courses, curriculum and teaching; a measure of teaching effectiveness that may be used in administrative decision making such as performance management and appraisal; information to current and potential students in the selection of units and courses; and, a measure for judging the quality of units and courses increasingly becoming tied to funding. The first two purposes are recognised universally as the basis for many evaluations (Bennett & Nair (in press); Fraser 1998; Marsh, 1987). The latter three purposes are relatively new to many universities especially in the Australian context.

For Monash the usefulness of measures related to the quality of the units, courses, teaching and student experience are reflected in the values, aspirations, strategic documents and the nature of the organisation (Monash University, 2004, 2005).

Whereas at the UWS the mechanisms to gather feedback from students is outlined in the UWS Tracking and Improvement System for Learning & Teaching (TILT).
This system at UWS describes the national and institutional surveys and its importance in measuring student experience at various levels: total experience of the university, course specific and also at unit level. TILT at UWS was introduced in 2004, and it has been highly commended by staff on its use and outcomes to date. TILT implementation at UWS has also attracted great interest in the university sector in Australia. In 2006, UWS was invited by four universities to talk about TILT implementation and its effectiveness.

A critical part of any effective quality cycle is to ensure that student views are not only collected but used to affect improvement. This process of *'closing the loop'* is probably the most demanding aspect of seeking student feedback. The AUQA cycle 1 audits with thirty Australian Universities provide fourteen recommendations (47%) related to,

'universities gather feedback, translate feedback into actions and informing students of outcomes / acts on the finding to ensure continuous improvement' (http://www.auqa.edu.au/qualityaudit/sai_reports/index.shtml). In 2005 a report by the Australian Learning and Teaching Council (ALTC) analysed the AUQA audit reports of 25 universities. The report reviewed the learning and teaching chapters of the Performance Portfolio and AUQA reports and identified eleven messages or actions for improvement. The first action identified for improvement includes student feedback management (Australian Learning and Teaching Council, 2005). The AUQA good practice database also does not include any good practices in universities where feedback has resulted in improvement and effective communication on the actions. Leckey and Neil (2001) argue that, "closing the loop is an important issue in terms of total quality management. If students do not see any actions resulting from their feedback, they may become skeptical and unwilling to participate.(p 25)" The key, then, to effective institution-wide surveys is ensuring that the loop is effectively closed.

## Significance of this Paper

This paper outlines the approaches to collecting student feedback and the practices used to inform decision-making to improve the student environments at two Australian Institutions of Higher Education; the University of Western Sydney (UWS) and Monash University. The paper goes on to show that though the approaches to collecting feedback varies at both universities the end result is the same, that being the use of data to enhance all areas of the student experience. The challenge for both universities is not just to gather feedback from stakeholders, but rather implement projects as a result of stakeholder feedback and to communicate the actions to all stakeholders. Stakeholders should see that their feedback is not only value adding to the university but the university is taking appropriate and timely action to improve the overall student experience.

## Core institutional and national surveys

Table 1 lists the core institutional and national surveys that are administered at both universities. The range of surveys at both universities provides data on all aspects of universities' core and support services. The data collected is used by universities as part of their quality cycle and quality assurance process. The approaches taken to track and implement improvements vary slightly at both universities.

**Table 1: Institutional and National Surveys at UWS and Monash University**

| Type | University of Western Sydney | Monash University |
|---|---|---|
| Institutional | Student Satisfaction Survey (SSS) | 1. Monash Experience Questionnaire (MEQ)<br>2. Monash Support Experience Questionnaire (MSEQ) |
| | Student Evaluation of Units (SFU) | Unit Evaluations |
| | Student Evaluation of Teaching (SEEQ) | Monash Questionnaire Series on Teaching (MonQueST) |
| | Research Student Satisfaction Survey (RSSS) | Postgraduate Research Supervision Survey (PRSS) |
| | Offshore Student Satisfaction Survey (OSSS) | Monash Experience Questionnaire (MEQ) for offshore students |
| | Employer Survey | Employer Survey* |
| | Staff Services Survey | Staff Services Survey |
| | Engagement Survey | - ** |
| | Exit Survey | - |
| | First Year Retention Survey | - |
| | Commencing International Student Survey | - |
| | Image Survey | - |
| National | Course Experience Questionnaire and Graduate Destination Survey (CEQ/GDS) | |
| | Post Graduate Research Experience Questionnaire (PREQ) | |

** Sample Survey only* *** planned for future*

**University of Western Sydney**

UWS has implemented Tracking and Improvement System for Learning & Teaching (TILT). TILT has been benchmarked with universities in South Africa, Canada and Australia. Generally, TILT consists of survey data collected by a sampling methodology. Such sampling is based on obtaining a representative sample of students from all different groups. For example the main factors taken into for the methodology are undergraduate, postgraduate, sex, 1st year, 2nd year, 3rd year, campus, faculty, domestic, international, Aboriginal and Torres Strait Islanders (ATSI), students with disability and Non English Speaking Background (NESB). This is done to ensure that students are not surveyed several times using different survey tools. The only exception to the sampling is with administration of the CEQ/GDS and PREQ which is sent to all eligible graduating students.

TILT consists of fifteen surveys targeted at different groups of students. The challenge for any institutions is to bring all the survey findings on emerging themes together which could be used to assess the performance and implement improvement strategies at

Faculty and Administrative unit level. UWS produces two sets of annual course reports in November each year. These reports are sent out to all Faculties and Administrative units. The first report is the undergraduate course report and the second is the postgraduate (coursework and higher degree research) course report. Both annual course reports are divided into three sections: Overall UWS performance, Faculty specific performance and Course specific performance. These reports include performance data in all three sections in areas such as: student demand, load and enrolments, completions, retention, progress rates, GDS, CEQ including cleaned open ended comments on best aspect and needs improvement analysed using CEQuery. (CEQuery is an IT enabled tool which analyses open ended comments from surveys.) Where appropriate times series data benchmarked against universities in New South Wales metropolitan is presented in annual course reports. However, data from the Course Experience Questionnaire (CEQ) and the Graduate Destination Survey (GDS) is benchmarked with universities within New South Wales metropolitan area and the sector.

The UWS annual course reports is in its sixth year of implementation and based on the feedback from users; the university has further enhanced its data reporting capability by producing school specific reports. The school reports include summary of unit or subject level data including quantitative and qualitative results. Each unit/subject report has quantitative result for each item benchmarked with UWS overall mean, the relevant school mean, and the unit/subject mean score. The unit/subject report also has cleaned open ended comments on best aspect and needs improvement in a single electronic (PDF) report. UWS also uses the same reporting methodology for its Student Feedback on Teaching (SFT).

The annual course report is sent to all Deans, Associate Deans (Academic) and various administrative units. The Associate Deans Academic also forward these reports within the faculty for discussion and review. The report also includes a cover note from the Pro Vice Chancellor (PVC), Quality and Pro Vice Chancellor, Learning & Teaching. This note informs the Deans and Associate Deans to review the performance of the faculty and each course and to provide a report on the actions/improvements planned after consultation with the staff. The action plan includes the improvements each Faculty and Administrative unit is going to implement to improve on areas of weakness.

The action plan from faculties and units are reviewed by the PVC Quality and PVC Learning & Teaching and the recurring themes from various reports are summarised as possible actions or improvement priorities. The improvement priorities is embedded into the annual action plan for learning and teaching which has priority themes, action projects, key performance indicators, timelines and responsible person accountable for the implementation. The actions/improvements are then sent to relevant unit heads and the Strategy and Quality committee for sign-off.

The university communicates the improvement priorities with all students at all campuses. One such action was where UWS engaged internal design students to design posters '*Feedback- it counts'* which includes the actions agreed. Various designs of posters were trialled with 20 students and the most effective poster for the purpose of

informing students on the actions taken was selected. The posters outlined the improvements planned or underway to enhance student experience.

As for Higher Degree Research (HDR) students, UWS has similar processes for evaluation and improvement. The final sign-off on research improvement is via the Research Studies Committee. For example, UWS distributes postcards to all HDR students informing them on actions taken as a result of the Research Student Satisfaction Survey (RSSS) and national Postgraduate Research Experience Questionnaire (PREQ) survey results. The post card prepared to inform research students was a joint project with the university and the Postgraduate Association of UWS. The *'Feedback-it counts'*, poster was placed at all six campus especially at places where students mostly gather such as: Library, Student Centre, Support Services, Student Association, Cafeteria, Bookshops, International Student Office, and Aboriginal Education centre. Email was also sent to all students and the poster was also placed on WebCT and the Office of Planning and Quality's website.

The poster and postcard provided students opportunity to provide further feedback. This elicited more than fifty email responses with positive comments on the universities effort to action and communicate improvement priorities. Some students took the opportunity to further raise issues where improvement was needed and emails were directed to respective unit heads for action. The university also prepared a smaller version of the poster which will be used with future survey mail out to students to raise awareness of student feedback. In addition the university also includes brief action/improvements in the cover letter which goes out with future surveys with students. During this process the areas performing well in the Student Satisfaction Survey were sent with praise note by the Vice Chancellor.

**Monash University**

Monash's methodology in survey administration is to allow all qualified students to have a say in the evaluation process. This approach ensures that all students studying at Monash have a right of providing feedback on all aspects of the University. This approach has worked well for Monash on the six domestic and two international campuses and transnational partners (eg Singapore, Hong Kong, etc). The Monash Experience Questionnaire (MEQ), Monash Support Experience Questionnaire (MSEQ), Unit evaluation and the Postgraduate Research Supervision Survey (PRSS) forms part of the core monitoring tools at Monash and is an important component of the Monash Quality Cycle – plan, act, evaluate (monitor and review) and improve (Monash University, 2001).

In order that all qualified students are given the opportunity to be involved in the evaluation process, Monash's central quality unit, the Centre for Higher Education Quality (CHEQ), implemented a new University wide evaluation software system in 2005. This change not only allowed the administration of both traditional and paper based surveys on all domestic and international campuses but as well allowed greater access to meaningful global data housed in a central location, allowing more detailed analysis, in turn informing the University community about what may be improved in the services it

offers its customers – the students. This approach by the University is in line with previous research that recognised that higher education is a service industry which places greater emphasis on meeting the expectations and needs of students, as well as responding to the need for increased public accountability (Carroll, 2005; Cheng and Tam, 1997; Griffin, Coates, McInnis and James, 2003; Lee, Jolly, Kench, and Gelonesi, 2000; Nair and Blackwell, 2005; Nair and Chan, 2005; Ramsden, 2005).

At Monash the approach to implement changes as a result of feedback is devolved from the central to the 10 Faculties and 8 campuses. This has been true for Unit evaluations, Monash Experience Questionnaire and the Postgraduate Research Supervision Survey.

In unit evaluations, feedback from students was for the first time posted onto the World Wide Web. Students are advised by a global email of the availability of these reports. On obtaining the reports and raw data, faculties follow through the evaluation data addressing concerns students had raised. In the final stage of closing of the loop, many faculties have gone about informing students of the changes that have taken place as a result of student feedback. Course outlines in some faculties now not only give details of the opportunities for such feedback but as well outline changes as a result of student feedback.

