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the Rural Context in Malaysia

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Teoh Sian Hoon
Nor Syazwani Rasid
Nurul Akmal Md Nasir
Cheong Tau Han
Norziah Abdul Rahman

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1. **A Preliminary Study of Leadership in the Rural
Context in Malaysia** 1
Mary Yap Kain Ching
Siew Heng Loke
2. **Personal Realities and the Apprenticeship of
Supervising : My Tortuous Journey as a Supervisor** 21
Habibah Ashari
3. **Formal University Education and Job
Competency of New Engineers in Automotive
Industry in Malaysia** 41
Chan Yuen Fook
Selvam Balaram
4. **Teaching and Learning of College Mathematics
and Students' Mathematical Thinking :
Are the Lines of the Same Track?** 69
Parmjit Singh
Teoh Sian Hoon
Nor Syazwani Rasid
Nurul Akmal Md nasir
Cheong Tau Han
Norziah Abdul Rahman

**5. Academics' Diversification : Enhancing Graduate
Employability through the Scholarship of Teaching
and Learning**

Faizah A. Majid

85

A PRELIMINARY STUDY OF EDUCATIONAL LEADERSHIP IN THE RURAL CONTEXT IN MALAYSIA

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ABSTRACT

The paper focused on the review of literature particularly in relation to rural education in the Malaysian context. This exposed the scarcity of research on effective leadership practices in rural context especially in Malaysia. This awareness is an impetus for future researchers to venture into this issue and subsequently contribute to the knowledge corpus of effective leadership practices in the rural context. The paper also put forth a review of a preliminary study conducted on an award winning Head Teacher as observed in a rural primary school in Sarawak who had elevated his school to a higher stratum by clinching an international award, the Commonwealth Education Good Practice Award. Unstructured observations and informal interviews had been conducted and the data collected had been analysed using open, axial and selective coding processes. The preliminary findings had been mapped onto five main settings namely human, interactional, physical, programme and emotional. The review of this preliminary study exemplified the value of investigating leadership practices particularly in their specific rural context as different contexts might entail different leadership practices.

Keywords: *Rural education in the Malaysian context, leadership, head teacher, rural primary school, physical setting, human setting, interactional setting, programme setting, emotional setting*

INTRODUCTION

Prior to the 21st Century, research on urban schools has been given focus and this clearly suggested that there is a distinct lack of research on rural perspectives, challenges and issues. Relatively few scholars have studied rural education issues (Sherwood, 2000). This was alarming as policy makers experienced difficulty in finding recommendations from rigorous research which could help them formulate proper strategies and policies to help rural schools accelerate positive changes (Arnold, 2004).

“Research that specifically examines rural education is in a word, scant” (Sherwood, 2000, p. 160; Barley & Beesley, 2007; Howley *et al.*, 2005) and yet rural education is an important issue for a number of countries like the United States of America, Australia, New Zealand including Malaysia. Thus, educational research looking at issues surrounding rural schools and rural education needs to be carried out (Holloway, 2002), otherwise pupils, teachers, and rural community which is part of rural schools will remain at a disadvantage (Arnold, 2000; Holloway, 2002; Kline, 2002).

As a matter of fact, the paucity of rural research has meant that rural research carried out in Malaysia and elsewhere, has remained relatively undeveloped and is still at the level of exploration and description, rather than as a critical analysis of the development of responsibility and self-management of schools

The Purpose of this Paper

The purpose of this paper is to put forth a review of studies on rural schools in Malaysia which highlighted various issues and factors affecting the performance of rural schools generally and students specifically. This review has revealed the gap in research on rural school pertaining to leadership. Very little attention has been paid to leadership in rural schools especially when principals there often faced additional challenges (Chalker, 1999; Starr & White, 2008). The lack of rural education leadership research has posed a problem to school leaders serving in rural schools to effect policy development, planning and decision-making to improve educational support for rural teachers and students. This gap has already been pointed out by Bajunid (2008) when he acknowledged that the knowledge corpus

in the field of Malaysian educational administration and leadership from the rural perspective remains elusive. As a result, many of the rural primary schools in Malaysia are struggling academically because of poor leadership as most of the head teachers are placed there without any knowledge of what it takes to be effective school leaders. At the later part of this paper, the preliminary study on the Head Teacher who had successfully led the case school to the top position in the district is described. The leadership practices of this award winning Head Teacher had enabled the case school to beat the odds despite being tucked in the remote rural community of Lawas in Sarawak. This subsequently establishes the fact that leadership matters especially in bringing and integrating the community and context to achieve school excellence.

RESEARCH ON RURAL SCHOOLS IN MALAYSIA

One of the main foci in literature related to developing countries was the rural disadvantage in educational quality. Extensive literature has focused on the school location in developing countries which had indicated lower achievement in rural schools (Mohd Burhan, 2005). In one Malaysian study, Charil (1997) explored Edmond's five-factor model of effective schools and the model included "... strong administrative leadership, focus on basic skills, high expectations for students' success, frequent monitoring of student performance and safe and orderly schools" (Dagget, 2005). The factor analysis showed that in Malaysian primary schools, the model was reduced to three factors with leadership and school climate as one factor, high expectations in acquiring basic skills as another factor, and frequent monitoring of students' performance as the third factor. In addition, the study also found two extra factors contributing to school effectiveness which were: the role of the Parent-Teacher Association and school physical resources. Parental involvement was found to be a significant factor in many school effectiveness studies conducted in the developed world subsequent to Edmonds' Five-factor model (Teddle & Reynolds, 2000). Statistical evidence showed that Malaysian parents, in general, encouraged their children to go to school (Ministry of Education, 2006) as Malaysian parents were aware of the importance of education as a key factor in social mobility (Mohd. Salleh, 2007). As stated in the Malaysia Education Development Plan (2013-2025), in 2011, Malaysia had achieved near universal enrolment

at the primary level at 94%, and the percentage of students who dropped out of school had been significantly reduced from 3% in 1989 to just 0.2% in 2011. Enrolment rates at the lower secondary level rose to 87% and the greatest improvement was undoubtedly at upper secondary level, where the enrolment rates almost doubled, from 45% in the 1980s, to 78% in 2011. However, what was of interest was the extent of the parents' involvement in helping to educate their children which could improve school quality as a whole (Teddlie & Reynolds, 2000). Unfortunately, in Malaysia, parental involvement in terms of monitoring their children in doing school homework and involvement in school activities was lacking (Charil, 1997). Parents could motivate students to achieve better outcome if they were more involved in a school-home partnership (Charil, 1997; Mahony, 1998).

A study conducted by Othman and Muijs (2013) suggested four basic quality factors that were pertinent to improving Malaysian primary education and they were educational resources, school climate, leadership and parental involvement. The educational resources factor was characterised in this study as physical resources in school. Studies related to developing countries generally found this factor to be significant in improving academic achievement (Charil, 1997; Chiu & Khoo, 2005). Apart from that, a school as an organization needs a conducive environment that make learning and working effective. It was found that teachers' shared perceptions of school climate might be associated with their teaching and learning creativity in the classrooms (Gregory et al., 2007). Studies usually showed indirect effects of school climate on academic achievement (Cheng, 1994). Ahmad Zabidi (2005) suggested that school climate helped in improving the discipline of the school which in turn would impact academic achievement.

Research also showed that rural teachers generally received less access to teaching resources and teacher support programmes due to their geographic isolation (Hammer, Hughes, McClure, Reeves, & Salgado, 2005). In the Malaysian context, rural schools consistently suffer from serious teacher shortage and high demand for teacher replacements (Marwan, Sumintono & Mislán, 2012). This situation is really disturbing since studies in Malaysia found that rural teachers faced considerable obstacles in their teaching work due to lack of parental involvement, low motivation among students, lack of teaching aids and inadequate facilities (Rahman, Nor, Mokhtar & Halimi, 1993). Research also showed that 87%

of teachers in rural schools in Malaysia had less than five years of teaching experience. These inexperienced teachers were thus more vulnerable to feeling overwhelmed and losing motivation when faced with the difficult work conditions in rural schools. Principals of rural schools highlighted in a survey that teacher performance deteriorated after the third or fourth year of teaching (Rahman, Nor, Mokhtar & Halimi, 1993). When rural teachers themselves were surveyed, 56% of them indicated that they did not have adequate skills to perform their duties effectively. Teachers seemed to emphasize on the need for in-service training and one study found that 61% of the teachers indicated that in-service training and guidance was more important than pre-service training (Rahman, Nor, Mokhtar & Halimi, 1993). Unfortunately, in-service training in rural schools was extremely limited. In the same survey conducted on Malaysian rural teachers, 36% of the survey respondents reported that their last training took place in the previous year and 46% reported that they had never attended any in-service training (Rahman, Nor, Mokhtar & Halimi, 1993).

At the same time, school principals were overworked and hardly had any time to train the teachers. When Hong, Tan and Bujang (2010) conducted a cross-sectional survey in the rural areas of Kuching, Sarawak, it was found that most of the rural teachers did not feel that they received adequate feedback from their school principals. It was reported that principals on average spent 75% of their time with administrative work and thus could only designate 25% of their time on instructional duties which included a host of different responsibilities such as fostering shared beliefs and cooperation within the school community, enforcing clear structures, rules and procedures for students, teachers and staff, as well as monitoring and evaluating the effectiveness of curriculum, instruction and assessment.

Much of the research undertaken in rural schools in Malaysia did not concentrate on examining the role of the school head but rather on the quality of curricular provision, for example, in studies by Azizah and Sharifah (1992), Ratnawati and Ismail (2003), and Thiyagarajah (2003). Murdoch and Schiller (2002) argued that, “it has often been assumed that the principalship role of smaller primary schools is a ‘scaled down’ version of the full time primary principalship and that similar leadership and management approaches apply” (p. 1). This assumption prevailed in Malaysian research that running a small school was considerably easier

than running a large one (Wilson & Brundrett, 2005). The number of small primary rural schools in Malaysia, totalled 4852 out of 7762 (Retrieved from <http://www.moe.gov.my>) made rural school an important area of research to inform existing and future aspiring leaders on effective leadership practices.

Chan and Sidhu (2009) conducted a study to explore the leadership characteristics of a school principal in a Malaysian secondary school. The findings revealed that a successful leader “was identified as being reflective, caring and a highly principled person who emphasized the human dimension of the management enterprise” (p. 114). The principal involved in their study emphasized personal values and was sensitive to cultural as well as structural change of the community. Chan and Sidhu (2009) further elaborated that the principal was a “sense-maker” which might be crucial in helping the school to create a sustainable school climate to encourage teachers and student productivity. The findings of their study was motivating and more studies revealing effective leadership practices for rural primary schools would be truly rewarding.

As research on rural schools is important in informing future leaders, it is the intention of this paper to contribute to that knowledge.

The Importance of Leadership in the Rural Context

It is crucial to increase research specifically in rural education leadership. Researches on leading change in rural schools emphasised the need for school leaders to be familiar with the school communities, and acted in accordance to them. Semke and Sheridan (2011) noted that, “it is becoming increasingly evident that context is a significant factor in understanding academic achievement, and the setting in which a child, family, and school is situated among the salient contexts influencing performance” (p. 3). Budge (2006) reported that a more complete understanding of a community’s values required a “willingness to be highly visible, accessible, and approachable, as well as to reach out to members of the community to provide rationale for district action” (p. 7). Masumoto and Brown-Welty (2009) suggested that formal and informal interactions with the community assist to create useful collaborative bonds that helped in achieving the school’s mission. Theobald (1997) acknowledged that leading change in rural schools was a process that would take time but it

could be done when the administrators, teachers, and community members work together. School leaders needed “to accept the challenge of leading schools by building on the assets that are available within the school and the community” (Surface & Theobald, 2014, p. 15).

The work of Hallinger (2003) affirmed the notion of context-responsive leadership as he pointed out that “it is virtually meaningless to study principal leadership without reference to the school context” (Hallinger & Heck, 1996, p. 346). For them, a school’s context “is a source of constraints, resources, and opportunities that the principal must understand and address in order to lead” (p. 346) so that the school “can be a source of hope and possibility for sustaining and improving life in rural communities” (Surface & Theobald, 2014, p. 15). According to Hallinger (1996), the most critical variables to principals included “the students’ background, community type, organizational structure, school culture, teacher experience and competence, fiscal resources, school size, and bureaucratic and labour organization” (p. 346). Given the different and complex school environments school leaders found themselves in, it was critical that they had an understanding of effective leadership practices and the pragmatic wisdom to adapt these practices to their immediate contexts. Their approaches must be enacted in concert with their school’s unique contexts. An important conclusion reached in all the research was that context mattered (Leithwood & Riehl, 2003) for leaders to manage their organisations effectively.

In view of this void, more studies are crucial in filling the gap that is represented in topics related to rural education, leadership practices and community context. Such studies are needed to create an understanding of the essential nature of rural schools as well as to identify new and emerging understanding of rural school leadership as it is now becoming clear that “the qualities, characteristics, and skills required in a leader are determined to a large extent by the demands of the situation in which he is to function as a leader” (Bass, 1981, p. 65).

Preliminary Study Conducted on an Award Winning Head Teacher of a Rural Primary School in Sarawak

A preliminary study on a Ba' Kelalan primary school which is located at a remote area in Sarawak was conducted. The school perpetually ranked among the lowest performing schools in the state of Sarawak. This preliminary study exemplified the qualities possessed by the Head Teacher in turning the context he was in into opportunities and subsequently turning this case school around from a low performing school to a high performing school.

Ninety-nine percent of the pupils at this primary school are Christians and of the LunBawang ethnicity. At present there are only about 40,000 LunBawang worldwide and are concentrated in the northern part of Sarawak, East Malaysia. The pupils come from one of nine villages surrounding the school which collectively make up Ba' Kelalan, tucked in the interior highlands of Borneo. The pupils' families live quite simply with limited electricity and water supply. A large majority of their parents are farmers who are not educated beyond Form 3 (age 15). The people of Ba' Kelalan are largely isolated from the outside world due to rough geographical setting with virtually non-existent computer use and internet access. Getting to Lawas, the nearest town, requires either a five-hour trip by 4WD truck or a costly plane ride; neither of these options are totally reliable.

The Head Teacher's Profile

The Head Teacher, born in Long Rusu, Ba' Kelalan received his primary education in the case school of this preliminary study from 1963-1968. Thereafter, in 1969-1970, he continued his lower secondary education in SMK Lawas and completed his Form 4 and Form 5 at SMK Limbang in 1971-1972. In 1974, he attended *Maktab Perguruan Batu Lintang* (Batu Lintang Teachers' Training College) in Kuching and graduated with a Teaching Certificate. His professional record saw him serving in six schools. He taught in SMK Limbang from 1977 to 1978 after which he returned to Ba' Kelalan and taught in this case school as a teacher from 1979-1982. In 1982 he was promoted to be the head teacher of SK Merambut, Limbang for a year before he was, transferred as the head teacher at SK Long Luping. In 1984 till 1999 he headed SK Long Sukang, Lawas and in 2000,

he successfully got his transfer to go back and served as the head teacher in this case school for 13 years until he retired in September 2013. Within three years, the Head Teacher successfully led this case school to the top position in the district. This school also clinched the 2003 *National Hopeful School Award for the Interior Schools Category* in the country. In 2007, this school received the Education Ministry's *Excellent School and Quality Award*. Incredibly, the school's project on '*Community Participation in Achieving Quality Education in Difficult Circumstances*' bagged the prestigious 2009 *Commonwealth Education Good Practice Gold Award*. In recognition of his service and contributions, the Head Teacher received the *Pingat Perkhidmatan Setia* from the state government in 2004 and in 2008, he was bestowed with the *Pingat Ahli Bintang Kenyalang* (ABK). From the Ministry of Education, he received the *Excellent Service Award* and the *New Deal Incentive* in 2010. In the same year, he was promoted as the *Excellent Head Teacher* of the school from grade DG34 to grade DG38.