Further, staff participation in this important process was also increased by acknowledging high performing units in the University and the Faculties. In addition, the university introduced a monitoring process to ensure that not only is policy of evaluating units regularly adhered to but as well to account for the actions taken for areas of concerns raised by students. This process is now overseen in a reporting process to the Learning and Teaching Quality Committee, a sub committee of the Education Committee.

The Monash Experience Questionnaire came about as a result of Monash's self review where the report identified a gap in institutional monitoring (Monash, 2002). The report identified that Monash did not have a way of collecting information systematically across the institution about current student experiences. The questionnaire was finalised after extensive comment and review from staff across the university and from student focus groups. Following its successful first administration, the second iteration of MEQ in 2005 was adapted to exclude students' views of student experience and satisfaction with administration and support services and the decision was taken to develop a specific instrument to focus on these aspects, –the Monash Support Experience Questionnaire (MSEQ). The second iteration of MEQ saw a general increase in student satisfaction in every dimension measured by this survey. Changes were planned and implemented based on MEQ data at the faculty levels. Changes were however localised in the first instance. For example some campuses were able to find innovative ways to address the shortfall of computers without further increasing the number of available computers. To assist in this change process, the Centre for Higher Education Quality (CHEQ), organised a MEQ symposium where approaches from various faculties were showcased so that approaches used to address common issues could be discussed and shared. MEQ is accepted across the University as a key quality monitoring and improvement tool and is embedded within the University key performance indicators (KPIs). The KPIs allow the university to

monitor at the institutional, faculty and campus level on the universities performance with respect to student satisfaction.

The Postgraduate Research Supervision survey was designed and administered initially in 1994. This questionnaire was developed to gather information from students on the quality of the supervision and support from the faculty and departments. Data from this survey has shown significant improvements in student perceptions of their research environment. The data from this survey is reviewed by the Pro-Vice Chancellor (Research and Research Training) who then identifies areas in need of improvements. These identified areas are then highlighted to each Faculty with improvements tracked by the Office of the Pro-Vice Chancellor (Research & Research Training).

The Monash Research Graduate School hosts on their website both the best practice arising from this survey and produces a league table of the key areas that needs improvement essentially allowing students to review the results and changes resulting from their feedback.

CHEQ, Monash's central quality unit is central in maintaining student and staff involvement in the process of evaluation. To this effect, global emails are sent out to staff and students by senior administrators (Pro-Vice Chancellor (Quality) and Senior Deputy Vice Chancellor) thanking them for supporting the process with respect to Unit evaluations and MEQ. Further the Centre also alerts both staff and students to the availability of evaluation reports and improvements posted on the University website.

In 2006, Monash implemented a ground breaking approach to further assist in the momentum that was gained in evaluation and improvement. The University setup a response team comprising staff from CHEQ and the Centre for Advancement of Teaching and Learning (CALT) to identify units and issues arising from the Unit evaluation and student satisfaction surveys. The team is also responsible to assist staff and faculties in the use of the data for improvements. Examples of improvements as of a result of this approach are, more clarity in the unit objectives, a more structured assessment and a template in the unit outline informing students of the improvements that had taken place as a result of previous student feedback.

In line with helping faculties to improve their use of data, the University is in the process of implementing a similar reporting mechanism utilised at UWS, the Course and Unit profiling system. This report will draw upon all necessary evaluation data and information from the student management system so that informed decisions can be actioned.

## Conclusion

This paper has described approaches taken by two universities in gaining student feedback. Though there are similarities in the type of surveys that are administered at UWS and Monash, there are also marked differences. The main differences between both

universities lie in the way data is collected. UWS employs a sampling approach whereas Monash utilises a total population administration of surveys. Though both are acceptable methodologies in getting useful data Monash's approach is governed by its policy to allow all students to have a say.

However, whichever way the universities may approach in getting feedback from their students this paper shows that the end results from both institutions are the same, that being to use results to effect change.

The critical steps in the student feedback process is to ensure that student views are utilised so as to effect change and subsequently that the students are informed of the improvements. Student satisfaction provides strategic-level information while being student-centred. Powney and Hall (1998) suggest that in institutions where staff are not concerned about student opinion, student apathy towards the completion of feedback questionnaires is more apparent. They also suggest that students are less likely to take the time and effort to complete questionnaire if they feel that it is simple meaningless, result-less, ritual that the institution goes through in order to meet quality assurance procedures.

Decisions made by both universities are led by research in the quality, teaching and learning arenas. For example both institutions publicises their survey reports. Though there has been argument against this (Baty, 2001; Johnson, 2001), Harvey (2003) has argued that student perspectives on publishing reports have some advantages: it gives the view of the participants in the process; and it provides ratings that could be relevant to prospective students. The quality argument relates to that students' views are recognised as important and to provide the participants the results of their feedback in the process of closing the loop.

As part of the wider study of student feedback and the quality of student education experiences, Lackey and Neil (2001) and Watson (2003) argue that staff participation and buy-in is also key to any successful evaluation process. In this aspect both universities have a process acknowledging high performing areas whether teachers or areas (departments, schools etc) in this important process.

At UWS and Monash, improvement as a result of student feedback has been gaining momentum over the last few years. Since 2004, the UWS has effectively used quantitative and qualitative results from various surveys and implemented various actions/improvements as a result. The actions/improvements outlined in posters and postcards are signed off with respective unit heads, the Planning and Quality Committee and the Research Studies Committee. The unit heads sign-off after consultation with staff within the functional area. This process ensures that staff take ownership of the actions/improvements. UWS monitors the progress on each actions/improvements during the next round of surveys. Monash's approach is work with student data in collaboration with faculties and campuses to achieve change. In 2006 Monash has embarked on lifting the game generally by having an organisational response with a University response team addressing areas of concern to action improvements.

As a result of systematic processes in place both at UWS and Monash for collecting stakeholder feedback, acting on the results and communicating the improvements, the cycle 1 audits of Australian Universities by AUQA commended both Monash and UWS for the development of surveys and evaluations systems to enhance its quality management systems. Monash was found to have not only "*a systematic implementation of a considerable suite of evaluation instruments*", but the "*rigorous evaluations of student satisfaction with the study experience, through the Monash Experience Questionnaire and unit evaluations, that have contributed to the improvement of satisfaction with the experience*" (AUQA, 2006). Further, the effective implementation of the quality cycle in the university's work process was also commended in the report. UWS on the other hand was commended for its "*development of computer-supported quality systems for consolidating data and tracking processes using Tracking and Improvement in Learning and Teaching system" (AUQA, 2007).* AUQA further praised UWS for its powerful systems that consolidate rich data sources but as well for keeping track of complex quality assurance processes in important areas of University activity. For both Monash and UWS, the AUQA commendation in relation to surveys and improvement is included is the AUQA Good practice database as exemplars of good practice.

Supporting AUQA's view on improvements attributed by a rigours and systematic evaluations is also reflected on the benchmarking data that both universities have with numerous universities. At Monash benchmarking data suggest that Monash is performing as well if not better in many areas of student satisfaction. Similar results are also reflected with UWS data. Though the aim in all these exercises is to find more about best practices and institute changes for the betterment of the learning environment for students, both institutes have yet to realise the full potential of this useful data.

Clearly, both UWS and Monash have processes in place that allows closure from the feedback they have obtained from the various surveys. However, as in any evolving quality process both universities are introducing better approaches so that changes can be made more effectively. For example, at the University of Plymouth, posters are displayed within faculties during the start of year induction period, drawing students' attention to the action taken in response to a key issue identified for each faculty. Sheffield Hallam University produces glossy marketing-type leaflets that are given to students in the following year's survey pack ('You talk, we listen') and also used the same information in their prospectus ('We listen, and act, on what students say'). University of Central England (UCE) produces a lengthier feedback-flyer which is handed out to in coming students in the following year with the questionnaire (Watson, 2003).

UWS and Monash have both demonstrated a commitment to an effective evaluation system as embodied by the Quality Cycle employed at both institutions. Further, both universities have established a link between evaluation and quality thus embedding in the mindset of students and staff that student feedback provides valuable information that the institution will act upon so as to improve student teaching and learning environments. Both institutions will be paying closer attention in the next cycle of evaluation to the

extent to which the improvement has had impact on student learning which is critical to any good quality system. Clearly, the marriage of evaluations and quality is here to stay!

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# Online Testing: Perceptions of University Students in Jordan

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## Abstract

The purpose of this study was to evaluate the online testing experience of the Hashemite University students in Jordan. A sample of 258 undergraduate students representing most academic fields during the second semester of the academic year 2006/2007 were surveyed using the Students' Perceptions of Online Testing Instrument (SPOTI), a 33-item Likert-type questionnaire. Analysis of the SPOTI scale resulted in 26 items distributed over three factors: environment of online testing (11 items), benefits of online testing (10 items), and problems with online testing (5 items). Results also showed that, on the overall, students' perceptions toward the Hashemite University's strategy for online testing were found to be positive and moderate, indicating students' acceptance of the university's decision for adopting and implementing online testing. Finally, the results revealed no significant differences in students' perceptions toward online testing based on gender, age, academic level, or years of online testing experience. However, based on GPA, the results revealed the existence of significant differences in students' perception toward online testing on the "benefits of online testing" dimension.

**Keywords:** Online testing; Computer-based assessment; Higher ducation; The Hashemite University

## Introduction and Theoretical Framework

Assessment plays a critical role in the educational process as a mean for both grading and supplying valuable feedback for students and stakeholders. While an assessment defines, for students, their sense of what is significant in their undergraduate study and how they will prioritize their time and effort, it means for stakeholders a way to ensure the achievement of the preset goals as well as controlling the quality of the graduates (Burton, 2001).

The embracing introduction of technology in every aspect of the educational process has raised the use of Computer-Based Assessment (CBA) (Elshafey & Elhosiny, 2007) and has led to new methods of student assessment. With the evolution of web-based technologies and the wide availability of computers, student assessment can now have a wide variety of formats. Consequently, many educational institutions have started to utilize CBA tools to assess students' learning and to encourage their self-assessment at all stages of the learning experience.

A quick scan of the programs hosted by the educational institutions show that they are increasingly turning to CBA tools, especially for entry-level courses like introductory computing or for administering computer literacy and proficiency exams (Durfee, Schneberger, & Amoroso, 2005; Underhill, 2006). Electronic, online, or CBA can provide a number of advantages; such as time and place convenience for students and instructors, standardized delivery, self-paced learning, economies of scale in terms of classrooms and instructors, automated feedback to students and instructors, and a variety of available content (Strother, 2002; Underhill, 2006). In addition to that, CBA can assist instructors in extending availability beyond class time and office hours, establish links between classmates, and accomplishing administrative activities. Furthermore, data from CBA results can be used to conduct item analysis and strengthen course personalization, content, and delivery (Durfee, Schneberger, & Amoroso, 2005).

Recently, almost all higher education institutions in Jordan began to use CBA tools to help conducting their educational activities. The Hashemite University is one of those institutions that first introduced CBA tools in its educational settings. Currently, the Hashemite University relies on online testing to assess more than 20 of its university required courses. Although there are many format of questions that compose online tests (multiple choice questions, true and false, etc.), the Hashemite University focuses mainly on multiple choice questions (MCQs) format. Related literature shows that the main advantage of MCQ testing is in its versatility. In addition to that, there are significant cost savings— particularly where large numbers are involved—and it is a format that can provide a good precision where other measurement options (e.g. observing performance or interviewing) may not do so. On the other hand, criticisms of MCQs tend to center upon unreliability due to random effects (e.g. Burton, 2001), the inequity of the format in terms of its bias towards certain socio-economic or ethnic groups (e.g. De Vita, 2002), and also the depth of learning the format engenders (or lack thereof) (e.g. Leamnson, 1999).

Incorporating new uses of technology for assessment has demanded the need to evaluate the uses of these innovative tools. The need is further significant for the Hashemite University as it tries to enhance the way testing is prepared and conducted. Several researches indicate that any successful implementation of a CBA system should take into consideration the commitment of management, academic, and support staff working as a team in conducting online testing. Therefore, this study comes to explore students' perceptions regarding online testing and the related issues that need to be considered to develop and improve the online testing experience.

## Statement of the Problem

Many researchers have examined the impact of utilizing several computer-based forms of testing (Alexander, Bartlett, Truell, & Ouwenga, 2001). In Jordan, however, little has been done to evaluate the use of online testing tools. Therefore, this study came to address this need and to help the Hashemite University and other universities to improve their online testing strategies.

## Research Objectives

Specifically, this study came to meet the following research objectives:

1. To determine the latent factor structure of the Online Testing Scale (SPOTI) based on the perceptions of the Hashemite University students.
2. To determine the perceptions of the Hashemite University students toward the use of the online testing strategy.
3. To determine if significant differences exist among the Hashemite University students' perceptions based on the selected characteristics of gender, age, academic level, grade-point average (GPA), and years of experience with online testing.

## Significance of the Study

CBT in general and online testing in particular are becoming an integral part of the assessment settings of higher education institutions around the world. For the last five years, the Hashemite University in Jordan has employed several online testing tools to help in assessing students in almost all of the university requirement courses. Unfortunately, almost nothing has been done in evaluating these tools. Therefore, this study came to address this need and help the Hashemite University and other universities to improve their online testing strategies. The findings of the study are expected to pave the road of teachers, educators, university administration, and decision makers in higher education who have different roles in student assessment.

# Methodology

## Population and Sample

The sample of the study included all the Hashemite University students whom their exams were administered online. According to the university records, the sample of the study consisted of 10 courses with a total body of 270 students representing most academic fields of study in the second semester of the academic years 2006/2007. Of those, 258 students returned usable surveys representing 95% response rate. The students in this sample were predominantly of age 20-22 (76.7%) and the majority of the students were juniors (69.8%). Almost 60% of respondents had GPAs between 2.5-3.49. About 71% of students had 1-3 years of experience with online testing (see Table 1).

**Table 1** ***Demographics of the Sample***

| Variable | Number and Percentage of Total (258) |
|---|---|
| Gender | 111 males (43.0%), 147 females (57.0%) |
| Age | 49 below 20 years (19.0%), 198 of 20-22 years (76.7%), 11 above 22 (4.3%) |
| Academic Level | 47 freshmen (18.2%), 22 sophomores (8.5), 180 juniors (69.8%), 9 seniors (3.5%) |
| Grade-Point Average (GPA) | 3.5-4 (10, 3.9%), 2.5-3.49 (155, 60.1%), 2-2.49 (79, 30.6%), less than 2 (14, 15.4) |
| Years of Online Testing Experience | Less than one year (50, 19.4%), 1-3 years (184, 71.3%), more than 3 years (24, 9.3%) |

## Instrumentation

A 33-item survey called Students' Perceptions of Online Testing Instrument (SPOTI) adapted from (Alexander et al., 2002) was used to gather the required data. The survey consisted of two sections. The first section was devoted to collect personal information from participants. The second section consisted of 33-Likert-type scale questions with a five-point spread that reflected students' perceptions toward the university's strategy for online testing, where the participant scoring options were: (1) strongly disagree, (2) disagree, (3) no opinion, (4) agree, and (5) strongly agree.

## Validity and Reliability of the Instrument

The original English version of the survey was developed after an extensive review of the literature. Alexander et al. (2001) developed the original draft of the survey by asking 71 undergraduate students to describe in writing what they believed were the advantages and disadvantages of online testing. Based on this students' input, the instrument was drafted by the researchers and reviewed for validity by a 15-member panel of experts to determine if the questionnaire met the stated objectives. These experts included developers of the online testing system used at the researchers' university,

troubleshooters, and trainers for online testing system users, and faculty members who had been using the online testing system in their courses.

## Instrument Translation Process

To ensure equivalence of meaning of the items and constructs between the Arabic and English versions of the SPOTI, a rigorous translation process was used that included forward and backward translation, subjective evaluations of the translated items, and pilot testing. The goal of the translation process was to produce an Arabic version of the SPOTI with items that were equivalent in meaning to the original English version (Lomi, 1992; Sperber, Devellis, & Boehlecke, 1994). Two translators (faculty members) bilingual in English and Arabic translated the English version of the SPOTI into Arabic (forward translation). These translator were asked to retain both the form (language) and the meaning of the items as close to the original as possible but to give priority to meaning equivalence. When the Arabic translation was finalized, the SPOTI was then back-translated (from Arabic to English) by two other faculty members, bilingual in both English and Arabic.

The back-translated items were then evaluated by a group of five faculties to ensure that the item meanings were equivalent in both the original English version and the back-translated version. If differences in meaning were found between items, those items were put through the forward and back-translation process again until the faculties were satisfied that there was substantial meaning equivalence. The Arabic version of the SPOTI was then pilot tested with a group of 30 students and 10 faculties to collect feedback about instrument content and usage. The feedback from the students did not lead to any substantial changes. The feedback from the faculties emphasized that the instrument has both face and content validity in the Jordanian context.

## Instrument Standardization

The instrument was pilot tested with a group of 54 students who were enrolled in the online tested courses. These students were excluded from the actual sample of the study. Changes recommended by the validation panel and those identified as needed during the pilot test were incorporated into the instrument. These changes occurred only in the wording of items. The internal consistency of the instrument was determined using the same group of students used in the pilot study. The 33-item instrument based on the pilot test yield a reliability coefficient of ($\alpha = .83$). The standards for instrument reliability for Cronbach's alpha by Robinson, Shavor, and Wrightsman (1991) were used to judge the quality of the scale: .90-1.00 – exemplary reliability, .80 - .89 – very high reliability, .70-.79 – extensive reliability, .60-.69 – moderate reliability, and < .60 – minimal reliability. Therefore, and based on those standards, the instrument has very high reliability and is suitable for measuring students' perceptions regarding online testing.

## Data Collection

The data collection took place during the second term of the academic years 2006/2007 from students enrolled in 10 courses utilizing online testing strategy. The researchers met with classroom instructors, explained the nature and purpose of the study, and gained permission for the administration process. Participants were informed about the study through short presentations in their classes prior to the final exam. Students in attendance were informed of the purpose of the study and also were assured of confidentiality and voluntary nature of the study. The researchers distributed the instrument prior to the beginning of the final exam and collected them after completion

## Data Analysis

The study included three objectives. These objectives were analyzed using the Statistical Package of Social Sciences (SPSS 11.5). The first research objective was about determining the latent factor structure of the SPOTI. This objective was accomplished utilizing exploratory (common) factor analysis to identify the dimensions included in the instrument based on students' perceptions. Common factor analysis is considered more appropriate than principal component analysis when the objective is identification of latent structures (Nunnaly & Bernstein, 1994). Oblique rotation was employed because of its suitability for latent variable investigation when latent variables may or may not be orthogonal (Hair, Anderson, Tatham, & Black, 1998). The initial criterion used to determine the number of factors to retain was an eigenvalue greater than or equal to one. The second research objective was to determine the perceptions of the Hashemite University students regarding online testing overall and regarding each dimension. Descriptive statistics including means and standard deviations were utilized to accomplish this objective. The third research objective was to determine differences in the Hashemite University students' perceptions based on their demographic characteristics on the overall score for the SPOTI and on each dimension. With regard to gender, t-test statistic was used to determine if significant differences exist between males and females on their perceptions regarding online testing. For the rest of the demographic variables, analysis of variance (ANOVA) was utilized because it accommodates more than two levels. An alpha of .05 was set a priory.

## Results

Data collected from all participants were analyzed using SPSS 11.5. Descriptive statistics of all variables in the study were examined using frequencies. The minimum and maximum values for each variable were examined for the accuracy of data entry by inspecting out of range values, which did not show any outliers. Missing subjects were not detected either. The results section is organized according to each research objective.

## Results Pertaining to Research Objective One

The first research objective was to determine the latent factor structure of the students' perceptions of the online testing scale (SPOTI). Exploratory factor analysis with oblique

rotation was utilized. In the beginning, examination of the Measure of Sampling Adequacy (MSA) (0.83) indicated that the data is suitable for factor analysis. The 33 items in the SPOTI instrument produced an item-to-respondent ratio of approximately 8:1, well within the recommended ratio for factor analysis (Hair et al., 1998). The MSA for individual items was examined first in order to exclude any that did not meet the minimum recommended value of .60 or higher (Hair et al. 1998). All items were found to meet this criterion and were retain for further analysis.

Several criteria were used to determine how many factors to extract including the eigenvalue greater than one rule and a visual inspection of the scree plot. The initial analysis was run without specifying how many factors to retain. This procedure resulted in three factors explaining 31.96% of the common variance. This factor structure appeared to be the best representation of the data (see Table 1). An examination of the residual correlation matrix showed no substantial residuals suggesting that the three-factor structure was appropriate and that the extraction of more or fewer factors would not improve the structures representing of the data. Items were retained on factors if they had a minimum loading of .30 but were not retained if they had a cross loading above .20. Using these criteria, 26 items of the original 33 items were retained on the SPOTI.

In sum, loading of items was characterized by interpretable simple structure, meaning that it has high loadings on one factor and minimum cross-loadings on the rest of the factors. Factor loadings for items retained in this solution ranged from .32 to .77 with an average loading of .55 on major factor and .05 on the rest of the factors. The first factor was named “Environment of Online Testing”, which included 11 items (1, 3, 6, 9, 12, 13, 14, 15, 16, 17 and 21) with a reliability coefficient of .80. The second factor was named “Benefits of Online Testing”, which included 10 items (2, 7, 10, 11, 22, 23, 24, 25, 26 and 30) with a reliability coefficient of .76. The third factor was named “Problems with Online Testing”, which included five items (18, 19, 28, 31, and 32) with a reliability coefficient of .73. All factors had acceptable reliability coefficients.