RESEARCH METHODOLOGY

To accomplish this preliminary study, the researcher conducted a basically unstructured peripheral investigation and observations. The unstructured nature of the investigation enabled the researcher to broaden her scope in observing while experiencing the daily routine at the school. Observation is commonly employed as the means to understand "live" situations by looking at and reflecting on them to provide holistic descriptions (Lin, 2015) of all activities at a research site. Apart from that, the researcher also conducted informal interviews on the Head Teacher, and other participants consisting of teachers, non-teaching staff, parents and community members who had personal experience of their Head Teacher's leadership and practical efficiency. The unstructured interviews were conducted as informal discussions after observations of the leadership practices so questions raised at the interviews were often impromptu, generated by the flow of friendly conversations between the participants and the researcher.

DATA ANALYSIS

The analysis of the data collected through this preliminary study was following the three stages of analysis popularised by Strauss and Corbin (1990). The first stage of coding is the “open coding” where the data is broken down or taken apart into discrete parts to be compared between each other. The next stage of data analysis is “axial coding” which aims to form webs of relationship between categories and subcategories. The third stage is reassembling and arraying of analysis of data which is also known as the “selective coding” where core categories are sought and the story line delineated.

FINDINGS

The outcome of the data analysis process was truly eye-opening. Through the processes of coding and sorting, the findings fell into four main settings: human, interactional, physical, and programme settings. These settings are important multi-dimensional ways of investigating the role of environment (Cohen, Manion & Morrison, 2000, p.305) in relation to the leadership practices of the award winning Head Teacher of this case school in Sarawak.

Human

When the Head Teacher took up the post to lead the primary school at the beginning of the year 2000, the attitude of the villagers, the pupils, and even the staff was dispiriting and the prospect of academic excellence for them was beyond reach. But there was a plus point in relation to the community there. The entire school community, other than a few Malay members of the staff, was of LunBawang ethnicity and belonged to the same denomination of evangelical Christians. When the school administration planned events or service projects, they knew without question that the villagers, most of whom did not have packed schedules like town'sfolk, would come and participate. Locals said their strong religious convictions were paramount not only in unifying the community to serve the needs of the school but also in instilling obedience and proper values in their children. Discipline problems and bullying were rare. Apart from that, the Head Teacher had a core group of committed teachers and staff who shared the

belief that academic excellence was attainable. Another comforting fact was that the pupils there enjoyed learning and were outstanding in various fields.

Interactional

Because of the remoteness and relative backwardness of Ba' Kelalan, the children were not exposed to those harmful elements of society present in urban areas. Television, movies, and videogames were not available time-wasters. The pupils could read or play outside for entertainment instead. With pristine tropical rainforest lying just beyond the schoolyard gate, the pupils naturally took an interest in environmental science. The Parent Teacher Association of the school was quite robust and pitched in on books and financial assistance. Overall, the staff took full advantage of their 24-hour access to the pupils by planning a multitude of extra opportunities for them to learn beyond the daily class schedule.

Physical

The school compound had the basic necessities and was in acceptable condition, but nothing made it a special place where children would thrive. The classroom environments were plain, lacking physical and visual embellishment for the stimulation of learning and creativity. The school was in no way a reflection of the unique cultural traits of the LunBawang people. There was little to be proud of. Nevertheless, this primary school had certain advantages, for example, there were few enough pupils in each class that the desks could be arranged in a U-shape, leaving an open space in the center. This facilitated better interaction between the teachers and pupils and among the pupils themselves. Teachers often invited the pupils to sit with them on the floor and approach learning more informally. Recognizing that these pupils were away from their parents for much of the year and yearning to go home, teachers tried to relate to them more like parents so that they would feel more comfortable and make the school and classroom as homely as possible. In this way, the teachers believe that the pupils would stay in school without coercion.

Programme

Above and beyond the standard curriculum, the school led by the Head Teacher initiated and maintained twelve programs designed to develop the pupils' abilities in the three main subjects by which the Malaysian government assesses schools: academics, sports, and student welfare. *Musang* and COMIC were the two major programmes.

Musang, meaning "teamwork" is a LunBawang tradition whereby an individual or a family appeals to the surrounding community for assistance in completing a complex task. Under the *Musang* program, the school administration led by the Head Teacher outlined projects designed to build up and beautify the school compound. They then solicited help from the community to implement the projects and encouraged the volunteers to carry it out their own way, allowing for a great deal of originality. Each of the component villages was assigned to a different area of the schoolyard and asked to improve it. The volunteers cleaned up their areas, planted new flowers and trees, and even erected wooden huts to serve as quiet, shaded places for pupils to read.

The Communities in the Classroom project, or COMIC, followed the *Musang* concept, but volunteers worked inside the classrooms rather than on the school grounds. Each village was assigned a classroom and asked to beautify it in a way appropriate for whichever age of pupils occupying that room. The volunteers built mini 'self-access huts' at the back of each classroom which were packed with pictures, posters, and reading materials. The design of the huts reflected the unique architectural craftsmanship of men from the various villages and provided a one-of-a-kind physical enhancement to each of the classrooms.

For both *Musang* and COMIC, representatives of each village were expected to come periodically for maintenance and improvement of their designated areas. New structures have sprung up on the campus and the classrooms have been filled with decoration. Recognizing that their community has unified to work on their behalf, the pupils are more motivated to do their part – to come to class every day and try their best.

As for the remaining ten programmes, they were focused around the issues of improving the overall UPSR results, mastering the language and mathematical skills, and motivating the pupils to be more independent and responsible individuals in carrying out their daily chores in life.

One incidental outcome of the data collected through this preliminary study was the establishment of another setting – the *emotional setting* of the Head Teacher. Through the findings, the Head Teacher held a belief that a complete paradigm shift was necessary and that the school harnessed the potential to rise and defy all expectations. The Head Teacher would always dwell on any opportunity or good community asset available to build up the school and community, for instance the willingness of the community to volunteer their time and skills. The school could benefit from free voluntary service to help overcome its deficiencies in human and material resources to build up the school and upgrading the educational standard of the school. He held strongly onto the fact that for the LunBawang community to have a bright future, education was the only way. So he set his mind on convincing others to come on board. He rewrote the school's vision and mission statements, and he set very specific and ambitious goals for the Year 6 pupils' performance on the standardized year-end exam.

IMPLICATIONS AND CONCLUSION

In conjunction with the 15th Conference of the Commonwealth Education Ministers, this school was announced the winner of the 2009 *Commonwealth Good Practice Awards* judged by the Pan-Commonwealth Adjudication Panel. This school had also managed to haul itself out of the very poor outcome in the Primary School Achievement Test (*Ujian Pencapaian Sekolah Rendah, UPSR*) to consistently surpass the 95% passing rate.

These positive leadership attributes and success of this Head Teacher in Sarawak were relatively undocumented despite the international recognition that had been bestowed upon the success of this Head Teacher. With a paucity of local research being carried out to study how the Head Teacher had positively impacted the student achievement and culture of his school, this initial exploration of the context of this school had confirmed the value of such research. The impetus of this preliminary study was truly pragmatic and realistic for the researcher to further investigate the issue.

Through the analysis conducted, the findings mapped under the five settings namely human, interactional, physical, programme as well as emotional settings have their respective potential to support the school forward. Nevertheless, how the interrelationship of all these findings under these settings led by the Head Teacher contributed to the success of the school generally in the international arena has left much to be desired.

It would be extremely beneficial that more in-depth investigation involving living the life and experiencing the context of the case could be conducted. This may help to ascertain the trustworthiness of the data and quality of the research which is focussing on the effective leadership practices of the Head Teacher at a rural primary school and subsequently establish the connectivity and interrelationship of all the data collected. This would surely create more credible point of reference for the consumption of the readers particularly individuals who are closely associated to leadership and management of rural primary schools. The findings from this preliminary study has clearly illustrated the Head Teacher's commitment in ensuring effective management of the school, it would be truly constructive to extract the case further on the attributes behind all the activities behind his leadership practices. These attributes may serve as useful guidelines especially for novice head teachers to consider when managing their schools particularly those located in the rural area.

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PERSONAL REALITIES AND THE APPRENTICESHIP OF SUPERVISING: MY TORTUOUS JOURNEY AS A SUPERVISOR

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ABSTRACT

The supervisor-supervisee relationship is an important relationship between two individuals; a relationship often fraught with conflict and tension. A successful relationship usually culminates in the finished product – the completed thesis; whilst a failed relationship results in the delay of the thesis or the abandonment of the research work altogether. Whilst one is usually trained in the field that one is teaching, lecturers typically become supervisors without any formal training; it is assumed that if one has done research, one can certainly supervise a research enterprise. This reflective paper recounts a senior professor's evolution as a supervisor of the masters' and doctoral theses. In this, she asked pertinent questions regarding how she learned to be a supervisor, her actions as a supervisor, her expectations and requirements, and the challenges she faced as a supervisor. She became a supervisor through an apprenticeship of sorts – learning at the feet of her own supervisor. This apprenticeship only shows one side of the equation, the side the student sees, but not the backstage work that comes with it. She discovers that she learns a lot more about supervising thesis through the act of supervising, having conversations with colleagues, reading about the area, and most importantly, reflecting deeply into the enterprise. A conscious, critical, and mindful reflection of one's actions as a supervisor can help one improve practice and better serve the student whose relationship to a supervisor is very critical to their success.

Keywords: *supervisory practices, supervisor-supervisee relationship, thesis writing*

INTRODUCTION

I have always been bemused by the above quotation, a line oft-quoted by my husband whenever we were correcting our students' essays, theses, or dissertations. I thought it was a really apt saying, and a saying I often repeated to my own students as well, particularly when I was especially perturbed by the quality of their writing. I thought it was an original saying from my husband who is very good with words, but because of this paper, I decided to google the saying and learned that it was said by Samuel Johnson a couple of centuries ago.

My husband was and I am still teaching at the Faculty of Education in the Department of TESL (Teaching English as a Second Language) at a large public university. As the name suggests, our program prepares students to become TESL teachers, historically for the public secondary schools, but currently for any organization that needs their expertise, be it in teaching or in training, human resource, advertising, or media, in both public and private sectors. Many of our graduates are much sought-after by industry as they can communicate well, both spoken and written. This is a result of the massive amount of reading, writing, speaking and listening they are exposed to in the program. However, the intensity of this exposure to English takes its toll on us, the lecturers.

In whatever subject we teach, particularly TESL-related, one of the main tasks of a TESL lecturer at the faculty is to correct and grade the students' writing, whether they be short answers, essays, or reports. Correcting essays by second language speakers of English is no small feat. Every time we mark our students' essays, you can hear us groaning, harrumphing, and literally tearing our hair out. It is the norm to encounter essays that are so mangled and so garbled that you throw up your hands in despair. You realize that you don't know what to correct, or if you do correct any mistake you are never sure whether the students will learn from their mistakes, or whether they will just continue to make the same mistakes paper after paper, assignment after assignment throughout their years at the university.

The faculty offers the bachelors, masters and doctoral programmes. In this paper, I am going to focus on post-graduate writing to document the initially tortuous personal journey that I experienced in my evolution as a graduate supervisor. But before I do this, I must state the genesis of our supervising duties. The faculty started assigning supervision duties to its lecturers at the undergraduate level. The TESL undergraduates are required to write a final year research-based report which is the capstone of their studies at the faculty. We call this Academic Exercise (AE), and the main objective of this course is to introduce students to the essential elements of doing research so that they are not unfamiliar with this enterprise. I had my first experience as a thesis supervisor supervising an AE paper. There was an unexpressed assumption that if you can do research, you surely can supervise research. At that time, it was unheard of to train supervisors; most of us began supervising by falling back on our experience being supervised. Hence, this paper is a distillation of my own genesis and experience as a supervisor. Its aim is to highlight my personal and often tortuous journey as a supervisor of PhD and master's theses.

RATIONALE FOR THE STUDY

UiTM, formerly RIDA, MARA College, and ITM consecutively, was established in 1956 with the sole objective of uplifting the Malays' and Bumiputeras' educational opportunities. Although the Malays hold the political power in the country, it was the Chinese and the Indians who wield economic power. The leaders of the newly-independent country realized that it was only through education that the Malays and Bumiputeras can get out of their economic doldrums. Hence the institute was established to give these mainly rural youngsters what Tan Sri Arshad Ayub (dubbed the Father of ITM), in a biography about him of the same name (Rokiah, 2008), called a "second chance". Many of these youngsters would not have gone on to tertiary education were it not for the opportunity that ITM provided to them.

Rather than the traditional research-based courses that universities at that time were offering, ITM offered professional based or hands-on courses that would lead graduates to hold jobs required to help develop a young nation. Examples of these courses were Banking, Business, and Accounting. Because of the visionary thinking of its early leaders, the

medium of instruction at the newly-formed Kolej RIDA and later MARA College and ITM (henceforth referred to as UiTM) was English. English continues to be the medium of instruction at UiTM, but at the rate English language proficiency is seemingly declining in this country, teaching English as a Second Language seems akin to teaching English as a Foreign Language (EFL). And lecturers teaching English continue to be responsible for teaching it to the mostly linguistically-challenged students.

Re-visiting My Article on Supervision

In 2006, I wrote an article on the mismatch between the expectations of supervisors and supervisees. This was triggered by the observation that some of our master's students were not completing their theses. Not completing their theses means not getting their degree. When I enquired, many of them said that they could not get along with their supervisors (although this may not be the only reason). One said that her supervisor would only spend a few minutes with her and would not even look at her face during the consultation process. Another said that it was impossible to meet her supervisor - he was incredibly busy and was unable to set any appointments. There were many horror stories on the part of the students; similarly, there were also horror stories from the supervisors. Supervisors complained that students have no research skills (Sidhu, Kaur, Lim & Chan, 2016), students don't answer their emails, or supervisees do not keep their appointments or meet deadlines (Ashari & Md. Yunus, 2006).

The anguish I heard from both sides compelled me to conduct that early research. As I near my retirement date, I feel duty-bound to reflect on my evolution as a supervisor. This reflection may have come a little bit late in my career, but if a junior lecturer were to read this paper and become inspired by it, I would be very satisfied. It is also my hope that this paper addresses supervisors' difficulties and challenges in directing students' dissertations. Following Donald Schon's (1995) exhortation for reflection-in-action, I asked several questions during my reflection. The following are the questions that drive this reflective paper.

Research Questions

1. How did I learn to be a supervisor?
2. What do I do as a supervisor?
3. What are my expectations and requirements as a supervisor?
4. What challenges do I face as a supervisor?

How did I Learn to be a Supervisor?

Like many colleagues, I learned to supervise at the feet of my own doctoral supervisor. It was an apprenticeship of sorts. I was first supervised by Professor Norm Overly (henceforth referred to as Norm), who was also my student adviser, and the first professor I spoke to when I began my doctoral studies at Indiana University in the fall of 1990. Not only was he my adviser, he was also the professor for several of the curriculum courses that I had to take as a curriculum major. When the time came for me to select my own doctoral committee (as is the practice at most North American universities), I invited Norm to be my supervisor and chairman of the committee. I also invited three other professors with whom I was familiar to be on my committee. I was at first reluctant to select my own committee members having not been exposed to this democratic process, and feeling quite inadequate, but it is now my opinion that being allowed to select your own supervisors is such a civilized and an adult practice. Instead of having a supervisor hoisted on you, as in most cases in Malaysian universities, in the US you can select professors whom you know to be on your dissertation committee because you had taken classes with them and they are familiar with you and the work you are capable of.

For two years Norm supervised the preparation and writing of my dissertation. I hardly met the other three professors during the time of researching and writing the dissertation as there was a professional understanding amongst them that Professor Overly would be the lead supervisor. I, out of respect, nonetheless, met each of them twice during the process of writing, at which time all agreed with Norm's direction of my writing. A couple of them did offer suggestions as to which research

articles I should read in order to strengthen my review of literature. That was the extent of their supervision of my dissertation writing.