**Results Pertaining Research Objective Two**

Research objective two was to determine the perceptions of the Hashemite University students toward the University's strategy for online testing. Means and standard deviations were used to accomplish this objective. As shown in Table 3, the mean value for the environment of online testing dimension (3.83) is higher than all other means, followed by the benefits of online testing (2.95), and problems with online testing (2.94) respectively. The overall value mean for the scale was 3.31. These results indicate positive and moderate agreement toward online testing.

**Table 2** ***Factor Loadings, Eigenvalues, and Variance Explained for the Student Perceptions of Online Testing Scale Factors (SPOTI).***

| Online Testing Scale Factors | | | | | |
|---|---|---|---|---|---|
| 1<br>Environment of Online Testing<br>α = .80 | | 2<br>Benefits of Online Testing<br>α = .75 | | 3<br>Problems with Online Testing<br>α = .71 | |
| Items | Loading | Items | Loading | Items | Loading |
| 15 | .70 | 22 | .68 | 32 | .77 |
| 21 | .59 | 23 | .62 | 31 | .58 |
| 12 | .58 | 30 | .60 | 28 | .36 |
| 14 | .58 | 25 | .59 | 19 | .33 |
| 16 | .57 | 24 | .57 | 18 | .32 |
| 6 | .52 | 26 | .47 | | |
| 17 | .51 | 2 | .38 | | |
| 13 | .48 | 10 | .37 | | |
| 1 | .43 | 7 | .36 | | |
| 9 | .35 | 11 | .31 | | |
| 3 | .33 | | | | |
| Eigenvalues/percentage of variance explained | | | | | |
| 6.65 | | 2.57 | | 1.32 | |
| 20.16 | | 7.79 | | 4.01 | |

**Table 3** ***Means and Standard Deviations of the Three Dimensions of the Student Perceptions of Online Testing Scale (SPOTI).***

| Dimension | Means | Standard Deviations |
|---|---|---|
| Overall of Online Testing Scale | 3.31 | .51 |
| Environment of Online Testing | 3.83 | .60 |
| Benefits of Online Testing | 2.95 | .65 |
| Problems with Online Testing | 2.94 | .80 |

**Note.** The dimension "Problems with Online Testing" is reverse coded; high positive scores indicate low level of problems**.**

## Results Pertaining to Research Objective Three

Research objective three was to determine if significant differences exist among the Hashemite University students' perceptions based on the selected characteristics of gender, age, academic level, grade-point average (GPA), and years of experience with online testing. T-test for independent samples was used to examine the difference in means between males and females. However, one-way analysis of variance (ANOVA) was utilized to identify whether the variances of the three level groups of age, the four

level groups of academic level, the four level groups of GPA, and the three level groups of experience with online testing were significantly different. Table 4 shows that there were no significant differences at the 0.05 alpha level between male students and female students on the overall score of the SPOTI and on each dimension of the SOPTI scale. Utilizing ANOVA, Table 5 shows that there were no significant differences among the three age level groups (below 20 years, 20-22 years, above 22 years) on the overall score of the SPOTI and on each dimension of the SPOTI. Similarly, Tables 6 and 7 revealed that there were no significant differences on the overall of the SPOTI and on each dimension of the SPOTI among the four academic level groups (freshmen, sophomores, juniors, and seniors) and the three groups of years of online testing experience (less than 3 years, 1-3 years, more than 3 years).

**Table 4** ***The Differences between Students Males and Females on the SPOTI Scale and on Each Dimension of the SPOTI Scale.***

| Dimension | Gender | N | Means | Std. Deviations | t | *p* |
|---|---|---|---|---|---|---|
| Overall | M | 111 | 3.33 | .52 | .53 | .60 |
| | F | 147 | 3.30 | .49 | | |
| Environment of Online Testing | M | 111 | 3.80 | .65 | - .56 | .57 |
| | F | 147 | 3.84 | .57 | | |
| Benefits of Online Testing | M | 111 | 2.98 | .64 | .92 | .36 |
| | F | 147 | 2.92 | .66 | | |
| Problems with Online Testing | M | 111 | 3.00 | .79 | 1.19 | .24 |
| | F | 147 | 2.89 | .80 | | |

**Table 5** ***The Differences among the Three Age Level Groups (blow 20 Years, 20-22 Yeas, above 22 Years) on the Overall SPOTI Scale and On Each Dimension of the SPOTI Scale.***

| Sum of Squares | | | *df* | Mean Square | *F* | *p* |
|---|---|---|---|---|---|---|
| Overall | Between Groups | .284 | 2 | .142 | .550 | .578 |
| | Within Groups | 65.948 | 255 | .259 | | |
| | Total | 66.232 | 257 | | | |
| Environment of Online Testing | Between Groups | 1.052 | 2 | .526 | 1.401 | .248 |
| | Within Groups | 95.768 | 255 | .376 | | |
| | Total | 96.820 | 257 | | | |
| Benefits of Online Testing | Between Groups | .337 | 2 | .169 | .390 | .678 |
| | Within Groups | 110.459 | 255 | .433 | | |
| | Total | 110.796 | 257 | | | |
| Problems with Online Testing | Between Groups | .081 | 2 | .040 | .062 | .940 |
| | Within Groups | 166.592 | 255 | .653 | | |
| | Total | 166.672 | 257 | | | |

**Table 6** ***The Differences among the Four Academic Level Groups (Freshmen, Sophomores, Juniors, Seniors) on the Overall SPOTI Scale and On Each Dimension of the SPOTI Scale.***

| Sum of Squares | | | *df* | Mean Square | *F* | *p* |
|---|---|---|---|---|---|---|
| Overall | Between Groups | .597 | 3 | .199 | .770 | .512 |
| | Within Groups | 65.635 | 254 | .258 | | |
| | Total | 66.232 | 257 | | | |
| Environment of Online Testing | Between Groups | 1.594 | 3 | .531 | 1.418 | .238 |
| | Within Groups | 95.226 | 254 | .375 | | |
| | Total | 96.820 | 257 | | | |
| Benefits of Online Testing | Between Groups | .683 | 3 | .228 | .525 | .666 |
| | Within Groups | 110.114 | 254 | .434 | | |
| | Total | 110.796 | 257 | | | |
| Problems with Online Testing | Between Groups | 2.381 | 3 | .794 | 1.227 | .300 |
| | Within Groups | 164.292 | 254 | .647 | | |
| | Total | 166.672 | 257 | | | |

**Table 7** ***The Differences among the Four Groups of Online Testing Experience (Less than One Year, 1-3 Years, More than 3 Years) on the Overall SPOTI Scale and On Each Dimension of the SPOTI Scale.***

| Sum of Squares | | | *df* | Mean Square | *F* | *p* |
|---|---|---|---|---|---|---|
| Overall | Between Groups | .927 | 2 | .464 | 1.810 | .166 |
| | Within Groups | 65.305 | 255 | .256 | | |
| | Total | 66.232 | 257 | | | |
| Environment of Online Testing | Between Groups | 1.795 | 2 | .897 | 2.408 | .092 |
| | Within Groups | 95.026 | 255 | .373 | | |
| | Total | 96.820 | 257 | | | |
| Benefits of Online Testing | Between Groups | 1.499 | 2 | .750 | 1.749 | .176 |
| | Within Groups | 109.297 | 255 | .429 | | |
| | Total | 110.796 | 257 | | | |
| Problems with Online Testing | Between Groups | 1.400 | 2 | .700 | 1.080 | .341 |
| | Within Groups | 165.272 | 255 | .648 | | |
| | Total | 166.672 | 257 | | | |

However, Table 8 illustrates that there were significant differences at the 0.05 level between the four groups of GPA only on the dimension of "benefits of online testing". Students with GPAs between 2-2.49 had higher mean value (M = 3.09) than those with GPAs between 2.5-3.49 (M = 2.83).

**Table 8** ***The Differences among the Four Groups of GPA (3.5-4, 2.5-3.49, 2-2.49, less than 2) on the Overall SPOTI Scale and On Each Dimension of SPOTI Scale.***

| Sum of Squares | | | *df* | Mean Square | *F* | *p* |
|---|---|---|---|---|---|---|
| Overall | Between Groups | 1.561 | 3 | .520 | 2.044 | .108 |
| | Within Groups | 64.671 | 254 | .255 | | |
| | Total | 66.232 | 257 | | | |
| Environment of Online Testing | Between Groups | .921 | 3 | .307 | .813 | .488 |
| | Within Groups | 95.899 | 254 | .378 | | |
| | Total | 96.820 | 257 | | | |
| Benefits of Online Testing | Between Groups | 5.089 | 3 | 1.696 | **4.076*** | .008 |
| | Within Groups | 105.708 | 254 | .416 | | |
| | Total | 110.796 | 257 | | | |
| Problems with Online Testing | Between Groups | 1.633 | 3 | .544 | .838 | .474 |
| | Within Groups | 165.039 | 254 | .650 | | |
| | Total | 166.672 | 257 | | | |

*Significant at the .05 alpha level

## Discussion and Conclusions

This study evaluates the online testing experience of students in a Jordanian university. The Hashemite University has adopted several online testing tools to help in students' assessment in almost all of its university requirement courses and in several other courses in various departments. In a more precise manner, this study was driven by three main objectives. The previous section displayed the results of the study pertaining each of these objectives. This section discusses the results and makes some conclusions based on the discussion. As mentioned earlier, the study surveyed 258 undergraduate students who were enrolled in courses that their exams were administered online during the second semester of the academic years 2006/2007. A 33-item survey (SPOTI) was utilized in the study to collect data from participating students. Data were analyzed based on the objectives of the study.

The first objective was to determine the latent factor structure of the SPOTI based on the perceptions of the students. Based on a systematic procedure of exploratory factor analysis with oblique rotation, 26 items of the original 33 items of the SPOTI were retained. These items appeared to have an interpretable simple structure. Three factors with acceptable reliability coefficients resulted from the analyses procedures:

1. Environment of Online Testing: this factor included 11 items with a reliability coefficient of .80.
2. Benefits of Online Testing: this factor included 10 items with a reliability coefficient of .76.
3. Problems with Online Testing: this factor included 5 items with a reliability coefficient of .73.

Based on the above results, one can conclude that a good instrument for evaluating an experience with online testing can be built around three main pillars: the environment of

the online testing, the benefits of the online testing, and the problems with online testing. The SPOTI instrument which includes these three pillars seems to be a reliable instrument for evaluating the online testing experience of the Hashemite University students. Through its 26 items, the instrument pinpointed things that have to be considered carefully when looking at the online testing experience of the Hashemite University.

The second objective was to determine the perceptions of the Hashemite University students toward the university's strategy for online testing. The findings showed that the means of students' perceptions on the three dimensions of the SPOTI scale were in the following order: 3.83 for the environment of online testing dimension, 2.95 for the benefits of online testing dimension, and 2.94 for the problems with online testing dimension. Moreover, the mean of the overall SPOTI scale was 3.31. Based on these figures, it can be concluded that:

- The dimension of the SPOTI scale that received students' highest positive rating was the environment of online testing. A positive mean value of 3.83 indicates an acceptable level of satisfaction among students toward the environment of online testing. Students in general seem to be satisfied with the settings of the online tests. These settings include things related to the schedule, place, and administration of online tests.
- The next two dimensions of the SPOTI scale, "benefits of online testing" and "problems with online testing", received less positive perceptions than the first dimension. Apparently, the mean values of perceptions for the two dimensions (2.95 and 2.94, respectively) were very close to each other but far from the mean value for the first dimension (3.83). Based on these figures, one can conclude that the benefits of online testing and the problems associated with online testing at the Hashemite University were equally perceived by students. Although students find online testing beneficial in some aspects, like being challenging and providing immediate feedback, they still face problems with online testing, like the absence of the instructor and the existence of some technical problems. This draws the conclusion that the administration of the university needs to take some serious steps toward solving problems related to online testing. At the same time, it has to reinforce the benefits of online testing in all means available.
- On the overall, students' perceptions toward the Hashemite University's strategy for online testing were positive and moderate (3.31). In general, students perceive that the university's decision for adopting online testing was acceptable. This can be looked at as an evidence for the successfulness of the decision made by the university administration for integrating online testing into the assessment process.

The third objective was to determine if significant differences exist among the Hashemite university students' perceptions toward the university's strategy for online testing based on the selected characteristics of gender, age, academic level, grade-point average (GPA), and years of experience with online testing. The results of the analyses revealed that there

were no significant differences (at 0.05 alpha level) in students' perceptions based on gender, age, academic level, and years of experience with online testing. In addition, there were no significant differences in students' perceptions among the four groups of GPA on the overall score of the SPOTI scale or on two of its dimensions ("environment of online testing" and "problems with online testing). However, on the third dimension "benefits of online testing," the results showed that there were significant differences among the four groups of GPAs. Particularly, there were significant differences in students' perceptions towards the benefits of online testing between the group of 2-2.49 GPA and the group of 2.5-3.49 GPA to the benefit of the former group. In other words, students with GPAs from 2 to 2.49 had higher mean value of perceptions toward the benefits of online testing than those with GPAs from 2.5 to 3.49. A reasonable explanation for this may be because students with GPAs from 2 to 2.49 who made just around 31% of the sample were optimistically hoping that online testing will dramatically improve their performance in the examinations by giving them more control over the questions through immediate feedback. However, students with GPAs from 2.5 to 3.49 who made the majority of the sample (around 60%) were modest and more realistic. Although they admire the benefits of online testing, they still believe that it is studying and preparation for the exam, rather than the exam strategy, that make the substantial difference in the exam scores.

In conclusion, the Hashemite University's experience with online testing seems to be successful from students' point of view. This can be considered as a good evidence for the successfulness of the decision of integrating online testing within the assessment process at the university. This study could benefit the international audience who has interest in exploring the success of online testing in other countries worldwide. One area of interest could be the issue of students' exchange and study abroad. For example, international universities may admit international students into their graduate programs based on additional admission criteria such as the ability to deal with the new technology related to teaching and learning. Further, international and regional countries that send their students to Jordan could have an advanced picture of the ability of Jordanian institutions to provide their students with up-to-date knowledge and skills related to technology (e.g., online testing).

**Recommendations**

Based on the findings of the study, the following recommendations were set forth:

1. This study should be replicated with all public and private higher education institutions in Jordan to evaluate their online testing experiences.
2. Since the results revealed an overall acceptance among students for the strategy of online testing at the Hashemite University, the administration of the university needs to move forward by taking some serious steps toward solving problems related to online testing, and by reinforcing the benefits of online testing in all means available including seminars and workshops.
3. Since the study evaluated the Hashemite University's experience with online testing just from student's angle, evaluating this experience from other angles

is vital. The perceptions of faculty members and exam administrators should be part of the overall equation.

4. The Administration of the Hashemite University should initiate a broader university planning and policy implementation for the upcoming years related to online testing. For example, the university should require the majority of faculty members to attend training workshops related to the development of online testing for their courses within a one-year time-frame. The next step is to demand each faculty member to develop a testing bank of about 1000 questions for each course that they teach.
5. Although the benefits of online testing are clearly acquainted by students, problems with online testing are also evident. University administration needs to make serious steps toward solving these problems.

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# Comments: *Strategic Alliances in higher education?*

While this Journal is one on IR in Southeast Asia, it cannot succumb itself to simply this geographical area or region. Indeed many of the papers and articles published over the last 7 years included those from other parts of the world. This is great to see for it means that people in other parts of the world recognize the contributions JIRSEA can make to the intellectual discourse in institutional research and higher education topics generally.

It is satisfying to see that the SEAAIR Executive Committee's decision on JIRSEA to be an e-journal has been proven right. The number of e-journals has mushroomed and covers a multitude of areas, disciplines and interests. The requirement of indexing agencies that e-journals should be freely accessible by the interested public had increased the size and dynamics of e-traffic involving accesses to e-journals.

If we look through many research papers nowadays, a lot of references in their reference lists increasingly come from on-line websites. This is obviously the mechanism by which predicted information explosion happens, for the effortless access to the references facilitates further and new research and thus future papers, information and hopefully improvement in our general well-being.

The interesting questions are of course, what are all these leading to and how should we react?

Answering the second question first is probably easier. So here goes.

Observations and literature are clearly in unison about the inevitability of change being the only constant now and in future. It matters not whether the change is in technology or not. Change must become part and parcel of survival. Those who resist change will face natural attrition. Those who claimed fist mover advantage will be superseded by the second place occupier if they don't change for the place of place-getters is only ephemeral.

Then we have the Net-gen or the Millennials as some would call them, the generation that is now finishing their undergraduate university studies or are entering the employment markets. Much has been said about the difference between them and previous generations. It would seem that unlike the generation of the 60's who made a lot of noise and ran lots of demonstrations, the Net-gen simply walks off if they couldn't see the system meeting their needs. Researchers say of the Net-gen as:

- a great facility for technology
- an eagerness for change
- an assumption that information is to be shared, not hoarded
- a lack of patience with bureaucracy
- a talent (and preference) for collaboration
- a passion for service, and
- a desire to make a (big) difference

These are of course not the whole story, but readers would get the gist of what is happening around us and therefore should be able to anticipate the changes that we have to make to ourselves in order to meet these challenges.

Importantly, experts seem to say that the failure to change in order to meet these challenges will result in irrevocable and irreversible losses.

Technology on the other hand has also created a virtual bridge between developed and developing nations to the extent that the perhaps 'feared' impacts of globalization are no longer haunting the latter but have arrived in force. This means that the above challenges are felt equally by developed and developing countries.

What all these lead to is the inevitable cooperation and collaboration between organizations, in our case, higher education institutions in both developed and developing countries in all aspects of their operations. In turn this will lead to strategic alliances between higher education institutions in developed and developing countries.

There are already many examples of such alliances in existence now while new ones are perhaps being prepared. Some are assisted by international organizations such as UNESCO, UNICEF, EU. Others are direct institution to institution agreements. Yet others are through professional accords such as the Washington Accord and the Sydney Accord in the engineering and technology professions,, EQUIS and EPAS in the management and business professions.

The Tenth SEAAIR Conference to be hosted by De La Salle University in Tagaytay, The Philippines in October 2010 carries the Theme of "***Towards Global-ASEAN Institutional Research Strategic Alliances***". This should be of great interest to higher education institutions within and without Southeast Asia.

# Management Expectations and Students' Perceptions of the Entry-Level Technician Skills: Evidence from the Semiconductor Industry in The Philippines

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## Abstract

This paper examines the mismatch in skills of semiconductor manufacturing technicians by doing a comparative study of the managers' expectations of technical graduate skills with students' perceptions of the skills that the semiconductor managers valued. *T*-test of the standardized means was used to reveal any significant differences in the importance rating of the skills. It was found that students have no realistic perceptions of the skills that semiconductor industry managers valued. The variations or gaps in the ranking of skills were found to be significantly different. This reveals that there are significant differences between management expectations and students' perceptions of the entry-level semiconductor technician skills that the managers valued. The gaps and the differences describe the skills mismatch that is being felt between the technical graduates' skills and the skills requirement of the semiconductor industry. The results challenged educators to align the graduates' skills to the skill needs of the industry using the validated skill standards. Close collaboration between technical schools and semiconductor companies is recommended to look into the opportunities of setting up a specialized course for semiconductor technology.

**Keywords:** Entry-level Technician Skills, Semiconductor Industry, Management Expectations, Students' Perceptions

## Introduction

The Philippines has 912 semiconductor and electronic companies operating in the country comprising 64 percent of Philippine total exports and 34 percent of the country's domestic economy (Philippines News Agency, 2007). The Semiconductors and Electronics Industries of the Philippines, Inc. (SEIPI) claims that ideally, both sectors need a total of 600 employees with a master's degree and 200 more with a doctorate degrees working within the industries by 2010. Among the fields that the industry requires its workers to specialize on are chip design, package technology development, product and test development, equipment development, and reliability engineering. These industries should take into consideration the quality of its available technical force.

The highly-specialized labor requirements that accompany a technical field always pose the problem of a stable source of experts or specialists. Unfortunately, the Philippine Information and Communications Technology (ICT), electronics, and semiconductor industry is confronted every year with a scarce number of graduates with ample skills and a large pool of young, inexperienced, and unqualified workers with further need for training (AIM Policy Center, 2005). These companies are, therefore, hardly competing for skilled, qualified, and experienced graduates in the market.

It is important to look at the current situation of the technical education. There may be a need to raise standards to a level which will enable technical graduates to function effectively in this increasingly sophisticated work environment. There should be a match or agreement on the actual level of skill and kinds of knowledge and behaviors graduates need to succeed in today's semiconductor industry needs. Without clear definition of the proficiencies graduates should have, technical schools cannot begin to change curricula and assessment programs to ensure the adequate preparation.

A number of studies have investigated industry expectations of graduates, graduates' actual skill levels, and broader issues related to school's curriculum. However, majority of the studies were done in the context of a school or college consortium of a particular education initiates the partnership with industry representatives to review programs based on a national curriculum model. The results were then being used to improve curriculum development, faculty training, facility improvement, and student recruitment. Since the acquisition of skills that match the job requirements has become an issue in human resource development (Xiao, 2006), it is, therefore, imperative that industry must have a defined list of its desirable skills that can be communicated to economic and workforce initiatives and educational institutions. It would be even better if industry could get a comprehensive view of the existing gap in terms of what is expected by the management and what is perceived by the students. This paper aimed to explore the important technical skills required by semiconductor and electronic industries. This study also aimed to find out if the current technical school curriculum is meeting the industries' expectations of delivering the skill sets needed in the workplace.