During the first year of course-work, I had chosen the topic I wanted to do research on, and in our face-to-face meetings Norm and I would often discuss what I was going to do and how I would proceed. Our meetings usually took place in his office at the Education Building; I would typically have given him a draft of my work, and he would make comments by the margins in his tiny hand-writing. During the meetings with him, we would be discussing the general focus of my study and the direction I was to take based on his suggestions. The corrections on my English was minimal as my written English was near-perfect. Most of the corrections were directed at my ideas, logical structure, and or claims and arguments that I had made. The only time English was mentioned was when Norm outlined to me the difference between goals, aims and objectives – terms I found quite confusing at that time.

What I remember most clearly about Norm was how patient and courteous he was with me. He was a very busy professor and had more than 15 doctoral students under his supervision at that time. He also held two administrative posts consecutively whilst he was my supervisor: one as the Chair of the Curriculum and Instruction Department of the College of Education, Indiana University, and the other (which took him physically farther away from me) was when he accepted the post of Provost of the MUCIA (Midwest Universities Consortium for International Activities) Programme at ITM Shah Alam. In the mid-80s, the MUCIA programme was the first twinning programme in Malaysia; JPA and MARA-sponsored students were prepared for the TOEFL and SAT, and subsequently did their two years of an American Associate Degree in Malaysia, after which they transferred to any American university within the consortia or those which were approved by JPA. During the time Norm was in Malaysia heading the programme, we communicated via e-mail.

The 90s were the early days of the e-mail (for a brief history of e-mail read <https://en.m.wikipedia.org/wiki/E-mail>). I would write at the computer lab at the Indiana University library and I would send my drafts via e-mail attachments. At that time, one had to write at the library as that was the only site that was connected. Writing at home was impossible as Wifi was not

easily accessible as it is now. If the Internet was quite unstable in the US at that time, imagine what it was like in Malaysia. Norm frequently said that my drafts used to burn up his dot matrix printer. Despite these difficulties, I was in a more lucky position with Norm than most of my colleagues who were doing their PhD in Malaysia and supervised by local lecturers. Norm would send back his comments to me within a week, whilst my colleagues in Malaysia had to wait months before they get any comments from their supervisors. I appreciated getting feedback very quickly because that meant that I could continue writing without losing momentum and interest. At the time, however, I did not vow to do the same thing as Norm, as the thought of becoming a supervisor was far from my mind then.

Norm was also very firm in his deadlines with his students. He usually set the times when we were supposed to turn in our revisions and when we were required to confer with him. When he was in Malaysia, he supervised all his students via e-mail. He was still in Malaysia in 1994 when he informed his students, and I was one of them, that he was coming for a short working visit to the US in March and suggested that a group of us defend our proposal during his visit. Taking our cue from this instruction, we worked very hard to meet this deadline and when March came, five of us managed to successfully defend our dissertation. It was a proud and satisfactory moment when Norm came out of the conference room and called me Dr Ashari, the newly-minted PhD graduate. Had not Norm kept up on me regarding my writing, I might have gone the wayward path of not completing my dissertation during the time stipulated by both the university and my employer. Thus, how Norm treated me when I was his doctoral student was how I came to treat my students when I first became a supervisor.

I became a supervisor in a rather serendipitous manner. In our Bachelor's degree program, our fourth-year students are required to carry out a research study; this course is called Academic Exercise (AE), a course similar to the capstone project in American universities. Before they reach the fourth year, they would have been taught Introduction to Research Methods in an earlier semester. In this course, they are taught the fundamentals of research, the various research methodologies, research instruments, and carrying out a literature review. The outcome of the course is the writing of the Research Proposal. This is then the research proposal that they bring to their assigned supervisor in the following semester. At

this time, ideally, most supervisors and their assigned students (hereafter referred to as supervisees) would start work on completing the research.

How are these supervisors appointed? This is a fundamental question. Since we are teaching at the bachelor's level, many of the faculty members have a master's degree, and it is assumed, rightly or wrongly, that at the master's level, they would have also undergone a research course and conducted research. Therefore, many of us became supervisors sans experience and training. And many of us stumble along the way, trying to be good supervisors without really knowing the strategies to become one. We often blame our students for not finishing their work, or for not meeting us, or for not having the research skills, or for going AWOL. Many of us question our students' skills, often without probing deep into our own skills as supervisors. This power imbalance between supervisors and supervisees often lead to deep misunderstanding and miscommunication between the two parties. Understanding my own supervisory practices, what I do wrong, what I do right, what I can do better, re-visiting my own research supervision became the compelling drive for this paper. Even in Islam, one is exhorted to *Muhassabah Diri*, i.e to do a daily accounting of one's own work: what went wrong, what was good, and what one can do better. This daily accounting of one's actions, be they personal or professional, serves to improve practice. In the Buddhist tradition, this probing deep into the self is akin to the concept of mindfulness – always being aware of what one is doing.

During the writing of this paper, I also carried out an SMS (Short Message Service) survey of my colleagues (referred to as C1-C8) and asked one simple question "How did you become a supervisor?" The following are their answers:

"There weren't any courses. Just a short briefing a long time ago." C1

"Not really... I mean formally..." C2

"I sought help from seniors at the faculty...and also emulate my Supervisor's SOP." C3

"No training, Prof." C4

"Never. I asked the faculty on several occasions to have one, especially for new staff, but nothing happened."C5

"Never. Basically learnt it on my own and through discussion with/ and observation of others." C6

"Supervision, traditionally, is culturally transmitted...you perpetuate the practices of your supervisors."C7

"Yes. At AKEPT. With a professor from Oxford on Postgrad Supervision." C8

Out of the eight colleagues I asked, only one had received training on supervision at the Higher Education Leadership Academy (AKEPT). Like me, when they became supervisors, they also fell back on the "apprenticeship-of-experience" they had with their supervisors. In short, when I became a supervisor, I fell back on my experience of being supervised to be my guide, remembering how Norm guided me and, hopefully, practising the good, and eliminating what was not good practice. The problem with this apprenticeship is that there is the unquestioned assumption that what one's own supervisor did was often good and one might unknowingly perpetuate negative practices.

What do I do as a Supervisor?

The first thing that a student will do once he or she becomes my supervisee is to set an appointment to see me. During that first meeting, I usually invite them to talk about themselves, where they are from, what they like, whether they are married, what they do, what are their aspirations, among others. The students are usually nervous and need prompting to talk about themselves. Typical of Asian students, they do not ask me any questions. It will be later in our relationship that they will pluck up the courage to ask me personal questions. During the first meeting, I usually don't volunteer any personal details about myself; I discover that most of the time my supervisees would have carried out some background check on me. My reputation always precedes me.

Most of the time the students will come with a research proposal in hand. I will outline to them what I am going to do with it. I typically take about a week to 10 days to read a proposal and give feedback on it. I usually require a hard copy version as it is cumbersome and tedious to the eyes to read a draft on the computer. Further, the paper must be double-spaced, fully justified, and printed on one side only. I will ask them to insert page numbers and with a running head of the title of the study on each page to remind me of their topic.

For those who do not have a proposal and who would like to change topic, I will typically ask them to talk about what they want to do and the reasons they want to pursue a particular topic. If I am satisfied by their explanations, I will approve their topic. I usually do not change the topic that my students want to pursue. I believe that it is their right to do what they are interested in doing. One of the things I constantly remind the students in the Introduction to Research Methods class that I teach is that they must be interested in the topic they are investigating. If they are merely doing it for the sake of doing research, I remind them that they are not going to go far with it and will soon lose interest.

I also tell them about the writing process – that it is a lonely job. I remind them that writing is hard and that it is a recursive process. One does not have to write in a linear fashion, beginning with the introduction and ending with the conclusion. I tell them that they can begin anywhere in the text; if they are stuck in one area, do not get frustrated, but just move on to another section. The beauty of the computer is that one can begin anywhere, one can cut, delete, copy, and paste at will, and I tell them to appreciate these functions. Most of the students will never know what working on a manual typewriter is like, that if one makes a mistake on a sheet of paper, one has to throw out that sheet and begin all over again.

I teach students regarding aspects of writing: the structure of an academic paper, introduction, body, conclusion; I introduce them to Swales' (Swales, 1990) rhetorical moves in academic writing: establishing the field, what is in the introduction, what is the gap, what is the gap they are going to fill in with their investigation, and the justification for their study, amongst others. In my lecture on the writing act, I frequently use the analogy of sewing in my description of the writing process. If one wants to make a shirt,

the different parts of the shirt is going to be joined- sleeve, collar, armhole, cuff, button, hem– to get a finished product. Similarly with writing, words are joined to make sentences, sentences to make paragraphs, paragraphs become chapters and chapters become a dissertation. Every part must flow smoothly and must be connected. I teach them the idea of cohesion and coherence in writing (Connor, 1984) and the use of linguistic devices to signal relations between parts of the text.

I also remind my supervisees that if they experience a mental block during writing, do something else like write the reference page, check the page number, write the acknowledgement or abstract, or some other menial tasks related to writing. The idea is that they must turn on their computer daily and look at the draft – the inspiration to write will come soon enough. Not turning on the computer for days on end, and therefore not looking at their writing for days or weeks will not get them anywhere; they lose momentum and lose the interest to write; and because they have not made any progress in writing, they would not be getting any feedback from their supervisors. We have many students who do not graduate because they stop writing. Again, this reminds me of Norm who constantly exhorted me to “...Write! Write! Write!” a mantra I often repeated to my own students.

What are My Expectations and Requirements as a Supervisor?

Students are to keep their appointments and be punctual. If, for any reason, they are going to be late, they must inform me by texting me beforehand. I get very annoyed with tardy students, and most of the time my students honour my wishes. Whenever they have an appointment with me, they are to text me the day before to remind me of the time and place for meeting. I really appreciate this as sometimes, I have been known to forget appointments even though they are written down on my desktop calendar.

Some students also cancel appointments because of a family emergency and they usually regale me with a long text explaining their predicament. In this instance, we usually will set up another appointment. As working adults, these students have responsibilities to their families and their jobs, and I appreciate and respect the challenges that they face (Ashari, 2006).

What I expect of students is also what I demand of myself too. I am usually in my office waiting for them to keep their appointments; if, for any reason, I was going to be late, I will also text them to inform them. If I have to cancel any meetings, I will text them to inform them of the cancellation. I have heard of supervisors who fail to inform students of any cancellation and the students are left stranded in front of their offices at the previously-agreed upon time. To me this is a total disrespect of the students' time. Most of our students are adult students and they have responsibilities to their jobs and families (Ashari, 2006). Many of them must apply for leave in order to meet with their supervisors and it is my opinion that supervisors who don't keep their appointments violate a fundamental supervisor-supervisee relationship; it is disrespecting their time.

I also expect students to have done their revisions and corrections when they hand me a revised draft. In fact, students are required to turn in the previous draft with the new one so that I can easily compare each draft side by side and note the revisions that have been made. In my first meeting with my supervisee, I also physically show them how to make revisions – I tell them to have a document stand next to their computer, place the draft on the stand, retrieve their work from the computer and start the revising process page by page. Every time they make a correction which I had indicated, they are to mark the correction on the hard copy with a tick. After each page, they are to hit the save button on the computer. I also advise students to save their work on several back-up thumb drives. In my early days as a supervisor, I have had students give the excuse that they lost their file and hence cannot turn in their work. In these days of the cloud and dropbox, this kind of excuses is no longer valid.

One of the major sins a supervisee can commit is to ignore the corrections I have made. I have been known to highlight corrections that were not attended to in the new draft and write in capital letters, "YOU DID NOT CORRECT THIS! SEE PREVIOUS DRAFT". Most of the supervisees attend to the corrections, but I had one student who ignored my comments and suggestions so consistently that I threatened to resign as her supervisor. Finally, she had to hire a language editor who made sure that she attended to my corrections faithfully. I take delight in telling my students that I read every word that they write and that every correction I make has been carefully thought out, and that whenever I make a correction, it is justified. In short, they had better check their corrections.

Another requirement of mine is that my students must have a meeting with their family at the commencement of their graduate studies at which time they, through a consensus, lay the ground rules for the dissertation process. Each spouse, child, or parent must be informed about how much time the programme is going to take, and how much time they can spend for family activities and such. I advise them that it is imperative that they obtain the support of each family member as they go through their graduate studies. Without the family support, the graduate journey, whether at the master's or doctoral level, would be that much harder.

In conclusion, I expect students to honour their appointments, to be conscientious in making the corrections I have indicated, and to have a family conference regarding the demands of graduate work.

What Challenges do I Face as a Supervisor?

There are many challenges and many twists and turns, hence tortuous, that I face as a supervisor. The main challenge is the language competence of the students. Many of them need help with grammar and the mechanics of writing. Some of the writing problems they have are in using subject-verb agreement, pronoun agreement, tenses, use of punctuations, use of discourse markers and signal words, possessives, word choices, word forms, modals, and many others. Many of them do not even know when to use the colon and semi-colon! In 1998, I even compiled a list of my editing marks so that students understand what the marks I make on their papers mean when they do their corrections. It is entitled *Editing Guidelines for Supervisees (Graduate and Undergraduate)*, a yet-to-be-published monograph. Besides the editorial marks, I also include general information on how to edit/prepare your research paper, and a section entitled *My Actions as a Supervisor*.

Another challenge is that as a supervisor, one needs to know a lot of topics. The field of TESL is huge and there are a variety of topics that students can do research on – from speaking anxiety to communication styles, from discourse analysis to pragmatics, from code-switching to error analysis, from teacher job satisfaction to teacher motivation, and from principals' leadership styles to students' achievement. On rare occasions, we may be assigned a supervisee in an area we are not familiar with and if you do get a supervisee who wants to do research on a topic you are

not familiar with, you might have to do a lot of learning on your own. For example, if you get a question like this – “What are the variables that could have potential cause for shaping teacher trust of the principal?”...how do you as a supervisor begin to think about this area? In short, the supervisor must be knowledgeable in many areas as well.

The supervisors need to know a variety of research methods as well, both quantitative and qualitative, and now even mixed-method (Fraenkel, Wallen & Hyun, 2012). For supervisors who are more quantitatively-inclined, facing a supervisee who wants to do a qualitative research might present problems. A qualitatively-inclined supervisor might be baffled when given a set of statistical tables to comprehend. One of the ways in which I help students who are faced with this dilemma is to introduce them to other experts in the faculty, for example, I have introduced a supervisee to a mathematics professor who helped her to test the reliability of her questionnaire. I even read his research book to learn about Cronbach's Alpha and factor analysis.

In summary, the main challenges that I face as a supervisor are the language competence of the students, the requirement to know a lot of areas in one's field, and the ability to be familiar with several research methods. A supervisor's mind must be like a sponge, absorbing many different knowledge to guide their supervisees constructively and productively.

Strategies for Successful Supervision

In more than 15 years of graduate supervision, I have learned a few things about successful supervision. The first is to set out my expectations as a supervisor, i.e. when to meet, how often to meet, what to do at meetings, how to do revisions, how to follow advice, and how to set appointments, among others. Phillips and Pugh (2000) devote a whole chapter in their book on “How to Manage Your Supervisor”. In this chapter, they lay out six expectations of a supervisor, one of which is the regularity of meetings. Early in our relationship, I always ask my supervisees whether they want to GOT. The cheeky ones will always say Games of Throne at which time I will say “Graduate on Time!”. I stress that if they want to GOT, they must have regular meetings with me, at least once a month. I also then give them examples of students who had graduated on time because they met me on a

regular basis. I stressed that regular means once every 4 to 6 weeks, not 4 to 6 months. The successful student has constant and consistent meetings with the supervisor.

A good supervisor also finds out the expectations of their supervisees. As most of the students are adults and usually working, I always ask how often they can meet me, what day of the week is best, and whether morning or afternoons work best for them. If the students have a particularly demanding employer, they might have to take leave to attend the supervisory meetings. I also learn about the work schedules of their spouses so that I know how to tell my students to get help from their partners.

A good supervisor gives timely and effective feedback, both face-to-face and written, to their supervisees. They are to read the drafts that their students have submitted and make comments and suggestions on the drafts. According to Phillips and Pugh (2000), providing feedback is not an easy task. One has to be both “constructive” and “supportive” (p. 173). I know of supervisors who sit on their students’ drafts for months and these students get stymied by the long periods of inactivity. Besides writing comments or giving suggestions on their early drafts, I often go through the drafts page-by-page with them and explain my corrections. Our meetings typically last between 60-90 minutes, and both supervisor and supervisee feel satisfied at the end of the meetings. Students usually take notes of our discussions, and this helps them during their revision. We usually close the meetings by deciding on when they are to turn in the revised draft and when to meet to discuss the corrected one. I usually need a week to read the newly-revised draft before I can meet them.

Competencies of a Good Supervisor

This paper is not about the act of doing research itself, i.e. searching for topics, reading the literature, building instruments, collecting data, and analyzing data. It has focused more on the supervisor-supervisee relationship during the process of writing the thesis or dissertation, i.e. the writing act itself. This is a relationship that is fraught with conflicts and power struggles. Pugh (cited in Lynch, 2014) said that when a supervisor-supervisee relationship breaks down, “...it can go disastrously wrong and have serious consequences.”

In the process of supervising my students' writing, I discover that I must possess certain competencies that will enhance the supervisor-supervisee relationship. I have categorized these into two: technical and interpersonal competencies. Under technical competencies, a supervisor must have good reading, writing, listening, and editing skills. Although Phillips and Pugh (2000) have said that a supervisee must not expect a supervisor to be a "copy-editor", I find that I edit the papers as I am reading them. This is in the DNA of an English teacher; the English teacher is armed with a red pen and wired to correct! It also behooves me to check the grammar of the students as they are going to name me in their acknowledgements. I have my reputation to safeguard.

The effective supervisor must also have good interpersonal competencies. Some examples of these competencies are patience, respect, and humility. A supervisor must be patient with the supervisees, especially when they are struggling between writing and juggling their responsibilities as a student, employee, spouse, or parent. Supervisors must be supportive of their supervisees. Although supervisors are regarded as being in a position of power (Lynch, 2014), common human courtesy of respecting one's fellow human being must prevail. Supervisors must remember their own days as students and reflect on what they did not like about their own supervisors. Some of what was learned during the apprenticeship-of-experience must be unlearned if they do not serve the supervisees.

CONCLUSION

Supervisors have to be super-human; they must know just about everything in the research enterprise, similar to what Fraenkel *et al.* (2012) said about knowing the mixed-method where the researcher needs to be competent in a variety of research methods, both quantitative and qualitative. There are many competencies that the good supervisor must have, other than the ones listed above, but it is beyond the scope of this paper. A recommendation for further research will be to carry out an empirical study with a larger population to really find out how supervisors become supervisors; whether supervisors need formal training; the challenges supervisors face; and strategies for successful and effective supervision. This paper is a reflection-in-practice of one individual who became a supervisor of graduate

students through a rather circuitous route of apprenticeship, self-learning and self-discovery. Like the advice given to teachers to not just rely on the apprenticeship of observation (Borg, 2004), a good supervisor must analyze and reflect on his or her actions as a supervisor; apprenticeship of supervision is but a partial view of the whole supervising process, and that the good supervisor must constantly learn, relearn, and unlearn.

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FORMAL UNIVERSITY EDUCATION AND JOB COMPETENCY OF NEW ENGINEERS IN AUTOMOTIVE INDUSTRY IN MALAYSIA

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ABSTRACT

The main purpose of this research is to verify the relevancy of knowledge and skills acquired by engineering graduates from university to automotive industry in Malaysia. Hence, this paper aims to identify to what extent the knowledge and skills acquired by the new engineers in the university have equipped them with job competency in the automotive industry. This study adopts a qualitative case study method to analyze and compare data collected from a private engineering college, a public university and an automotive manufacturing industry. The identified target groups are one human resource manager, six new engineering graduates, and 4 university lecturers. The findings of this study suggested that the stakeholders, university, students as well as industries are aware that it is not easy for new engineers to fit into industries right after graduation. The study emphasizes the important role of the stakeholders namely; university, new engineer and industry, to enhance the acquisition of knowledge and skills for better job competency of new engineers at the beginning of their career at industry. The results revealed certain attributes showing strong linkage between university education and job performance. In particular, students' attitude, interpersonal skills, lack of manufacturing knowledge, lecturers' industrial exposure, collaboration between university and industry, poor execution of internship, poor training needs analysis and incompetent coach at industry were among the attributes that have high influence on the ability of new engineers coping with the job challenges. The study has contributed to a better understanding of job competency and the challenges faced by new engineers at the chosen automotive industry.

Keywords: *Knowledge, skills, job competency, new engineers, automotive industry*

INTRODUCTION

The automotive industry is a promising industry which contributes to the boosting and evolving economic and industrialization processes which lead Malaysia to a developed country in the foreseeable future (Ukessays, 2013). The recent challenges posed by market liberalization and the pace of changes and growth have generated intense competition in the automotive manufacturing industry worldwide which is impacting the Malaysian manufacturing industries with ventures local and abroad. Hence, the automotive manufacturing industry is recognizing the need to grow and attract more competent new automotive manufacturing professionals. Meeting these needs will result in many challenges to find skilled automotive manufacturing professionals who can lead the industry into the future. One of the most critical issues for this challenge is the expected knowledge that is distinct to the nature of the automotive manufacturing industry. While industry representatives have expressed their concerns regarding the future workforce, very little data is available about the extent of demand, the characteristics and knowledge and skills of preferred candidates, and the role that universities can play. Furthermore, previous researches have identified that students' knowledge is the concern of the problem.

According to Keizrul (2008), "Malaysia is now experiencing a shortage of experienced engineers in certain areas. One of the root causes of the dwindling interest in engineering is the structure of the Malaysian education system". To be an engineer, one should be able to understand the materials and resources, their physical attributes, and their strengths and weaknesses, in order to be able to make improvements to existing products or to create new products. Apart from that, one should be analytical and logical, able to solve problems, and have good communication skills. Furthermore, Christodoulou & Holmes (2013: 6) stated that "The employer's expectation in terms of behavior or performance of the candidate is crucial and critical". In fact, employers are looking for someone who are confident, enthusiastic and a self-starter, to meet the expected increase in demand for graduates. Without the right candidate for the vacancy, more positions will be filled

by individuals without the right knowledge. They must learn all industry specific knowledge on-the-job, as well as training programs organized by the industry. As such the objective of this research is to identify the knowledge and skills acquired by new engineers in the university and on the job. Besides that, the study also aims to identify to what extent is the knowledge gained at the university able to meet the knowledge expected in the automotive industry.

LITERATURE REVIEW

Walton and Austin (2001) highlighted that, industry is criticizing the Civil Engineering curriculum for not properly moulding engineering students for the workplace. Industry wants engineering students who can communicate well, show good teamwork, manage projects and understand the economic situation of their professional activities. Engineering curriculum must make sure that their programs are preparing students to have an understanding of professional practice issues rather than having capability in technical subjects only. For example the American Society of Civil Engineers (ASCE) requires students to have an understanding of professional practice issues. The students must have communication skills, project management capability, pursue life-long learning, and apply creative and critical thinking skills. It is a known fact that an engineer is hired based on his/her technical capability but fired for poor people skills, and promoted for capability in leading and people management skills. Due to this, a suitable curriculum has to be devised to face competitive and complex workplace without affecting the quality of existing engineering program. Hence, ISU CE Industry Advisory Council has developed an integrated curriculum that is a mix of existing course and new courses. This is believed to equip the engineering students with business and performance skills and optimize application of the engineer's technical skills.

The ISU CE Industry Advisory Council has suggested some enhancement areas on CE curriculum. Below is the outcome of the academia review and ISU CE Advisory Council recommendations for the CE curriculum (Walton & Austin, 2001: 1-10):

- Understanding cost estimating, planning, and scheduling

- Utilizing critical thinking
- Communicating effectively to engineers and non-engineers
- Understanding the importance of timely and effective communication
- Working effectively within multi-disciplinary teams
- Understanding the necessity for high professional and ethical standards
- Having basic knowledge of business and management principles
- Interacting with practicing professionals
- Developing leadership skills

In fact, the Task Force has worked on designing an integrated curriculum that is integrating the existing core courses to the new courses to meet the required objectives. Some previous courses were removed and some additional revisions such as technical communication and engineering economics integrated and included into the new CE curriculum. The new CE curriculum consists of the following courses (Walton & Austin, 2001: 1-10):

- Civil Engineering Projects
- Engineering Problems with Computational Laboratory
- Graphics for Civil Engineering
- Civil Engineering Capstone Design
- Leadership Skills
- Team Processes in CE Practice
- Interpersonal Skills
- Communication Skills
- Project Management
- Agreements and Contracts
- Continuous Quality Improvement
- Business Management
- Professional Ethics

ISU faculty has integrated professional practice skills with technical integrity in order for the undergraduate program to remain relevant to the civil engineering job requirement. The new courses are set to educate the engineering students not only on knowledge generation and technical skills but would prepare them for real business requirement and personal skills. Hence, it needs a lot of effort to make any changes to the status quo but realizing the benefit it can bring to the stakeholders would be worth the effort.

Hum, Abdul Aziz and Yohan (2013) further stressed that the common skill shortages of business graduates, especially in the field of business management were poor work attitude and foreign language, inadequate technical skill, and lacked work experience, communication skill, decision-making, analytical skill, and specialized skills. This sort of skills development has become a great challenge for curriculum designers to incorporate in university education curriculum. This has also posted problem, for employers to recruit fresh graduates to fill positions such as human resources, safety, accounting, marketing, sales and service and other supporting functions. As such, it is appropriate to reflect on the practicality of higher education curriculum, specifically business management to meet industries requirement. Business management curriculum must be designed to broaden knowledge and skills that is required by industry to cope with current job demand in a competitive business environment.

To address this pressing issue, the development and practice of business management curriculum must be consistent to national education standards to meet all stakeholders' needs. From time to time the curriculum should be revised by the stakeholders to cope with the quick changes with university board. Universities should form a Quality Assurance Committee to evaluate its curriculum, assess lecturers and students' learning. However, problems like government policy, scarcity of resources, and lack of communication with stakeholders, and lacks integrated approach in teaching and learning environment have resulted in skill gap among graduate employees. Other areas of concerned are the ineffective enforcement of government policies on nurturing relationship between university and industry, misperceptions between university and industry toward skills enhancement, scarcity of resources to innovative programs and poor cooperation between university and industry in sharing feedbacks of academic and employability issues. These are some of the issues that created the gap between university curriculum and industry (Hum, Abdul Aziz & Yohan, 2013).

In an academic environment, educational providers cannot educate students in isolation. Unsuitable curriculum won't be able to prepare students with state-of-the-art skills and knowledge. Without sufficient skills and knowledge, graduates would not be able to perform well in competitive industries and fresh graduates would be an expensive human capital for industry. Thus, everyone involved in the loop have to absorb

the impact directly or indirectly if it is affecting the income of industry. Obviously, the impact caused by curriculum gap is felt by students, faculty, industry and society. Therefore, the stakeholders such as government, line ministries, universities and industries must work together to close the gap. For instance, government should enforce law to facilitate strong corporation between university and industry, university should have more dialogues with industry, and industry should create more opportunities for researchers, educators and students to embark research on employability problem to solve the pertinent issues.

Hence, D'Agostino & O' Brien (2010) suggested that there was a need to redesign curricula of higher educational institutions. The approach should be to enable students to interpret and apply their current methods of theory into the practical environment with emphasis on interaction approach. The university learning experience needs to be enhanced based on the various disciplines of learning. Every discipline of study requires a variation of methods specific to that particular area of study to enhance the learning experience rather than one common approach which is prevalent in higher education environment. Even though higher education is based on disciplinary knowledge and practice, there is an absence of disciplinary epistemologies in the current curriculum, practice of teaching and assessment. Currently, it is apparent that discipline based epistemologies are not incorporated within professional development programs which were designed to aid the staff to gain teaching capability or expertise. Experts in various disciplines joined the academia with limited knowledge of how thinking and reasoning skills can be taught to students. Practical approaches should be used effectively in teaching and assessment by academics in higher education. The current professional development programs which are being offered in universities do not give an opportunity to the academics to deliver an in-depth knowledge of the subject instead a generalized principle of effective teaching is being emphasized. This scenario has promoted a need to review the effectiveness of the methods of teaching. Hence it is essential to examine how university learning experience may be effective to design discipline specific ways of thinking and reasoning for students and how the academia can develop pedagogical expertise to assist in facilitating, support and assess such learning. Hence, an investigation into the methods used to teach and learn in various disciplines would help to bridge this gap. It would be useful to explore various methodologies and develop appropriate

strategies that would facilitate effective learning and assessment specific for various disciplines accordingly.

The quality of learning may be enhanced through appropriate assessment, teaching and learning activities, learning materials and feedback methods. Processes that assist to improve pedagogical changes are more attractive to academics since it involves their expertise from specific disciplines. Moreover, discipline specific methods provide a strong base for faculty staff and educational development staff to draw reference to assess the effectiveness of teaching practice and the quality of learning outcomes. The outcome of this study will help to improve the current curriculum to enhance teaching and learning practice and help students engage and make sense of particular disciplinary epistemologies within classrooms (D'Agostino & O' Brien, 2010).

RESEARCH METHODOLOGY

For this study, the researcher strongly felt that the qualitative research method would be appropriate because it allows the researcher to probe deeply into the heart of the issues surrounding all the stake holders namely, new engineer, university and industry. Finlay (2013) emphasized that qualitative research led to a deeper understanding and was beyond the usual numbers and statistics. In contrast, quantitative research extracted a summary of key issues and was devoid of any rich and comprehensive understanding of the perspectives encountered at work by personnel from both the university and the industry. This is agreed by Chua (2012), that the numerical data produced by quantitative research could not explain the different phenomena in the real world. He felt that there were special cases which required more careful observation to understand the phenomena of emotions, motivation and empathy, and this could not be captured by numbers in a quantitative study. Therefore, in this study, the researcher has used qualitative case study method to discover, understand, and explain in an in-depth manner the perspectives of the universities and industries on their practices, and the impact of contexts on their perspectives and performance. The interview questions used were taken from Laulata (2007)'s survey questionnaire but had been modified to suit the purpose of this qualitative study. Hence, a semi structured open-ended interview questions has been

developed as the data-gathering instrument to document face-to-face interviews with the participants.

For this study, one of the major automotive manufacturing industries located in the state of Selangor have been selected. This Malaysian and Japanese joint venture company which was established in 1970 has been producing non-national cars for the local and foreign market. In order to gauge the information for this study, a total of six new engineers (coded as NE1 to 6), one human resource manager (coded as HRm) and two supervisors (coded as SV1 to 2) were engaged to collect data through personal interviews. Besides that, two lecturers were selected from a private college in Cyberjaya (coded as LEC1 to 2) and the other two were from public universities located in Klang Valley (coded as LEC3 to 4). Overall, six engineers, one human resource manager and two supervisors have been selected to participate in this study.

FINDINGS

Basic Knowledge and Skills Learnt at University

The first theme addressed in this research was, “Basic Knowledge and skills learnt at university”. This question serves to check how useful and how well the new engineers remember the basic subjects they had learnt in university. The common subjects that were mentioned are Manufacturing Technology, Technical Drawing, Statistics and English Communication. In the case of informant NE1, he remembered the Manufacturing Technology, Technical Drawing and Material Science subjects because they were related to his current job at the Welding Department, where he refers to vehicle body parts and its drawings in his daily production work (NE1, 1.1). New engineers from different departments seem to remember different subjects. For instance, informant NE6, who is attached to the Quality Assurance Department, remembered the subjects of Statistics, Mathematics and Engineering Economics (NE6, 1.1). His department is in charge of inspection, collection of data, analysis of data and generation of reports. Informant NE6’s subjects resonate with (SV2, 1.3)’s opinion that engineers should have a basic knowledge in Production Systems, Problem Solving and Good Maintenance or 5S House Keeping to cope with the challenges

at the beginning of their careers (NE6, 1.1). On the contrary, SV1's choice of subjects was inclined towards technical aspects of manufacturing such as Time Motion Study and Total Preventive Maintenance (SV1, 1.3). Supervisors' opinions seem to be biased towards the job nature of their department.