## Operational Framework

The significant challenge of preparing students for the opportunities offered by tomorrow's technologies requires that industry do its part (Coucil for Education Policy, Research and Improvement, 2004). Communicating the industry skill requirements to these students' technical institutions would play a major role in facing that challenge. Better coordination between industries and the school system, with respect to curriculum, will help ensure the graduates not only meet educational expectations, but also industry expectations regarding the skill sets needed in the workplace.

One response to the perceived "skills gap" – the mismatch between the existing workforce skills supply and the skill demands in the new workplace – has been to redefine skill needs to reflect employer concerns. This redefinition shifts the focus from job-specific skills to general skills and adds other factors, such as attitudes or pro-social behaviors that are not typically defined as "skills". One conception, offered in a book by Marshall and Tucker (1992, p.80), sums up "the emerging consensus on the skills needed to power a modern economy" as follows: a high capacity for abstract, conceptual thinking; the ability to apply that capacity effectively to complex, real-world problems that may change as jobs evolve; the ability to communicate effectively, particularly when communicating within work groups, on highly technical topics, and with computer-based media; and the ability to work well with others as well as independently, with relatively little supervision (Stasz et al., 1993). These notions led to the conceptualization of the framework of this study.

The technical/vocational education/post-secondary formal education provides skills orientation training and development for a particular occupation or group of middle level occupation. Technical education includes the training of semi-skilled and middle-level manpower needed in agricultural, industrial, and service occupations.

Figure 1 shows the industry-based skill standards for entry-level technicians operationally used to develop expectation-perception "gap analysis". The skill standards which was adopted from previous study was developed using the professional model. The said model supplied more context for the work performed and describe the kinds of interactions that occur among individuals involved in the work process (Merritt, 1996).

The expectations-perceptions gap analysis is likely to reveal the result - skills mismatch in the manufacturing technician cluster of the semiconductor industry. This identified gap or mismatch can be communicated to economic and workforce initiatives and educational institutions. Furthermore, the other heavy lines imply a workable process in the acquisition of skills that match job requirements. The skill standards are actually ranked performance criteria (skills or behaviors) from a list of 247 observable and measurable behaviors rated in terms of importance (how important it is to know or do), proficiency (how well must it be done), frequency (how frequently is the task done or the knowledge applied), and difficulty (how difficult is it to learn or do).

The expectations-perceptions gap analysis will reveal the skills mismatch in the manufacturing technician cluster of the semiconductor industry. This identified gap or mismatch can be communicated to economic and workforce initiatives and educational institutions. Furthermore, the other heavy lines imply a workable process in the acquisition of skills that match job requirements.

## Methodology

Primary data were gathered through the use of self-completion survey instrument that were filled out by industry managers from 13 semiconductor companies and graduating students of technical schools located in NCR and CALABARZON areas. The survey questionnaire was developed from the adopted semiconductor manufacturing technician skill standards published by Maricopa Advanced Technology Education Center located in Tempe, Arizona, US in joint and collaborative effort with SEMATECH Technician Training Council, Richland College, and other participating semiconductor companies in the same region.

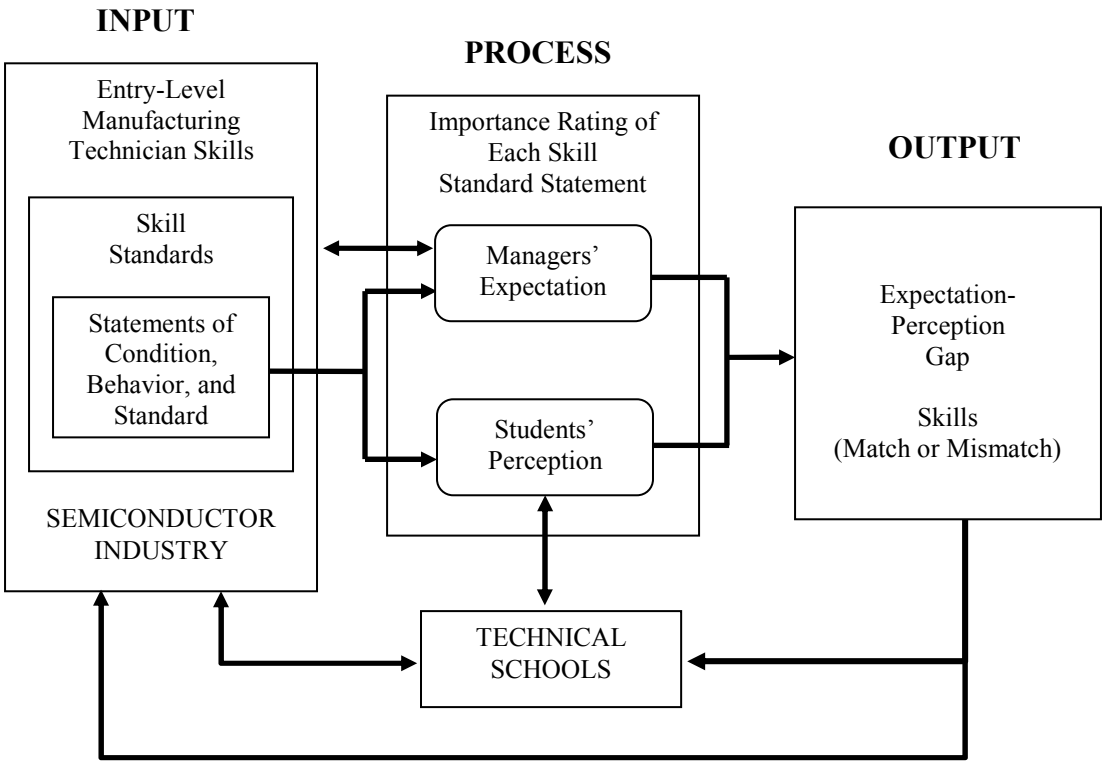


***Figure 1. A model showing entry-level technician skill standards needed by the semiconductor industry operationally used to assess expectations-perceptions gap and its underlying significance.***

The samples, drawn through simple random sampling, comprised of managers working in semiconductor companies (in-house manufacturer and contract-manufacturer) engaged in assembly with test manufacturing and purely test manufacturing operations. They were chosen at random from Cavite, Laguna, and National Capital Region in the Philippines. The sample students were drawn from two top technical schools in Metro Manila. One of the two schools is a state university which has its 3rd year students that had finished on-the-job training and readying for graduation while the other school is a technical private institution which has very recent graduates.

The survey instrument consisted of 70 skill standard descriptors covering a total of 22 skill standards. The managers and students were asked to rate the importance of each skill standard statements on a 5-point scale that was labeled 0= not important, 1= less important, 2= important, 3= very important, 4 = critically important and D= don't know (for items you do not understand). A "don't know" category was provided so that they will not be forced to rate skill standard statements that they do not understand. The *t* test of the standardized means was employed to reveal any significant differences in the importance rating of the skill standards of the managers and the students.

## Results and Discussion

### *Management Expectations and Students' Perceptions of the Skill Sets Needed*

Analysis of the managers' top 15 skills showed that skill descriptors associated to the skill standard group *P* (adhering to basics safety practices) were rated with high importance as three skill descriptors belong to the top 4 (Table 1). It was then followed by a skill descriptor on the 3.5th rank, "utilize variety of hand tools correctly", which belongs to group *L* (performing preventive and routine maintenance). Two other skill descriptors ranked 14th and 15th belong to the same group.

Ranking 5th is an important skill standard descriptor 'measure voltage, current, and resistance' which is a lone descriptor belonging to group B. Managers are also emphasizing not only safety and demonstration of basic knowledge but also the importance of interpersonal skills through the inclusion of several skill descriptors belonging to group U (employing interpersonal skills). Descriptors belonging to group N (implementing manufacturing technology and techniques) ranked next. The least important skill descriptors belong to group K (operating remote systems) and group M (maintaining automated systems).

Table 2 shows that the skill standard 'adhering to basic safety practices' shows coherence to the ranked ratings of its skill descriptors. The next was the skill standard 'implementing manufacturing technology and techniques' which has many skill descriptors rated with higher importance. The skill standards that have skill descriptors

ranked at bottom15 from previous table remained to be as the five least important for the managers with a relative unimportance value or standardized means of -0.54 to -1.09.

Table 3 presents a summary of the students' perceptions of skill descriptors that are important to the managers. Their ranking shows that a skill descriptor associated to the skill standard groups *A* implementing quality principles) topped the list with standardized mean value of 0.41. The 2nd and 5th were skill descriptors associated to group *P* (adhering to basic safety practices). Coming in strongly for 3rd, 4th and 6th position were all the descriptors associated with group *U* (employing interpersonal skills). It is quite interesting to recognize the importance that the students are giving to these skills. The rest of the top 15 were mostly concentrated on descriptors associated with group *E* (troubleshooting and repairing electrical/electronic systems).

***Table 1***
***Industry Managers' Rating of Skill Standard Descriptors***

| Description | Skill standard group | Managers' rating | | |
|---|---|---|---|---|
| | | Std. mean | Std. dev | Rank |
| **Managers' 15 most important skill standard descriptors:** | | | | |
| Follow basic safety practices | P | 0.94 | 0.59 | 1.5 |
| Demonstrate emergency shutdown procedures | P | 0.94 | 0.65 | 1.5 |
| Utilize a variety of hand tools correctly | L | 0.82 | 0.73 | 3.5 |
| Apply appropriate OSHA standards | P | 0.82 | 0.67 | 3.5 |
| Measure voltage, current, and resistance | B | 0.76 | 0.71 | 5 |
| Observe ESD precautions for product and equipment components | A | 0.69 | 0.67 | 6 |
| Follow operational procedures | U | 0.68 | 0.76 | 7 |
| Maintain chemical and gas delivery and disposal systems | N | 0.65 | 0.76 | 8 |
| Operate manufacturing equipment | C | 0.60 | 0.64 | 9.5 |
| Recognize ethical and non-ethical business practices | S | 0.60 | 0.74 | 9.5 |
| Recognize electrical/electronic malfunction indications | E | 0.59 | 0.56 | 11 |

| Description | Skill standard group | Managers' rating | | |
|---|---|---|---|---|
| | | Std. mean | Std. dev | Rank |
| Conform to clean room protocol | N | 0.57 | 0.63 | 12 |
| Exhibit responsibility | U | 0.56 | 0.80 | 13 |
| Fill out maintenance record form including appropriate information | L | 0.41 | 0.70 | 14 |
| Use mechanical measuring devices to calculate dimensions | L | 0.40 | 0.63 | 15 |

Note: *Skill Standard.* A = Implementing Quality Principles, B = Demonstrating Working Knowledge of Basic Electronics Principles, C = Operating Equipment, D = Processing Wafers / Assembly / Test; E = Troubleshooting and Repairing Electrical/Electronic Systems; F = Troubleshooting and Repairing Pneumatic Systems; G = Troubleshooting and Repairing Hydraulic Systems; H = Troubleshooting and Repairing Mechanical/Electromechanical Systems; I = Troubleshooting and Repairing Vacuum Systems; J = Troubleshooting and Repairing RF Systems; K = Operating Remote Systems; L = Performing Preventive and Routine Maintenance, M = Maintaining Automated Systems, N = Implementing Manufacturing Technology and Techniques, O = Utilizing Computers, P = Adhering to Basic Safety Practices, Q = Applying Scientific Fundamentals, R = Performing Mathematical Computations, S = Recognizing Workplace Fundamental Principles, T = Using Information Skills, U = Employing Interpersonal Skills, V = Displaying Appropriate Personal Qualities.