Informant NE3 mentioned that none of the subjects he learnt at university in the faculty of Electrical Engineering was relevant to his current job in Production Planning Department requires him to do planning and controlling for production process (NE3, 1.1). Even when probed about his extra-curricular activities, he was not able to recall any activities which had at least some relevance to his current job. As a matter of fact, he expressed his frustration over his current job which is too disparate from his field of study. In this case, it proves that there is a mismatch between his knowledge and the requirements of his job. Although there were many extra-curricular activities at university, he was not able to relate them to his current job. In contrast, informant LEC2 mentioned that his university organizes extra-curricular project work in groups, special training and talks to impart basic communication skills and foster teamwork spirit among students (LEC2, 1.3). Informant LEC1 also added that his university provides students with projects from industry to expose them to real-life challenges in the industry (LEC1, 1.3).

On the contrary, informant NE2 remembered the general English class that he signed up for in his 1st year and the presentation class in his 3rd year of studies, rather than the technical and engineering subjects (NE2, 1.1). According to him, these language subjects have honed his communication skills and equipped him with the right tools to converse with all staff and also to superiors during project presentations at work. Informant LEC4 (LEC4, 1.3) substantiates informant NE2's (NE2, 1.1) point by stating that:

“It is compulsory for students to attend English communication classes conducted during weekdays in the evenings and during weekend. But how well the students master the subject will depend on how much they believe on the importance of this subject to survive at the corporate world, despite the strong emphasis by the university”.

Informant NE5 also felt that the communication subjects he took in university proved to be valuable because they taught him to deal with different types of people in his working environment (NE5, 1.1). The subjects he took exposed him to different modes of communication for different levels of staff. For example, he learnt that convincing and rallying the support of the shop floor and office staff requires different approaches. He believes that technical and conceptual skills are essential for all engineers working in any organization. However, engineering graduates generally need to work on improving their communication and collaborative skills. He acknowledges that writing skills are equally important as verbal skills for new engineers who aspire to climb the career ladder. Informant HRm also lamented students' weak communication skills during interview sessions and mentioned that:

“Students should be well versed in interpersonal and communication skills, it was clearly seen during interviews that students were lacking in interaction and struggle to communicate in English with the interviewers” (HRm, 1.3).

On the other hand, informant NE4 managed to vividly recall and appreciate all the hands-on training that he received at university (NE4, 1.1). The hands-on training was useful, relevant to his job and helped him increase his confidence to deal with employees at the production floor. Those courses gave him an in-depth understanding of the tools and equipment of the manufacturing process. However, he also lamented that the practical training was not sufficient as there are many more sophisticated process tools & equipment in the industry. Nevertheless, he managed to use his basic skills to self-learn and explore the more sophisticated tools in industry. Informant LEC4 also acknowledges the advantages of practical training and mentioned that:

“Besides the normal courses, we also emphasize on, hands on training such as welding, NDT (Non-Destructive Test) and basic handling of machines. We have very good workshops with well qualified instructors to handle practical trainings, as hands on experience would be very essential for students to apply at work place” (LEC4, 1.2).

From this analysis, we can deduce that new engineers generally remember subjects that are relevant to their current jobs. The promptness of their response is a good measure of how useful and relevant that subject is to their current job. Surprisingly, some of the candidates were unable to state more than two subjects, and some even took longer time to recall the basic subjects learnt at university. Some of them needed assistance from the researcher to answer the question. This observation can be used to infer that some engineering graduates invest their efforts at university for examinations per se.

Formal University Education Contributes to the Job Competency of New Engineers

The second theme addressed in this research was, “Formal university education contributes to the job competency of new engineers”. This question serves to evaluate whether university education has imparted the necessary competencies to new graduates. Engineering education must ensure that graduates acquire the technical and non-technical competencies required at the workplace. Sanghi (2004) stated that competencies are components of a job which are reflected in one’s behaviours in the workplace. Competency is the ability to perform a task to the level expected in employment.

Most engineers agree that their engineering degree was a ticket to secure a job, but it does not guarantee competency to carry out a task in the industry. The knowledge and skills gained from the university should be used to explore and learn new knowledge and skills at the industry. According to informant NE1, his university degree helped him to get a job and the technical subjects were more relevant to his job at the moment. He applied about 20 % of what he has learned in the university and the rest were for exam purpose only. The technical competency (manufacturing, maintenance, automation, quality and safety) that he acquired in the industry has helped him to do technical and planning work for production” (NE1, 3.3). On the other hand, informant HRm who laments the in-competencies of new graduates as some university students were unable to draw a simple electrical circuit during interview session. The department managers would be reluctant to employ someone who is not able to draw a simple electrical circuit, as there are more complicating circuits in the factory to be executed by new engineers. But generally, the diploma holders are better at hands-

on work than the degree holders. However, most lecturers believe that the hands-on training provided in the university is sufficient to handle basic manufacturing work in the industry. Informant LEC1 was confident that the technology workshop and practical lab training in his university was sufficed for the technical competency required by the industry. Informant LEC1 also reiterates that all the students have gone through mandatory practical training in university, but he doubts their application of the acquired skills upon graduation. Design of circuits are taught in the university for students and tested until they are competent in making the circuit to work, but he doubts, how much the students can remember once they are out from university (LEC1, 5.2). In fact, new engineers are lacking in job competencies and have to acquire most of the job-related competencies while working. New engineers can work independently or with minimum supervision if universities can educate students on job related competencies (SV2). Informant SV1 also suggests that, besides the technical competencies, new engineers must also acquire other basic competencies such as computer application, interpersonal and presentation skills.

From this analysis, it can be concluded that there is disagreement between the academia and the industry on the competency requirement. Both sides also seemed to be misinformed about the extent of competency required from new graduates. Based on the interviews-conducted, HRm claims that the new engineers lack basic practical knowledge of engineering circuits, diagram, systems and principles. Supervisors lament incapability of new engineers to understand the machine operating systems and concepts. One of the supervisors adds that new engineers should be able to demonstrate proficiency in communication and presentation skills. On the other hand, new engineers claim that only a small part of the knowledge gained during the course of their first degree end up being relevant to their jobs in the industry. However, lecturers are blaming the incompetency among new engineers on their inability to remember and apply their knowledge in the industry. Therefore, it is necessary to provide the new engineers the appropriate supplementary training to increase their level of competency as required in the industry:

1. Core Competency: common awareness across the organization such as International Standardization for Organization (ISO), Environmental Management System (EMS), and 5S concepts of Seiri, Seiton, Seiso, Seiketsu & Shitsuke and Safety.
2. Personal Competency: soft skills such as communication, problem solving, interpersonal, teamwork, planning and organizing.
3. Technical Competency: job functional skills such as knowledge of processes and equipment”.

DISCUSSION OF THE FINDINGS

Basic Knowledge and Skills Acquired at University

The first theme of this research is, “Basic knowledge and skills acquired at university”. These interview findings have been summarised, categorised into subthemes and related to relevant literature to check how useful and how well the new engineers remember the basic subjects they had learnt in university.

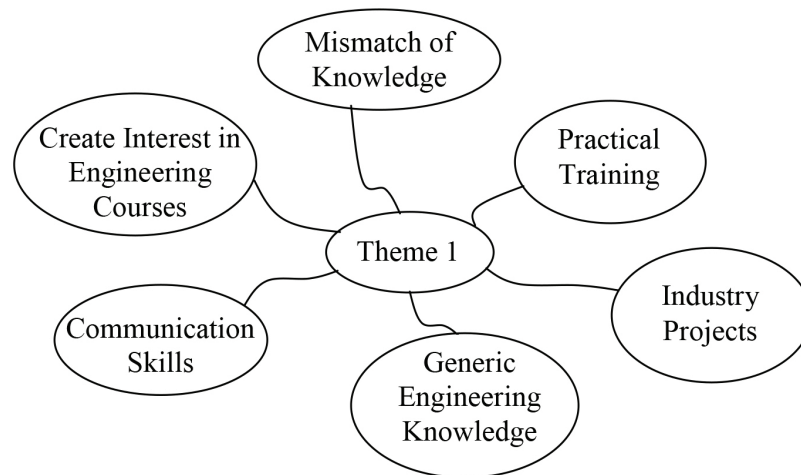


Figure 1: Subthemes of basic knowledge and skills acquired at university

Mismatch of Knowledge

Based on the interview findings, the most pertinent point that emerged was the mismatch of knowledge or the gap between learning and practice. For example, as mentioned by a new engineer (NE6) that “Statistics course in university was way too high level, theoretical and conceptual, but what was required at industry is very basic statistics that can be applied at shop-floor”. Concurred with past literature by Finley (2012), “A significant mismatch between Practitioners and Academics was that Practitioners were focused on outcomes while Academics were focused on the process itself”. Most of the new engineers felt that the courses at university were specific to engineering courses focusing on gauging student’s ability to do mathematics and engineering design and development. This was seen in the previous findings by Devine (2003), that, “Engineering curriculum is preparing engineers primarily for careers in research and development”. Many of the engineering graduates are employed in manufacturing industries rather than engineering firms doing pure engineering works. As such, most of their engineering knowledge will not be fully utilised in the manufacturing industry. Agreed in the past findings by Azami, Mohd Zaidi, Hasan, Norhamidi & Farah Liza (2009), “State of the current engineering education which does not emphasize on cooperation, knowledge retention, communication and the ability to synthesize and link courses and fields is a valid point of argument”. On the matter of graduate competencies, employers clearly imply that it is important to improve the engineering program, especially in a few non-technical aspects of the engineering education. Informants felt that engineering courses are unavoidable in the engineering faculty but the lacking of relevant manufacturing courses at university curriculum have made it difficult for new engineers to fit into the job right away. This is concurred by Devine (2003), that the “Engineers are therefore entering the workforce with little knowledge of manufacturing processes”. The lack of manufacturing knowledge among new engineers has required them to learn many new knowledge and skills at the beginning of their career in the manufacturing industry. They felt that, as most of their task requires them to learn many new things, the knowledge gained from university was not much of help. As such, the new engineers are unable to see the link between the knowledge gained at university and the knowledge required at the industry. That makes them think that there is no relevancy between university and industry. This fact is supported by past findings by

McConoughey (2008), which states that it was important to align a college's mission to create meaningful education experiences for students with the workplace's desire to have students who are prepared with job-ready skills. A similar issue was highlighted in another field of study by Ousey (2000), who described that there was an apparent gap between theory and practice in developed countries which was highlighted in the nursing care field. It has been stated that the term "gap" pointed towards the academics not being able to emphasise on the practical aspects.

Practical Training

The New Engineers have appreciated the hands-on practical training received at university. The hands-on training was useful, relevant to their job and helped them increase their confidence to deal with employees at the production floor. Those courses have given them an in-depth understanding of the tools and equipment of the manufacturing process. However, they also lamented that the practical training was not sufficient as there are many more sophisticated process tools & equipment in the industry. Nevertheless, they managed to use their basic skills to self-learn and explore the more sophisticated tools in industry. Concurred in the past findings by Mandal & Banerjee (2012), "To succeed in engineering profession, students must be strong in theory and practical hands-on experience". Some of the informants conveyed that the basic practical training lessons were sufficient and conducted by well-trained instructors. However, the past research highlighted on certain shortcomings in the lab exercises by Devine (2003), "When students do encounter problems during their lab exercises, the instructor often tells the student how to "fix it" without explaining the rationale for the solution".

Industry Projects

Lecturers have pointed out that the students are required to be involved in industry project work arranged by the university to work in groups with the intention of exposing them to real-life challenges in the industry and enhance team spirit among students. The importance of project based education has been expressed by Francis (2006), "Industry projects allow students the opportunity to apply their theoretical knowledge, usually design and build, and analyse products used in industries. By incorporating these

projects into their programs, many universities have found that the students' learning curve has been greatly improved. New engineers would appreciate the extra project arranged by university to impart real-life experience.

Generic Engineering Knowledge

The interview session with lecturers has implied that university is the best place to develop generic engineering knowledge and skills, build confidence and become an all-rounder. The knowledge and skills they obtain from classroom would generally be sufficient for them to perform basic jobs in the industry. What they are lacking is the in-depth knowledge and people skills that are required for them to progress in their career. The same issues have also prevailed among business studies graduates, and highlighted in the past findings by Hum, Abdul Aziz and Yohan (2013), "The common skill shortages of business graduates, especially in the field of business management were poor work attitude and foreign language, lacked in work experience, inadequate technical skill, communication skill, decision-making, analytical skill, and specialized skills". This sort of skills development has become a great challenge for curriculum designers to incorporate in university education curriculum. However, the HR manager felt that it is important for graduates to obtain knowledge beyond the lecture rooms besides excelling in academic pursuits. Besides the good academic knowledge, industries are looking for graduates who possess characteristics such as self-reliance, people skills, continuous improvement mentality and decision making skills. They want new graduates to have good analytical skills and are able to think critically. They also look for maturity, ability to articulate thoughts clearly and good reasoning methods. Similar suggestions were made in past findings by Walton and Austin (2001) that "Industry wants engineering students who can communicate well, show good teamwork, manage projects and understand the economic situation of their professional activities".

Communication Skills

New Engineers (NE2) mentioned that there were efforts by university to teach personal development skills especially the general English language course with substantial amount of time during the early stages at university. In fact, language and communication courses attended in the university have

refined the new engineer's communication skills and equipped him with the right tools to converse well which was reiterated by the interviewees. But how well the students master the subject will depend on how much they believe on the importance of this subject to survive in the corporate world, despite the strong emphasis by the university. Another New Engineer (NE5) felt that the communication subjects he took in university proved to be valuable because that has taught him skills to deal with different types of people in his current working environment. The subjects he learned exposed him to different modes of communication that can be applied to different levels of employees. He believes that technical and conceptual skills are essential for all engineers working in any organization but engineering graduates generally need to work on improving their communication and collaborative skills. He acknowledges that writing skills are equally important as verbal skills for new engineers who aspire to be successful in their career. Concurred by past research by Chan and Lee (2012) has also proven that "Those who graduated without profound communication skills have now come to realize the value of those skills and are of the opinion that Technical communication (which includes the ability to write reports) instruction has to be made compulsory in an undergraduate engineering course". The human resource manager (HRm) also lamented students' weak communication skills during interview sessions. They were unable to communicate in English fluently and at times not able to understand and provide an answer accurately. The New Engineers stated that there were extra-curricular activities at all universities done with the intention of improving teamwork, communication, problem solving skills and etc. The lecturers also affirmed that students were required to participate in these activities to fulfil curriculum requirements. It was observed that the students did not comprehend the actual objective of these activities and were unable to visualise how these activities could enhance personal development.

Create Interest in Engineering Course

Lecturers were disappointed that some of the students did not have the right aptitude for engineering courses. The sole purpose of study was to secure well paid jobs. Many of them took up engineering degree programs without knowing exactly what an engineering job is all about. This was supported by Lilley (1998) that, "For many young people, engineering is about mucky hands and car engines". Why does it appear to be that most

students who are studying engineering at university are only doing so because they are following in the footsteps of a relative? This is because the relative appears to be doing well in their profession and having a better lifestyle . . . Hence, it is essential that there should be proper screening done at the university on the quality of students at entry point. On the other hand, most of the new engineers have commented on the lecturing methodology being too theoretical. This was also seen in the past research by Devine (2003), “We cannot continue to design instruction around only learning theories that result in telling students what to remember and what to do and then punishing or rewarding them for their performance”. This common approach to instruction will get students to memorize things and perform certain tasks but it will not lead to conceptual understanding, will not help them think, nor enhance their ability to learn on their own.

Formal University Education Contributes to New Engineers’ Job Competency

The second theme of this research is, “Formal university education contributes to the job competency of new engineers”. These findings serve to evaluate whether university education has imparted the necessary competencies to new graduates to cope with the demands of their jobs.

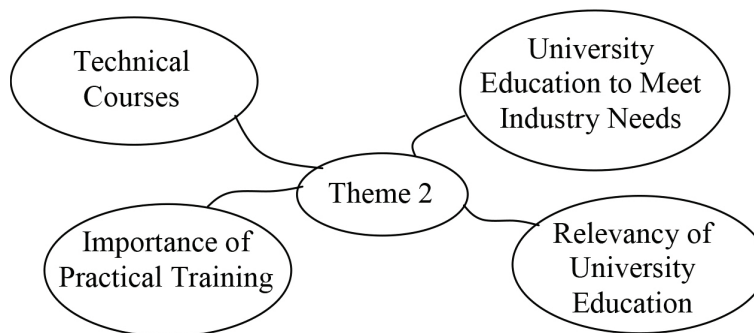


Figure 2: Subthemes of formal university education and new engineers’ job competency

University Education to Meet Industry Needs

Engineering education must ensure that graduates acquire the right technical and non-technical competencies required at the workplace. According to Rajah (2002), “There have been very few coordination efforts between technical institutes, schools and universities to propel education to meet the changing structure of demands by firms”. Findings of FICCI (2007), also highlighted the need for an understanding of the needs of the employer, requirements of specific skills by the industry and interaction of educational institutions with industry leaders. New engineer’s (NE2) concern is that the knowledge gained at university is not sufficient to make someone competent to work in the industry. Job competencies have to be acquired at workplace training and through work experience as they are very specific to the particular work environment. One of the supervisors (SV2) has also agreed that the new engineers are lacking in job competencies and have to acquire most of the job-related competencies while working. There are possibilities for new engineers to understand the job competencies faster if universities can instil industry related competencies for engineering students through their education curriculum. There were suggestions made in the past research by D’Agostino and O’Brien (2010) to improve university curriculum to help students to meet workplace competency. He suggested that there was a need to redesign curricula of higher educational institutions. The approach should be to enable students to interpret and apply their current methods of theory into the practical environment with emphasis on interaction approach. In fact, supervisors were disappointed on the inability of new engineers to understand the machine operating systems, concepts, proficiency in communication and presentation skills. According to new engineers, the degree of relevancy of knowledge gained from university will depend on the type of industry or job they are engaged. However, Lecturers are claiming that, students are not able to remember the knowledge acquired at university and use them effectively at the industry. Hence, it is necessary to provide appropriate supplementary trainings to cope with the competency required in the industry.

Relevancy of University Education to Industry

Mentioned by a new engineer (NE6) that the Statistics course in university was way too high level, theoretical and conceptual, but what was required at industry is very basic statistics that can be applied at shop-floor. The essential knowledge students must acquire is to analyse data, monitor trend and take action to prevent manufacturing process going out of track. Agreed in the past research by Francis (2006), “The greatest issue needing to be addressed in the education of manufacturing engineering students is their lack of understanding of manufacturing processes”. In industry, it has been stated many times that an engineer designed a part that looked good on print but could not be manufactured in reality. Some of the engineers have said that only a small portion of what they have learned at university is useful, especially the practical and project based courses and the rest was learned for examination. Most of the technical competency such as manufacturing, maintenance, automation, quality and safety had to be learned in industry while working. On the other hand, lecturer (LEC3) mentioned that the University syllabus covers more than what is required by the industry but it depends on the capability of the students to capitalize the knowledge and skills acquired at university. Students must be able to apply the acquired knowledge and skills at the workplace. Competency level depends on the commitment shown by the students at workplace.

Importance of Practical Training

Human Resource Manager raised concerns that some of the university students are unable to draw a simple electrical circuit during interview sessions. He wondered how students could handle more complicating circuits in the factory. Students should have some strong basic technical competencies otherwise it would be difficult to convince the department manager during interview session. Concurred in the past research by Devine (2003) he stated that students usually had to trouble shoot faulty circuits. During this process it was observed that the lecturers were required to instruct students on the steps of trouble shooting without them being made aware of the reason to follow these instructions. However, according to the Lecturer (LEC1), students have gone through mandatory practical training in university, but he doubts their application of the acquired skills after graduation. Design of circuits are taught in the university for students

and tested until they are competent in making the circuit to work, but he doubts, how much the students could remember once they were out from the university. The fact is, new engineers are required to use their basic technical knowledge gained in university and must be able to apply at industry appropriately. Devine (2003) in his work stated that professionals employed were required apply information learnt in the universities in various contexts in the industry, a skill called knowledge transfer, Unfortunately, the findings from Devine (2003) clearly indicates that students often have difficulty with knowledge transfer.

Technical Courses

Most lecturers were confident that the hands-on training provided in the university was sufficient to handle basic manufacturing work in the industry. They believed that the technology workshop and practical lab training in university sufficed for the technical competency required by the industry. Lecturers were aware that the new engineers were required to think quickly, analytically and carry-out designing tasks. Lecturers claimed that the curriculum at university was adequate to develop such skills in students. The past findings justify the reason by Reeves (2013), that “The well academically experienced professors will teach the students to fill them with plenty of knowledge and set coursework in order to meet the expectation of the curriculum”. New engineers agree that the knowledge and skills gained from the university should enable them to explore and learn new knowledge and skills easily at the industry. It should not only be a professional qualification to secure a job as agreed in the past research that graduating with a degree either local or abroad has become essential to secure a good job that comes with good salary (Rahmah, Ishak & Lai, 2011).

CONCLUSION

The findings imply that there is a mismatch between the knowledge taught to students and the knowledge expected by industry. Universities are educating students in mathematical subjects, applied science and engineering concepts but lack of emphasis on non-engineering subjects such as English language, computer and communication courses at university. University focused on students’ academic result to pass with good grades for the purpose of getting

good university ranking. Hence, it was observed that there was inadequate effort made to match university education to industry requirement. For universities to survive and prosper, they will have to continue their efforts to develop linkages with business and industry. Engineering programs must demonstrate that their graduates have the ability to function on multi-disciplinary teams to communicate effectively and a recognition for the need to engage in life-long learning. The skills that the industry want to see in graduating college students include communication, teamwork, leadership, and critical thinking skills. According to Tang (2014), “Although the liberal arts have been upheld as desirable or indispensable throughout the history of engineering education in America, until recently few scholars have sought to explore attempts to integrate engineers’ learning in the liberal arts with the techno-scientific disciplines. For a long time, most engineering educators were content with retaining the humanities and social sciences in a curriculum separate from math, sciences, and engineering sciences”. This means, the humanistic studies or liberal arts can develop an engineer to be more professional in his approach with people at work whereas, engineering skills will only make them proficient technically working with machines and engineering designs. In fact, both engineering and humanistic skills and knowledge are required for an engineer to be competent and progress in his career. The mismatch between employment and academic training can be as serious as the mismatch of skills between supply and demand in the workforce. As a result, when the linkage between the content of education and training in an academic degree program and the needs of industry is weak, private companies are forced to bear the burden and inefficiencies of providing separate programs of re-education and training.

Findings also imply that the Internship programs are not well organised to meet the actual objective of exposing students to real industry experience. Objectives cannot be achieved without the move by university to start collaboration with industry to enable students to gain appropriate industrial exposure. Internship coordinators need to stay abreast and find ways to improve the objective and execution of internship program. Students rely on internship tenure to see the connection between theory and practice. Internship programs that involve active partnerships among industry, universities and students rely on research to keep their internship programs current. The interaction of university coordinator and worksite supervisor with the interns during their internship may offer the intern better

recognition of both their personal and academic growth. It is only when all parties begin with the same vision that the goals and objectives become effective learning tools.

The study also implied that there is lack of industry exposure for lecturers. Tang (2014) has suggested that, “The department should put emphasis on hiring faculty with extensive professional experiences”. A good and experienced lecturer can guide students to make them to understand the lecture in a practical and simple manner. They can share their professional experience to students and the required attitudes and emotions deemed fit for their career. Francis (2006) also argued that, “The most crucial part of an educational program is the educator. An educator in the field of manufacturing engineering must possess an innovative spirit if the program is to be successful”. They must also have the knowledge and skill set to successfully interact with students to make their education a quality experience. Devine (2003) in his paper concurred that it was irrelevant to continue designing instructions focussed on learning theories. This would lead to students being punished or rewarded for their performance. The repercussion this action will be students memorizing things and perform tasks without any conceptual understanding. There would be no scope for original thoughts or enhancement in their learning capability.

Overall, the study implied that there is lacking university-industry collaboration. This study highlights several critical aspects that links university education and job performance; Students’ attitude, interpersonal skills and lack of manufacturing knowledge, lecturers’ level of industrial exposure, university-industry collaboration, disorganized internship programs and incompetent industry mentors were found to highly influence the ability of a new engineer to cope with job challenges. Therefore, both the university and industry need to work together to meet each other’s needs in order to reduce the knowledge gap and challenges faced by new engineers at workplace. Hence, McConoughey (2008) advocated that, “Industry/university partnerships should create the opportunity to develop curriculum that is relevant to the needs of industry and aligned with university programs”. Through partnerships, the universities would have insight into the most current business trends, research opportunities and regional career initiatives, and the university could enhance courses accordingly. The role of industry advisory boards are to advise university to

ascertain that the engineering curriculum is current, relevant and in line with the demands of the workplace. As a result, an effective advisory board will help to improve engineering curriculum, identify needs of manufacturing industry, supporting training programs, provide job placement, and provide professional development for lecturers to ensure better job competency of new engineers in the automotive industry.

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TEACHING AND LEARNING OF COLLEGE MATHEMATICS AND STUDENT MATHEMATICAL THINKING : ARE THE LINES OF THE SAME TRACK ?

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ABSTRACT

Studies related to school mathematics have shown that students who scored well on standardized tests often are unable to successfully use memorized facts and formulae in real-life application outside the classroom. The outcome of TIMSS and PISA studies further emphasizes the importance of mathematics teaching and learning in the Malaysian education system. Various measures have been taken by the Ministry of Education to enhance the teaching and learning of mathematics in schools. However, issues related to college mathematics have yet to be addressed. In the past decade, universities have been bogged down with ranking systems (such as Times Higher Education University Rankings, QS ranking) and Quality Indicators for Learning and Teaching related to issues such as students graduating on time (GOT). In this paper, we investigate the finer points of mathematics teaching and learning. Our premise is that practical knowledge (common sense) and mathematics knowledge are closely related in the learning of mathematics in college. Three case studies are discussed in this paper to highlight this premise. These studies revealed that college students gradually practices rote learning and their final grades do not reflect the development of mathematical thinking. Furthermore, the teaching approach that focuses on computation deters students from fully developing their understanding of why or when they should be applied. Teaching instructions should shift

from learning the rules for operations to understanding mathematical concepts which promotes the development of mathematical thinking. Students should be equipped with “problem solving tools” that would allow them to be accommodative to changing needs (Treffinger, 2008). It involves the acquisition and application of mathematics concepts and skills in a wide range of situations, including non-routine and real world problems to provide learning opportunities for problem solving. Hence we strongly propose mathematical problem solving as a new course central in the development of mathematical thinking at the tertiary level.

Keywords: *Mathematics, mathematical thinking, teaching, learning, achievement*

INTRODUCTION

Researchers, educators, parents, social scientists, politicians and other stakeholders have eloquently depicted mathematics as a useful and important subject which must be mastered. Various literature reflect this as thus:

Mathematics is one of the most important subjects of our life. No matter to which field or profession you belong to, its use is everywhere. That is why it is necessary to have a good understanding of the subject. Imagining our lives without it is like a ship without a sail. (Biswas, 2015)

Mathematics is the cradle of all creations, without which the world cannot move an inch. Be it a cook or a farmer, a carpenter or a mechanic, a shopkeeper or a doctor, an engineer or a scientist, a musician or a magician, everyone needs mathematics in their day-to-day life. Even insects use mathematics in their everyday life for existence. (The Times of India, Aug. 3, 2015)

Mathematics is beautiful because it helps you discover the truth about everything, particularly about nature. (Crean, 2015)

If Mathematics is perceived to be useful, great, timeless and beautiful, why do people abhor it too? On the contrary, there is less hatred towards Music, Art or Literature as reflected in Dudley's (1987) writing in *The American Mathematical Monthly* (note the sarcasm):

Mathematics is so useful that there could be no civilization without it, and it is so beautiful that some theorems and their proofs—those which cause us to gasp, or to laugh out loud with delight — Should be hanging in museums. (p. 3)

The statement by Dudley (1987) three decades ago is definitely relevant. It is no longer justified to merely say that Mathematics is useful, especially to the 19-22 year old “Millennial” generation. They expect to be engaged in their learning and they do not do well being passive learners (Starlink, 2014). However, a majority of non-science major college graduates will testify that they do not need Mathematics beyond Arithmetic to be successful. This has raised a concern among educators who agree that Mathematics should be taught as a thinking activity and they have repeatedly called for instructors to shift their approach from the traditional computation and routine based one to a conceptual one. The former method involves teaching of rules and procedures rather than the learning of Mathematics. Is there a possibility that current traditional methodological approaches are making it difficult for graduates to see its applications in real life? In this paper, we will discuss the development of mathematical teaching and learning in college settings in relation to mathematical thinking.

Mathematics Teaching and Learning in Colleges

Research outcome on college mathematics in Malaysia has consistently depicted a dichotomous situation where on one hand, students have been obtaining good grades in their transcripts but this did not truly reflect their development of mathematical thinking. On the other hand, research has expressed near universal agreement that many students arrive unprepared for the intellectual demands and expectations after high school and struggle during their early years. The consequence are high failure rate, not graduating on time and dislike for Mathematics. The quality of college students’ mathematical knowledge has always been a crucial matter. The crucial factor determining the quality of knowing is the quality of the students’ experiences in constructing their knowledge in classroom instruction. Before we discuss the quality of student’s mathematical knowledge in depicting their thinking capacity, we will briefly discuss the development of the teaching and learning of mathematics over the last few decades.

The development of mathematics teaching and learning has been dramatic, where in the 90s, the focus has been on computation and applying procedures in solving problems. In later stages of the 19th century and early 20th century, the conception of mathematics learning tilted from emphasis on computation towards understanding abstract concepts and relationships. This shift relied heavily on formulas to solve problems, i.e. the teaching of *what* and *why* on the conceptualization of the problems given. Then early this century, mathematical thinking has been the focus of attention. Mathematical thinking is defined as a thinking style that is guided by cognitive activities (Karadag, 2009). Ridgway, Nicholson and McCusker (2011) asserts, “*thinking mathematically is about developing habits of mind that are always there when you need them - not in a book you can look up later (p. 311)*”. It is a pre-built thinking of mathematical thinking in the mind of an individual when solving problems. The question to ask is whether the philosophical stance of mathematical learning has shifted in tandem with the evolutionary shifts in the nature of mathematics teaching and learning at higher education institutions in Malaysia.

One of the major aims of mathematical learning is the development of mathematical thinking. The common misconception is that “doing mathematics” is the same as getting involved in “mathematical thinking”. This misconception stems from the pedantic mathematics education in our systems that highlight the mastery of mathematics through rote memorization of formulaic structures. The consequential impact is negatively felt when such approach is no longer viable at the higher level of tertiary education. As the focus of education shifted from repetitive impractical exercises to critical production and innovation, a more authentic and creative manner of solving problems is needed by professional mathematicians in resolving real life problems be it theoretical, mechanical, industrial or philosophical. These observations seem to point to the fact that there is a disparity between school mathematics, where success is guaranteed in conformist formulaic approach, and true mathematical thinking that requires “thinking outside-the-box”, which would be more valuable to university students and professionals.

Three published research cases in literature is discussed in the following sections to support the need for promoting students’ mathematical thinking. These literatures examined both quantitative and qualitative methodological approaches to learn about students’ mathematical thinking

and to examine their interpretive practices. Analysis of interactions between students and instructors and students' reflective writing revealed changes in the patterns of their interpretations. We characterized these as changes in the focus of interpretation, from correctness to meaning, and in the interpretive approach, from quick and conclusive to thoughtful and tentative. We will also discuss factors associated with these interpretive turns.