The students' ratings of skills standard groups are shown in Table 4. The 1st on the rank is the skill standard "employing interpersonal skills" which has many skill descriptors rated with higher importance. Those that ranked 2nd, 3rd, and 4th were the skill standards associated with most of the top 15 skill standard descriptors. Skill descriptors are associated with the skill standards of adhering to basic safety practices, employing interpersonal skills, demonstrating working knowledge of basic electronics principles, performing preventive and routine managers'

expectations. While the managers ranked the skill descriptors "utilize a variety of hand tools correctly" (3.5th on the rank) and skill descriptor "measure voltage, current, and resistance" (5th on the rank) relatively higher, the students' perceptions on the importance of these skills to the managers were ranked very low (ranks 16.5th and 19th, respectively). Students rated five skill descriptors, which are usually associated with

maintaining automated systems, very much higher than the managers' rating. Students perceived these skill standards to be of relevant to the industry but the managers' expectations are less.

### *Comparison of Managers' Expectations With Students' Perceptions of the Skills That Managers Valued*

Table 5 shows the summary of managers' top 15 and bottom 15 ranked skill descriptors *vis a vis* the students' responses. It is worth noting that there are wide gaps between the industry expectations and students perceptions on the skill descriptors especially those that ranked 3.5th, 5th, 9.5th, 14$^{th}$, and 15$^{th}$ on managers' expectations. The managers' most important skill standard descriptor was ranked second by the students. There were seven among the top 15 ranked skill descriptors that were common to both groups. Skill descriptors associated with the skill standards of adhering to basic safety practices, employing interpersonal skills, demonstrating working knowledge of basic electronics principles, performing preventive and routine maintenance, and implementing manufacturing technology and techniques featured strongly in the top 15 skills identified by managers. Only those associated with the skill standards of adhering to basic safety practices and employing interpersonal skills were found to be common to both groups on the top 15 ranked skill descriptors.

There was a wide variation in the ranking of the skill standard descriptors between the two sample populations. In comparing the managers' and students' ratings of skill descriptors using standardized means, *t* test showed a significant difference in the importance rating of the skill descriptors (Table 6).

***Table 2***
***Industry Managers' Rating of Each Skill Standard***

| Skill Standards | Managers' Rating | | |
|---|---|---|---|
| | Std. mean | Std. dev | Rank |
| Adhering to Basic Safety Practices [P] | 0.90 | 0.59 | 1 |
| Implementing Manufacturing Technology and Techniques [N] | 0.61 | 0.34 | 2 |
| Employing Interpersonal Skills [U] | 0.50 | 0.69 | 3 |
| Operating Equipment [C] | 0.46 | 0.64 | 4 |
| Recognizing Workplace Fundamental Principles [S] | 0.43 | 0.73 | 5 |
| Demonstrating Working Knowledge of Basic Electronic Principles [B] | 0.32 | 0.58 | 6 |
| Performing Preventive and Routine Maintenance [L] | 0.24 | 0.43 | 7 |
| Displaying Appropriate Personal Qualities [V] | 0.18 | 0.55 | 8 |
| Implementing Quality Principles [A] | 0.15 | 0.66 | 9 |
| Troubleshooting and Repairing Electrical/Electronic Systems [E] | 0.10 | 0.36 | 10 |
| Troubleshooting and Repairing Mechanical/Electromechanical Systems [H] | -0.02 | 0.56 | 11 |
| Utilizing Computers [O] | -0.03 | 0.57 | 12 |
| Performing Mathematical Computations [R] | -0.06 | 0.68 | 13 |
| Processing Wafers / Assembly / Test [D] | -0.07 | 0.53 | 14 |
| Troubleshooting and Repairing Pneumatic Systems [F] | -0.10 | 0.44 | 15 |
| Applying Scientific Fundamentals [Q] | -0.12 | 0.82 | 16 |
| Using Information Skills [T] | -0.22 | 0.58 | 17 |
| Troubleshooting and Repairing RF Systems [J] | -0.54 | 0.69 | 18 |
| Troubleshooting and Repairing Vacuum Systems [I] | -0.54 | 0.55 | 19 |
| Troubleshooting and Repairing Hydraulic Systems [G] | -0.70 | 0.78 | 20 |
| Maintaining Automated Systems [M] | -0.80 | 0.60 | 21 |
| Operating Remote Systems [K] | -1.09 | 0.52 | 22 |

***Table 3***
***Students' Rating of Skill Standard Descriptors***

| Description | Skill standard group | Students' Rating | | |
|---|---|---|---|---|
| | | Std. mean | Std. dev | Rank |
| **Students' 15 most important skill standard descriptors:** | | | | |
| Observe ESD precautions for product and equipment components | A | 0.41 | 0.66 | 1 |
| Follow basic safety practices | P | 0.35 | 0.60 | 2 |
| Exhibit responsibility | U | 0.32 | 0.58 | 3 |
| Follow operational procedures | U | 0.30 | 0.60 | 4 |
| Apply appropriate OSHA standards | P | 0.28 | 0.57 | 5 |
| Exhibit teamwork skills | U | 0.24 | 0.57 | 6 |
| Display self-management skills | V | 0.23 | 0.64 | 7 |
| Conduct routine preventative maintenance | E | 0.23 | 0.64 | 8 |
| Demonstrate emergency shutdown procedures | P | 0.22 | 0.64 | 9 |
| Recognize electrical/electronic malfunction indications | E | 0.22 | 0.61 | 10 |
| Troubleshoot manufacturing equipment | C | 0.20 | 0.63 | 11 |
| Troubleshoot electrical/electronic components and devices, using proven techniques | E | 0.19 | 0.55 | 12 |
| Establish a goal (personal or occupation related) | S | 0.17 | 0.64 | 13 |
| Troubleshoot root-cause of electronic failures | E | 0.16 | 0.62 | 14 |

***Table 4***
***Students' Rating of Skill Standard Groups***

| Skill Standard | Students' Rating | | |
|---|---|---|---|
| | Std. mean | Std. dev | Rank |
| Employing Interpersonal Skills [U] | 0.90 | 0.47 | 1 |
| Adhering to Basic Safety Practices [P] | 0.61 | 0.47 | 2 |
| Troubleshooting and Repairing Electrical/Electronic Systems [E] | 0.50 | 0.50 | 3 |
| Displaying Appropriate Personal Qualities [V] | 0.46 | 0.55 | 4 |
| Implementing Quality Principles [A] | 0.43 | 0.47 | 5 |
| Implementing Manufacturing Technology and Techniques [N] | 0.32 | 0.61 | 6 |
| Operating Equipment [C] | 0.25 | 0.49 | 7 |
| Using Information Skills [T] | 0.18 | 0.47 | 8 |
| Utilizing Computers [O] | 0.15 | 0.49 | 9 |
| Demonstrating Working Knowledge of Basic Electronic Principles [B] | 0.10 | 0.47 | 10 |
| Processing Wafers / Assembly / Test [D] | -0.02 | 0.45 | 11 |
| Applying Scientific Fundamentals [Q] | -0.02 | 0.62 | 12 |
| Maintaining Automated Systems [M] | -0.06 | 0.58 | 13 |
| Troubleshooting and Repairing Pneumatic Systems [F] | -0.07 | 0.47 | 14 |
| Performing Preventive and Routine Maintenance [L] | -0.10 | 0.36 | 15 |
| Troubleshooting and Repairing Mechanical/Electromechanical Systems [H] | -0.13 | 0.54 | 16 |
| Recognizing Workplace Fundamental Principles [S] | -0.22 | 0.57 | 17 |
| Troubleshooting and Repairing Hydraulic Systems [G] | -0.53 | 0.53 | 18 |
| Troubleshooting and Repairing RF Systems [J] | -0.54 | 0.64 | 19 |
| Performing Mathematical Computations [R] | -0.70 | 0.58 | 20 |
| Operating Remote Systems [K] | -0.79 | 0.65 | 21 |
| Troubleshooting and Repairing Vacuum Systems [I] | -1.09 | 0.59 | 22 |

***Table 5***
***Comparison of Managers' and Students' Importance Ratings of Skill Descriptors by Rank***

| Description | Skill standard group | Managers' rank (a) | Students' rank (b) | Rank gap (b-a) |
|---|---|---|---|---|
| **Managers' 15 most important skill standard descriptors:** | | | | |
| Follow basic safety practices | P | 1.5 | 2 | 0.5 |
| Demonstrate emergency shutdown procedures | P | 1.5 | 9 | 7.5 |
| Utilize a variety of hand tools correctly | L | 3.5 | 20 | 16.5 |
| Apply appropriate OSHA standards | P | 3.5 | 5 | 1.5 |
| Measure voltage, current, and resistance | B | 5 | 24 | 19 |
| Observe ESD precautions for product and equipment components | A | 6 | 1 | -5 |
| Follow operational procedures | U | 7 | 4 | -3 |
| Maintain chemical and gas delivery and disposal systems | N | 8 | 16 | 8 |
| Operate manufacturing equipment | C | 9.5 | 43 | 33.5 |
| Recognize ethical and non-ethical business practices | S | 9.5 | 46 | 36.5 |
| Recognize electrical/electronic malfunction indications | E | 11 | 10 | -1 |
| Conform to clean room protocol | N | 12 | 21 | 9 |
| Exhibit responsibility | U | 13 | 3 | -10 |
| Fill out maintenance record form including appropriate information | L | 14 | 35.5 | 21.5 |
| Use mechanical measuring devices to calculate dimensions | L | 15 | 45 | 30 |
| Identify vacuum components | I | 56.5 | 67.5 | 11 |

| Description | Skill standard group | Managers' rank (a) | Students' rank (b) | Rank gap (b-a) |
|---|---|---|---|---|
| Identify RF equipment purpose and proper use | J | 56.5 | 51 | -5.5 |
| Identify requirements for RF connections and cabling | J | 58 | 60 | 2 |
| Conduct vacuum diagnosis (using a vacuum diagnostic system) | I | 59 | 66 | 7 |
| Explain vacuum fundamentals | I | 60.5 | 70 | 9.5 |
| Explain the purpose of each RF matches and theories | J | 60.5 | 59 | -1.5 |
| Install and adjust hydraulic components | G | 62 | 58 | -4 |
| Program motor controllers | E | 63 | 23 | -40 |
| Troubleshoot hydraulic components | G | 64.5 | 54 | -10.5 |
| Calibrate robot coordinate systems | M | 64.5 | 40 | -24.5 |
| Troubleshoot/maintain automated systems including robots, end effectors, fixed automations, and material transfer systems | M | 66.5 | 31 | -35.5 |
| Program automated systems including robots, end effectors, fixed automations, machine vision | M | 66.5 | 41 | -25.5 |
| Recall the reason for using DI water in semiconductor manufacturing | K | 68 | 69 | 1 |
| Identify cause and effects of problems within the liquid delivery system | K | 69 | 63 | -6 |
| Identify cause and effects of problems with the gas delivery system | K | 70 | 64 | -6 |

Analysis of the ranked skill standards showed the insubstantial amount of agreement among industry managers' expectations and students' perceptions (Table 7). Among the skill standards that have wide gaps with respect to managers' expectations were the following: implementing manufacturing technology and techniques, recognizing workplace fundamental principles, demonstrating working knowledge of basic

electronics principles, performing preventive and routine maintenance, and performing mathematical computations. The positive and negative values imply wide gaps on the management expectations' and students' perceptions of the skills that the managers valued.