STUDY 1 (2012)

Parmjit, Singh and White, Allan (2012). Unpacking First Year University Students' Mathematical Content Knowledge Through Problem Solving. Asian Journal of University Education, 2, 1, 33-56.

This mix method study conducted in 2012 involved a total of 536 homogeneous groups of first year college students majoring in engineering. The researchers investigated the use of problem solving for students to “unpack” previously learned mathematics, assess understanding, reconstruct understandings, and connect mathematical concepts for deeper understanding. The researchers took into consideration the students' national examination grades (SPM) in teaching college mathematics. From this group, 84.5% obtained grade ‘A’ (1A and 2A) while another 15.5% obtained a ‘B’ (3B and 4B) in their SPM Mathematics. It is not surprising to see a large number of students with ‘A’ in Mathematics because one of the pre-requisites for entering college is to have a minimum of 6Cs in SPM Mathematics. Since these students were from the engineering faculty, their mathematical background is deemed to play an important role in their academic pursuit of becoming engineers. These students have been formally taught the fundamental mathematical concepts in high school and this research enabled the researchers to assess the students' quality of understanding. They also investigated if there was a relationship between SPM Mathematics grades and the Problem Solving test scores.

The results obtained from the written assessment depicted a low mean score of 24.63 (Max score=48) with a SD of 3.16. In other words, these students obtained a percentage score of 51.3% ($24.63/48 \times 100$) in the written assessment test. The findings seem to indicate that these students have an instrumental understanding rather than a relational understanding

where the data shows that they were not able to apply knowledge to new contextual situations.

To support this assertion, consider students' response to Item 8 which stated: *"If it takes 9 workers to mow a certain lawn, how long would it take 6 workers to mow the same lawn?"* (Assume that workers are all performing at the same rate and are all working for the entire time)

Here, 78.7% of the students failed to see an inverse proportion relationship and solved the question by utilizing a cross multiplicative procedure. They applied the "rules without reason" as shown below and failed to realize that the resulting answer was unreasonable

9 workers – 5 hours

6 workers – X hours;

So, $X/5 = 6/9$ ----- $9X = 30$; and $X = 30/9 = 3 \frac{1}{3}$ hours.

For these college freshmen, the word proportion seemed to be equated with direct proportion. During the interviews, students were asked questions such as: "Why do you cross multiply?"; "Why cross multiplication can be used here?", "Can cross multiplication always be used in this type of problem?", "What is the meaning of cross-multiplication?", and the responses from the students were: "We were taught this way" or "I don't know".

The second outcome of this study indicates that there was no difference in the performance of the "A Math" students and "Non-Math" students in the Problem Solving Test. One would expect these college freshmen, especially those with 'A's from the SPM mathematics paper, to be excellent problem solvers. But sadly, this was not the case. The performance of the 'A' students was unsatisfactory. The question which arises here is: "How well do the current national examination grades reflect the mathematical knowledge of students?"

The conclusion from this research depicts that students have an instrumental understanding rather than a relational understanding (Skemp, 1976), where they were not able to unpack their mathematical content knowledge and apply it to new contextual situations.

STUDY 2 (2015)

Teoh, S.H, Kor, L.K, & Parmjit, S. (2015). Prototyping Routine Practices in Solving Non-routine Mathematics Problems. In Zuraimi Zakaria, Badrul Isa & Sumardianshah Silah (Eds). 21st Century Skills: Language and Arts Education through the Lens of Culture and Heritage. Malaysia: ITBM.

This qualitative study conducted in 2015 involved a sample of 25 math undergraduate students who were pre-service teachers from a public university in Malaysia. The researchers investigated learners' perspectives by providing them with an environment to solve non-routine problems and not just equipping them with skills and processes. The data from the investigation was collected via reflective writing journals and discussions after each lesson (a total of five lessons were conducted). The results show that students learned to use heuristics approaches in solving non-routine problems. From the reflective thinking, it was evident that Draw a Diagram, Systematic Listing, and Guess and Check were attempted by the respondents and these heuristics have been proven to be successful in solving non-routine problems. Further justifications in the solutions were made based on the diagram interpretation. Besides the types of heuristics identified as mentioned above, this study also found that peer-support learning played a very important role in successful non-routine problem solving.

The findings indicate that the pre-service teachers experienced positive cognitive growth in the context of thinking processes in solving non-routine problem solving. Students were empowered to process skills in a problem solving class, such as reasoning, connecting, communicating and representing mathematical ideas. They stressed that the thinking skills could be built during classroom practice. They could be trained to provide ways to contextualize the communication process in assisting learners to solve mathematical problems. The findings serve as a basis for the development of pedagogy in the teaching of a mathematical problem-solving course.

STUDY 3 (2016)

Parmjit Singh, Syazwani Rasid, Nurul Akmal, Teoh Sian Hoon, Cheong Tau Han(2017, in press). How Well Do University Level Courses Prepare Students To Be Mathematical Thinkers? Accepted for publication in The Social Sciences

This study conducted in 2016 investigated how well university level courses prepared students to be mathematical thinkers. The focal of study was based on the premise that university students, especially in the field of sciences, take various Mathematics courses throughout their degree programs (such as Calculus 1, Calculus 2, Algebra etc.) in order to graduate. The quality of students' mathematics knowledge is always a crucial. Thus the researchers used problem solving as an assessment tool because it is the means by which mathematics can be applied to a variety of unfamiliar situations to assess students' mathematical thinking. Using a descriptive design method, a paper and pencil test comprising 16 items was administered to 120 students (majoring in Mathematics, Physics and Engineering) among semester 5-6 in a college in Klang Valley. All these students have taken courses such as Calculus 1, Calculus 2 and Algebra as the requirement of their respective courses. The overall means score obtained by the students was 10.50 (SD=7.72) from a maximum score of 49. The types of errors made by university students were similar as the types made by lower secondary students based on previous research. For example:

Task 3

Eva and Alex want to paint the door of their garage. They first mix 2 cans of white paint and 3 cans of black paint to get a particular shade of grey. They add one more can of each. Will the new shade of gray be lighter, darker or are they the same?

Approximately 85.9% of the students answered this item wrongly with approximately 59.4% ($n = 71$) reasoning it as the same. The data from the interview reflected their problem solving skills. In fact, the students (45.3 %) used primitive additive reasoning. The reasoning is that if an equal number of cans for each type of paint is added to the mixture, the shade will remain

the same. They were unable to see the proportion of white paint to the black paint before and after the addition of two cans of paint.

S_{F3} : In my opinion, it is the same if you add one can of white paint and one can of black paint as the differences are the same. If we intend the outcome to be lighter, we should put in more white paint and if we want to have a darker effect, we put in more black paint. (Pada pendapat saya, sama, jika ditambah satu tin cat putih dan satu tin cat hitam, kerana bezanya sama. Jika ingin mendapatkan yang lebih terang, kita akan menambahkan lebih banyak cat putih dari cat hitam dan jika ingin mendapatkan yang lebih gelap, kita akan tambah lebih banyak cat hitam dari cat putih).

*R : Therefore, you believe that if you add another can of white paint and another can of black paint, the color will be...?
(Jadi anda berpendapat jika ditambah lagi satu tin cat putih dan satu tin cat hitam, warna adalah)*

S_{F3} : Same. (Sama.)

In short, these students failed to construct a coordination of two ratios simultaneously as: 2 white to 3 black and 3 white to 4 black. Their thinking was based on the primitive additive reasoning and not the expected multiplicative thinking. The findings indicate that the university level mathematics courses taken by students did not match the level of mathematical thinking expected of them. It seems to indicate that the current university mathematics courses are based almost exclusively on formal mathematical procedures and concepts.

DISCUSSION AND CONCLUSION

The three studies cited above supports, firstly, the nature of college students' understanding of basic mathematical concepts and some critical factors to be taken into account in facilitating their mathematical thinking. Secondly, the grades obtained in their transcripts for mathematics do not reflect their mathematical knowledge in problem solving. The studies signify that the current modes of teaching mathematics at colleges are not only

ineffective but also seriously stunt the growth of students' mathematical thinking and problem-solving skills.

The fundamental Mathematics courses taught in colleges today for students (major and non-major requirement) include Calculus, Algebra (modern and linear), Number Theory, Topology, Logic, Geometry, Probability etc. In the study by Parmjit and Teoh (2015), they elucidated that college students have learnt how to do numerical computation at the expense of learning how to think mathematically. The clinical interviews findings indicate that these students have an instrumental understanding rather than a relational understanding due to their emphasis on procedure rather than the process of learning. These courses have been taught throughout the years by instructors and students have been obtaining good grades in their transcripts (based on the number of students graduating with honours, Stuart & Christopher, 2012; Catherine, 2011; Parmjit, 2009). However, these grades in their transcript are not being translated into the development of their mathematical thinking (Devlin, 2013; Parmjit & Allan, 2006; Liu, & Niess, 2006).

Students in college need to 'unpack' their mathematical knowledge which they bring from school to allow them to examine the undergirding and interconnections of college mathematics with other relevant areas of mathematical application such as in Physics, Chemistry, Biology, Engineering and other related areas (Parmjit, 2009). The success of a well-prepared college student is built upon a foundation of key cognitive strategies that enable them to learn content from a range of disciplines. Unfortunately, the development of these key cognitive strategies in college (as shown in the studies cited) is often overshadowed by an instructional focus on decontextualized content and the imparting of facts necessary to pass semester-end examinations.

Several studies in both local (Intan, 2016; Aida, 2015; Parmjit & Teoh, 2016) and international contexts (Camera, 2016; Borsuk, 2016; Adams, 2014; Conley, 2003) have expressed near universal agreement that most students arrive unprepared for the intellectual demands and expectations after high school and struggle during their early years in college. Thus, these struggling students at college can quickly develop a strong negative attitude towards mathematics. Without early intervention and successful practices, the students are lost to a revolving door of remedial programs -

most of which we know do not work. These interventions have not worked for over the last two decades but we still continue to rely on them for the mathematical salvation of most of our struggling student's population in higher institutions of learning. A lot of debates have taken place in blaming schools for this problem but researchers need to ask what can be done to resolve the issue.

One solution is to teach mathematics as a thinking activity (Devlin, 2013; Liu & Niess, 2006). Another solution is to encourage the transition by providing students with "problem solving tools" that would allow them to be accommodative to changing needs (Treffinger, Selby, & Isaksen, 2008). The teaching of such "tools" constitutes an important step towards developing problem solving and reasoning skills. Simulating classroom practices with non-routine mathematics tasks is indeed important to equip learners with the heuristics required to teach non-routine problem solving in their future mathematics classroom. Another salient approach will be to encourage them to think deeply about the mechanics and process of the mathematical thinking upon completing problem solving exercises. We are conjecturing that there is a dire need to introduce a Mathematical Thinking Model application in enhancing student's cognitive growth in mathematics learning. They will participate in a variety of exercises, problems, and investigations as they explore mathematics concepts from a problem solving perspective in an interactive manner. The emphasis will be on exploration of various mathematics contexts to learn mathematics, to pose problems and problem extensions, to solve problems, and to communicate mathematical demonstrations. To operationalize this development, instructors will have to shift their approach from the traditional computation and routine based one to a conceptual one, which is by getting students to think about mathematics and representing topics in ways other than procedures.

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ACADEMICS' DIVERSIFICATION ENHANCING GRADUATE EMPLOYABILITY THROUGH THE SCHOLARSHIP OF TEACHING AND LEARNING

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ABSTRACT

Current debates on higher education graduates seem to address graduates' quality and their employability. Since industries' role as future employers become central in the preparation of graduates, issues on graduate employability (GE) have become one of the heated discussion topics with the inclusion of smart partnerships and collaborations between higher education institutes and industries. As students generally spend between three and five years in higher education institutes prior to graduating, students' graduate employability relies quite heavily on the preparation for the world of work during their time in the institutions. The Ministry of Higher Education has called for academics to collaborate with the industries as a measure to enhance GE. Needless to say, academics' diversification has always directed them to be multi-taskers. Four main professional tracks inevitable amongst the academics namely; teaching, research (and publication), community service and academic leadership have made the academic profession a diversified one. While this is easy to comprehend, the task to establish and maintain linkages with industries in enhancing GE remains an issue yet to be championed by the academics who are already swamped by various academic tasks, let alone collaborating with the industries to specifically promote graduate employability. This paper examines the issues of graduate employability alongside the diversified tasks of the academics. Based on Boyer's scholarship of teaching and learning (SOTL), this paper aims to address how GE could be enhanced amidst the academics' diversification. The proposed framework is hoped to pave the

way forward for the academics to play their parts in enhancing GE amidst their diversification in order to achieve the Ministry of Higher Education aspiration of ‘soaring upwards’.

Keywords : *graduate employability (GE), scholarship of teaching and learning (SOTL), academics’ diversification*

INTRODUCTION

Higher education institutes in Malaysia have recently been introduced to the latest policy in higher education through the National Education Blueprint (Higher Education) 2015-2025. The latest nation wide 2017 budget presentation by the Prime Minister has somewhat given similar impression on the government’s direction dealing with higher education institutes. One of the main concerns of the Malaysian government relates to graduate employability (GE henceforth). The identified shifts and specific initiatives in the blueprint echoed by the budget allocated for promoting GE among Malaysian graduates are evidences of what lie ahead for the institutes and academics.

Out of the ten shifts, Shift 1: Holistic, entrepreneurial and balanced graduates, has a special emphasis on the quality of graduates each higher education institute is to produce. All the other nine shifts complement each other particularly Shift 1. It is obvious the concern of GE is central.

In the National Higher Education Blueprint (2015-2025), the Minister of Higher Education stated;

“...Through the 10 Shifts identified, the Ministry aspires to produce balanced and holistic graduates with entrepreneurial mindsets, nurture ‘job creators’ rather than just ‘job seekers’,...”
(2015,p. 7)

The Malaysian Graduate Employability Blueprint 2012-2017 is already in its fourth year of implementation. Unfortunately, despite the GE Blueprint and the Ministry’s initiatives in enhancing GE, Malaysian employability rate seems to signal that more has yet to be done. Despite

the growing number of graduates produced, similar trend is not obvious in the graduates' employability. GE fluctuates across the year 2006 to 2015 as shown in the latest tracer study report depicted in the following diagram. The diagram indicates the percentage of employed graduates and since only 72.08% of graduates were employed in 2015, there was an indication that close to 30% of the graduates remain unemployed (Figure 1)

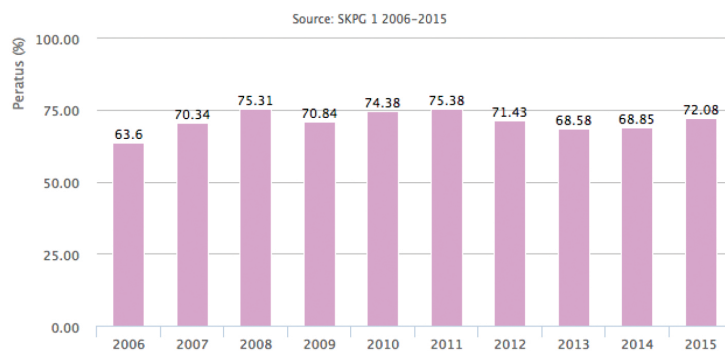


Figure 1: Malaysian graduate employability rate (source: <http://graduan.mohe.govmy/skpg-report/>)

Additionally, according to the Department of Statistics Malaysia;

“...The unemployment rate in Malaysia increased to 3.5 percent in September of 2016 from 3.3 percent a year earlier. The number of unemployed persons rose by 4.5 percent or 22.3 thousand to 512.6 thousand.”

(source : retrieved from <http://www.tradingeconomics.com/malaysia/unemployment-rate> on 16 November, 2016)

The September 2016 report produced by the Department of Statistics Malaysia on the increasing percentage of unemployment is quite alarming. Despite the GE Blueprint (2012-2017) and MOHE's initiatives since the GE blueprint's first conception in 2012, GE issues remain quite unsolved.