The managers' and students' ratings of skill standards using standardized means is shown in Table 8. Since there were wide gaps in the ranking of the skill standards between the two sample populations, *t* test of the standardized means revealed that there were significant differences in the importance rating of 13 out of 22 skill standards. Only nine skill standards were found to be not significant.

## Summary

This study aimed at determining the managers' expectations of the entry-level technician skills that graduates of three-year technology programs are required in a rapidly growing semiconductor and electronics industries The managers identified the skill standards of adhering to basic safety practices, implementing manufacturing technology and techniques, employing interpersonal skills, operating equipment, and recognizing workplace fundamental principles as the top 5 most important skills. Students' identified 7 of the 10 skill standards belonging to their top 10 most important rating. The ranking of standardized means revealed significant differences between managers' expectations and students' perceptions of the skills standards. Since there were variations in the ranking of skill standards, *t* test of the standardized means revealed the significant differences in the importance rating of the skill standards.

The managers' and students' ranking of skill standards reveals the wide gaps between management expectations and students' perceptions. This implies that students have no realistic perceptions of the skills that semiconductor industry managers valued. The gaps and the differences describe the skills mismatch that is being felt between the technical graduates' skills and the skills requirements of the semiconductor industry.

With these findings, technical schools should recognize the wide opportunities in meeting the technical skill requirements of a fast growing and dynamic semiconductor industry in the Philippines. Close collaboration and support from these industries will help bring this opportunity of having a specialized semiconductor technology course into a reality. The alleged skills mismatch can now be resolved through standardizing the skills in technical schools. The There must be a very comprehensive review and revision on the curriculum of the schools coupled with retooling of teachers and upgrading of facilities to respond to the latest technology and techniques of business and industry. The development of a technical course curriculum using valid and reliable skill standards has the potential of improving the quality of both academic and vocational technical education in the country. Moreover, this industry-validated standard for semiconductor industry can, likewise, be adopted by other electronic companies.

***Table 6***
***Standardized Means and t Test of Means for Skill Standard Descriptors***

| Description | Standardized mean | | *t* value | Significance |
|---|---|---|---|---|
| | Managers | Students | | |
| **Managers' 15 most important skill standard descriptors:** | | | | |
| Follow basic safety practices | 0.94 | 0.35 | 6.99 | .000000 |
| Demonstrate emergency shutdown procedures | 0.94 | 0.22 | 7.93 | .000000 |
| Utilize a variety of hand tools correctly | 0.82 | 0.14 | 7.32 | .000000 |
| Apply appropriate OSHA standards | 0.82 | 0.28 | 6.29 | .000000 |
| Measure voltage, current, and resistance | 0.76 | 0.11 | 6.16 | .000000 |
| Observe ESD precautions for product and equipment components | 0.69 | 0.41 | 3.04 | .002658 |
| Follow operational procedures | 0.68 | 0.30 | 4.18 | .000041 |
| Maintain chemical and gas delivery and disposal systems | 0.65 | 0.16 | 4.70 | .000004 |
| Operate manufacturing equipment | 0.60 | -0.06 | 6.83 | .000000 |
| Recognize ethical and non-ethical business practices | 0.60 | -0.07 | 6.62 | .000000 |
| Recognize electrical/electronic malfunction indications | 0.59 | 0.22 | 4.39 | .000017 |
| Conform to clean room protocol | 0.57 | 0.13 | 4.52 | .000010 |
| Exhibit responsibility | 0.56 | 0.32 | 2.65 | .008495 |
| Fill out maintenance record form including appropriate information | 0.41 | -0.01 | 4.39 | .000017 |
| Use mechanical measuring devices to calculate dimensions | 0.40 | -0.07 | 5.23 | .000000 |
| Identify vacuum components | -0.50 | -0.35 | -1.54 | .125255 |

| Description | Standardized mean | | *t* value | Significance |
|---|---|---|---|---|
| | Managers | Students | | |
| Identify RF equipment purpose and proper use | -0.50 | -0.12 | -3.70 | .000263 |
| Identify requirements for RF connections and cabling | -0.52 | -0.19 | -3.25 | .001318 |
| Conduct vacuum diagnosis (using a vacuum diagnostic system) | -0.53 | -0.34 | -1.97 | .050480 |
| Explain vacuum fundamentals | -0.59 | -0.65 | 0.52 | .603294 |
| Explain the purpose of each RF matches and theories | -0.59 | -0.18 | -3.68 | .000284 |
| Install and adjust hydraulic components | -0.66 | -0.17 | -5.28 | .000000 |
| Program motor controllers | -0.72 | 0.12 | -4.18 | .000040 |
| Troubleshoot hydraulic components | -0.74 | -0.13 | -6.07 | .000000 |
| Calibrate robot coordinate systems | -0.74 | -0.05 | -6.82 | .000000 |
| Troubleshoot/maintain automated systems including robots, end effectors, fixed automations, and material transfer systems | -0.82 | 0.03 | -9.33 | .000000 |
| Program automated systems including robots, end effectors, fixed automations, machine vision | -0.82 | -0.06 | -7.83 | .000000 |
| Recall the reason for using DI water in semiconductor manufacturing | -1.05 | -0.57 | -4.23 | .000035 |
| Identify cause and effects of problems within the liquid delivery system | -1.09 | -0.24 | -8.31 | .000000 |
| Identify cause and effects of problems with the gas delivery system | -1.13 | -0.27 | -8.83 | .000000 |

***Table 7***
***Comparison of Managers' and Students' Ranking of Skill Standards***

| Skill Standard | Managers' rank (a) | Students' rank (b) | Rank gap (b-a) |
|---|---|---|---|
| Adhering to Basic Safety Practices [P] | 1 | 2 | 1 |
| Implementing Manufacturing Technology and Techniques [N] | 2 | 6 | 4 |
| Employing Interpersonal Skills [U] | 3 | 1 | -2 |
| Operating Equipment [C] | 4 | 7 | 3 |
| Recognizing Workplace Fundamental Principles [S] | 5 | 17 | 12 |
| Demonstrating Working Knowledge of Basic Electronic Principles [B] | 6 | 10 | 4 |
| Performing Preventive and Routine Maintenance [L] | 7 | 15 | 8 |
| Displaying Appropriate Personal Qualities [V] | 8 | 4 | -4 |
| Implementing Quality Principles [A] | 9 | 5 | -4 |
| Troubleshooting and Repairing Electrical/Electronic Systems [E] | 10 | 3 | -7 |
| Troubleshooting and Repairing Mechanical/Electromechanical Systems [H] | 11 | 16 | 5 |
| Utilizing Computers [O] | 12 | 9 | -3 |
| Performing Mathematical Computations [R] | 13 | 20 | 7 |
| Processing Wafers / Assembly / Test [D] | 14 | 11 | -3 |
| Troubleshooting and Repairing Pneumatic Systems [F] | 15 | 14 | -1 |
| Applying Scientific Fundamentals [Q] | 16 | 12 | -4 |
| Using Information Skills [T] | 17 | 8 | -9 |
| Troubleshooting and Repairing RF Systems [J] | 18 | 19 | 1 |
| Troubleshooting and Repairing Vacuum Systems [I] | 19 | 22 | 3 |
| Troubleshooting and Repairing Hydraulic Systems [G] | 20 | 18 | -2 |
| Maintaining Automated Systems [M] | 21 | 13 | -7 |

| Skill Standard | Managers' rank (a) | Students' rank (b) | Rank gap (b-a) |
|---|---|---|---|
| Operating Remote Systems [K] | 22 | 21 | -1 |

***Table 8***
***Standardized Means and t Test of Means for Each Skill Standard***

| Skill Standard | Standardized mean | | *t* value | Significance |
|---|---|---|---|---|
| | Managers | Students | | |
| Adhering to Basic Safety Practices | 0.90 | 0.28 | 8.76 | .000000 |
| Implementing Manufacturing Technology and Techniques | 0.61 | 0.14 | -4.83 | .000002 |
| Employing Interpersonal Skills | 0.50 | 0.29 | 2.94 | .003587 |
| Operating Equipment | 0.46 | 0.07 | 5.12 | .000001 |
| Recognizing Workplace Fundamental Principles | 0.43 | -0.07 | 4.40 | .000016 |
| Demonstrating Working Knowledge of Basic Electronic Principles | 0.32 | 0.04 | 4.01 | .000080 |
| Performing Preventive and Routine Maintenance | 0.25 | -0.07 | 5.88 | .000000 |
| Displaying Appropriate Personal Qualities | 0.18 | 0.18 | 0.02 | .985034 |
| Implementing Quality Principles | 0.15 | 0.16 | -0.18 | .855059 |
| Troubleshooting and Repairing Electrical/Electronic Systems | 0.10 | 0.19 | -1.27 | .205871 |
| Troubleshooting and Repairing Mechanical/Electromechanical Systems | -0.03 | -0.07 | 0.60 | .550531 |
| Utilizing Computers | -0.03 | 0.05 | -1.14 | .257359 |
| Performing Mathematical Computations | -0.06 | -0.30 | 2.75 | .006453 |
| Processing Wafers / Assembly / Test | -0.07 | -0.00 | -1.10 | .274218 |
| Troubleshooting and Repairing Pneumatic Systems | -0.10 | -0.05 | -0.65 | .515469 |
| Applying Scientific Fundamentals | -0.13 | -0.01 | 0.28 | .783751 |
| Using Information Skills | -0.22 | 0.06 | -3.90 | .000125 |
| Troubleshooting and Repairing RF Systems | -0.54 | -0.16 | -4.07 | .000064 |
| Troubleshooting and Repairing Vacuum Systems | -0.54 | -0.44 | -0.97 | .333957 |
| Troubleshooting and Repairing Hydraulic Systems | -0.70 | -0.15 | -6.16 | .000000 |
| Maintaining Automated Systems | -0.80 | -0.03 | -9.26 | .000000 |
| Operating Remote Systems | -1.09 | -0.36 | -8.47 | .000000 |

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