Employability

Employability and employment are two distinctive concepts. As stated in the National Graduate Employability Blueprint 2012-2017, employment is defined as the potential to secure a job at a workplace while employability is the potential to secure, maintain, and grow in a particular job at the workplace. Based on this definition, it is safe to conclude that employability requires a set of skills which could direct the individuals to get employed, maintain being employed and even possibly become self-employed and create jobs. Pereira (2016) concurs with this notion and defines employability in terms of the qualities of an individual having a job and being an employee or self-employed. In this instance, Yorke and Knight (2003) have defined GE as a set of skills, knowledge and personal attributes that enables the person to be aware and succeed in his career which in turn could benefit not only himself but the community and the nation's economy at large.

The descriptions of GE could be summarized in the following list.

1. Obtaining and building a fulfilling career through continuous development of skills that can be applied from one employer to another.
2. Possessing the sets of attributes and skills that match those required by industry.
3. Taking the responsibility for self-development through learning and training, either through the employer or self initiatives.

(Bennet, Richardson & MacKinnon, 2016)

Two obvious attributes of GE as could be seen from the list are the concept of life-long learning and functional competencies. Life-long learning is needed as the graduates need to continuously develop and improve their skills. Whereas, functional competencies are equally important as the graduates need to maintain their relevance and importance despite in different organizations or with different employers.

From a closer look at employability, Deakin University Vice-Chancellor, Professor Jane den Hollander stated;

“...Employability is not employment. Employability is the collection of evidence - learning outcomes, experiences and knowledge - that enable a student to be fit for the purpose of employment.”

(Bennet, Richardson & MacKinnon, 2016, p.29)

It is at this juncture that the roles played by academics in educating are seen as prominent in enhancing GE. As students generally spend between three and five years completing their tertiary studies, the academics are their main reference to the world of work. Academics need to ensure that while the teaching and learning process is taking place, the learning outcomes they try to achieve via the knowledge and experiences provided need to direct GE development.

In illustrating GE development, Gurvinder and Sharan (2008) have outlined seven primary factors which are; English language proficiency and literacyskills, ICT skills, problem solving and adaptability skills, human skills, personal organization and time management skills, leadership skills, and communication skills. Besides this, a report on Employability Skills for the Future (ACCI/BCA 2002) had identified eight employability skills for graduates. According to the report, the skills comprise communication, teamwork, problem solving, initiative and enterprise, planning and organizing, self-management, learning and technology.

Based on the identified skills needed in developing and ensuring GE, it could be deduced that academics have a lot to accomplish whilst educating and training their students. Besides focusing on the subject matter, academics need to ensure the identified skills are developed during the teaching and learning process regardless of what subject matter they teach.

Academics' Diversification and GE

Academics' diversification in this paper is referred as the varied tasks entrusted to the academics upon their appointment as an academic in the respective higher institution. It could also be referred as the set of responsibilities or performance indicators. In simpler terms, academics' diversification is the multi tasks done by the academics as the tasks are required and expected of them.

There are various conceptions about what an academic does. The most common conception is they teach at higher education levels such as in diploma, degree or postgraduates programmes (Norzaini *et al*, 2011). In fulfilling this task, the academics first need to be the expert in their relevant field of discipline. The need to be the expert requires them to continuously pursue their studies in order to be qualified. Pursuing their own studies up to the doctoral level is becoming a norm amongst academics. When dealing with teaching tasks, academics are entrusted with several teaching codes and groups of students. Teaching entails preparation of the lectures, supervising, assessing students' work, marking and grading. Besides the allocated teaching hours, the academics need to identify several hours within a week for student consultations.

The next common conception about what academics do is conducting research (ibid.). In the fast lane of university ranking and rating, research and publication are core businesses of the academics besides their teaching load. In between their teaching, academics need to find time to conduct research, which in turn leads them to join special interest groups (SIG) or research interest groups (RIG). Working with several colleagues, the academics write research proposal, apply for research grants, conduct research and produce several publications based on their research. In complementing the university's effort to be ranked accordingly, academics are given the responsibilities to contribute to the scoring of the university through their impactful research and publication. Academics are recognized as experts by their peers through research and publication activities. This leads to the credibility of the academics in the academe (ibid.).

The other common conception of what an academic does is community service (ibid.). Applying their knowledge for the greater good is one of

the identified performance indicators of an academic. Moving beyond classrooms and research labs, academics are seen as responsible to contribute to the social well-being of the community. Integrating their expertise with the needs of the community, academics could produce innovative products as solutions to real problems. As the ministry encourages collaborations between academia and industry, the task of community service could be leveraged by the financial and physical support from the industries. Getting contributions or sponsorships from the industries in fulfilling this task is also considered as the academics' contribution to their university's ranking.

Finally, the academics' diversification is also identified through the final common conception of what they do as academics; academic leadership (ibid.). Academics are naturally leaders. They are the leaders when they teach, research and provide community services. By virtue of being autonomous and self-directed in performing the variety of tasks, academics are 'leaders-ready'. Additionally, some administrative posts in the university and Ministry such as Heads of Department, Directors, Deans and Coordinators are only open to the academics. When appointed, they could hold the relevant office according to their tenure, which is commonly between one and three years. There could also be a re-appointment. It has to be noted that the appointed academic leadership is also done amidst the fulfillment of the previous three common tasks.

Academics' Diversification Overlooked

Academics are responsible to the university and mostly to their students. In this instance, they have been commonly seen responsible for the varied tasks mentioned earlier. However, in discussing the issues with GE, some other varied tasks are often overlooked.

Teaching is indeed the most common task of an academic. However, more often than not the teaching is confined within the classroom and centred on the subject matter. In a survey done by Bennet, Richardson and MacKinnon (2016), it was discovered that 63% of the students reported that they depended on their lecturers to provide them with up-to-date information on the industry and careers. It was noted too that they depended on their lecturers almost double their use of other sources for similar information.

In addition, students who participated in the survey done by Bennet (ibid.) also confirmed that they needed their lecturers to provide real professional practices or the least imitate real work-based contexts. Studies done by Scott *et al.* (2010) and Scott and Yates (2002) have shown similar findings. Both researches highlighted the need for integrated, problem-based, real-world learning and assessment.

To this end, it could be deduced that although it is easy to assume that there is already academics' diversification through the various multi-tasking of the academics, one task unfortunately has been an oversight. Academics need to be aware that they too need to be industry-conscious.

GE and University-industry Collaboration

The Ministry of Higher Education has called for academics to collaborate with the industries as a measure to enhance GE. The National Education Blueprint (Higher Education) 2015-2025 and the Malaysian Graduate Employability Blueprint (2012-2017) have identified and underlined relevant measures and initiatives that could be taken by both parties; universities and industries. However, a closer look at what seems to be a potential collaboration between the two parties has resulted in what is not so promising. A survey done by TalentCorp in 2014 provided some interesting findings worthy to note (<https://www.talentcorp.com.my/facts-and-figures/matching-talents-to-jobs>).

The survey focused on the perceived quality of Malaysian graduates by the identified top employers. It also looked into the efficacy of career services in universities and government-funded graduate employability programmes. The survey respondents were 200 companies employing around 245,000 staff. The companies also represented a wide cross-section of National Key Economic Areas (NKEAs).

It is interesting to note that 81% of the respondents rated communication skills as the major skill deficit in graduates, 90% felt that more practical training should be provided for the graduates by their universities and 80% thought that the university curriculum should be revised in order to reflect the current realities of the industries.

In an attempt to confirm the industries' participation in preparing the students through relevant university-industry collaboration, it was discovered that only 10% of the respondents had experienced developing curriculum or joint programmes with universities and a mere 3% had the experience to participate in the classroom as adjunct professors. These findings are supported by the fact that 34% of the respondents had never approached universities to recruit candidates or were approached by universities to place their graduates into entry positions and 53% admitted that they had never worked with career centres (<https://www.talentcorp.com.my/facts-and-figures/matching-talents-to-jobs>).

Under the flagship of the Ministry's Academia-Industry Relations Department, universities have been encouraged to collaborate with the industries as interventions methods to enhance GE. On their part, several programmes have been conducted by the universities as evidence of their commitments towards university-industry linkages and collaborations. Some of the programmes include Bridging the Gap Programmes; Career Xcell Bridging Gap Programmes; Graduate Employability Management Scheme (GEMS), Finishing School; Grooming and English Language Special Programme (ELSP). Nonetheless despite all these efforts, more collaborative programmes still could be done as found in the survey conducted by TalentCorp.

Boyer's Scholarship of Teaching and Learning

Boyer first introduced the scholarship of teaching and learning (SOTL henceforth) in 1990 based on his observations of what academics do and the debates on teaching versus research nexus. Boyer stated;

"...We believe the time has come to move beyond the tire old "teaching versus research" debate and give the familiar and honourable term 'scholarship' a broader, more capacious meaning, one that brings legitimacy to the full scope of academic work."

(Boyer, 1990, p. 16)

He further added his notion on the scholarship of teaching and learning as claiming;

“...academics were called upon to serve a larger purpose: to participate in the building of a more just society and to make the nation more civil and secure.”

(Boyer, 1996, p. 13)

Based on his statement, it is clear that he saw academics as important in promoting nation development and serving the society for the greater good. In promoting flexibility in broadening the academics' expertise, skills and knowledge beyond classroom and research lab boundaries and into the reality of contemporary life, Boyer proposed four types of scholarship. Briefly, the four types of scholarship are;

- i) **Scholarship of discovery**
The scholarship of discovery is the closest to what is conceptualized as research done by the academics. Academics have the rights and freedom to research as research is central to the work of higher learning. The focus is not just the outcomes but also the process and most importantly the passion “to confront the unknown and to seek understanding for its own sake” (Bowen as stated in Boyer, 1990, p. 17). The common questions academics would ask as they engage in the scholarship of discovery are; ‘What is to be known?’ and ‘What is yet to be found?’
- ii) **Scholarship of integration**
The scholarship of integration positions the academics as the experts of their discipline who could give meaning of isolated facts by making connections between the facts or disciplines and putting them in a bigger perspective. The academics' intellectual capacity to make meaningful interpretations of what they observed is the idea. In turn, these acts could bring new insight and pragmatic real life problem solutions. A common question posed by academics who engage in the scholarship of integration is ‘What do these findings mean?’
- iii) **Scholarship of application and later known as engagement**
The scholarship of integration (and later known as engagement) leads the academics into using their knowledge, expertise and skills for the real use as needed by the society. In this instance,

the academics are seen as providing services to the community through the rigour of professional activities drawn from their expertise. In simpler words, the academics provide scholarly services to the community, which in turn develop the nation, or to the least improve the quality of life in the community.

iv) Scholarship of teaching and learning

The scholarship of teaching and learning redirects the concept of academics as beyond being the sole knowledge provider and the know all. In the words of Boyer,

“...They stimulate active, not passive, learning and encourage students to be critical, creative thinkers, with the capacity to go on learning after their college days are over.”

(1990, p.24)

It is also central to the scholarship of teaching and learning that the academics are learners themselves. Looking at learning as a joint process between the academics and their students, academics need to also challenge themselves to co-construct and transform new knowledge together with their students.

All in all, SOTL as introduced by Boyer suggests a more comprehensive and inclusive view of what it really means to be an academic. The academic diversification if seen holistically recognizes academics as scholars whose knowledge, expertise and skills are recognized through research, synthesis, practice and teaching. There need to be a balance between all the four types of scholarship. Losing focus on one could risk the academics' scholarly attributes. While teaching and research (and publication) are serious businesses of the academics, they need to also be recognized and given merit for their community services and reflective teaching practices. Boyer commented;

“...Almost every college catalogue in this country still lists teaching, research, and service as the priorities of the professoriate; yet, at tenure and promotion time, the harsh truth is that service is hardly mentioned. And even more disturbing, faculty who do spend time with so-called applied projects frequently jeopardize their careers.”

(1996, p. 13)

Proposed Framework for GE Enhancement through SOTL

Arum and Roska (2011) put forth the possibility that students seem to risk graduating with little exploration of self or career opportunities. As an example, the students are said to possess underdeveloped skills in complex reasoning, critical thinking and communication. Additionally, students still need to develop their negotiation skills when facing challenges such as intense competition for entry-level work (Bennett & Bridgstock, 2014).

Blumenstyk (2014) claims that students need to be provided with learning experiences designed to enhance employability. There need to be explicit connections between student learning and the professional context. Most importantly, GE development needs to be done overtly to encourage meaningful learning on the part of the students.

Mason, Williams and Cranmers (2009) state that employability could be enhanced through industry placements since students' professional behaviours and skills are directly emphasized and trained within the industry. The participation of the industry in classrooms as adjunct professors could further enhance GE skills development. Additionally, the academics could also profit from industry attachment as it prosper their career paths (Bennet, Richardson & MacKinnon, 2016).

To this end, several concepts are central to the notion of enhancing GE through SOTL amidst the academics' diversification. The following conceptual framework summarizes the key concepts discussed thus far.

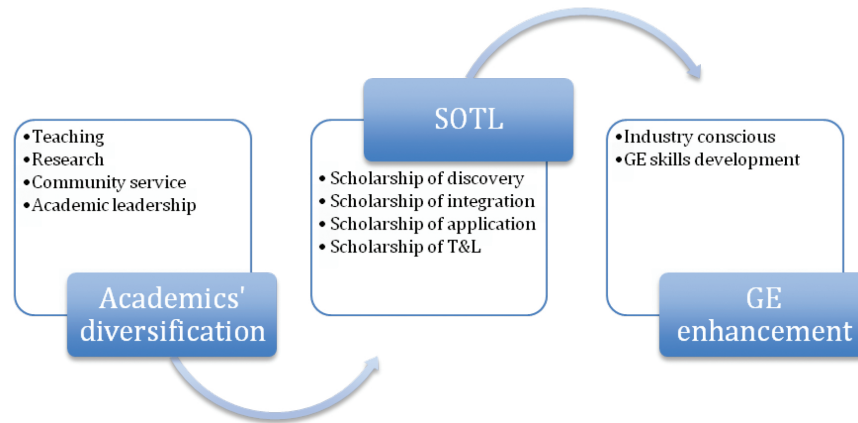
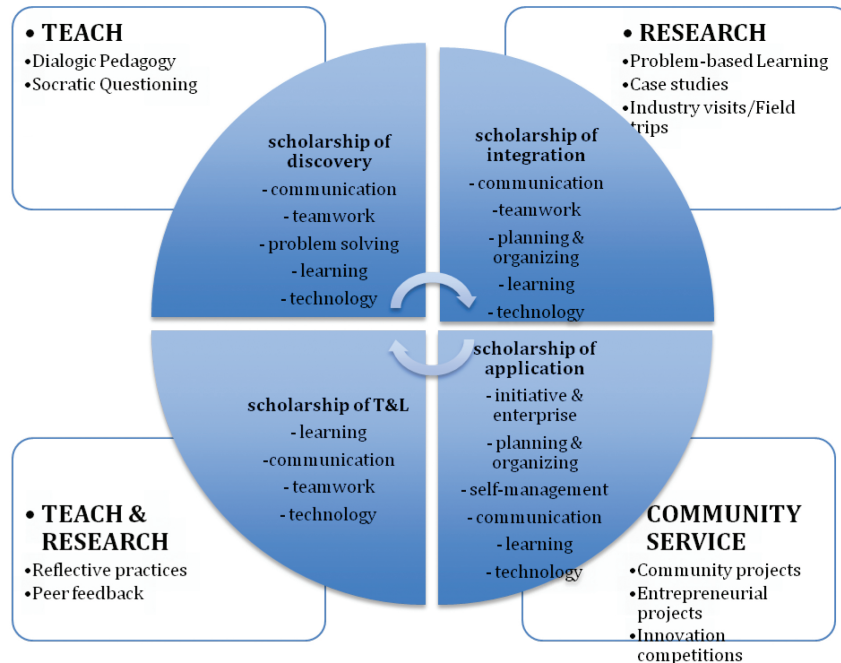


Figure 2: Conceptual Framework of Academics' Diversification and GE Enhancement through SOTL

Considering GE development, academics' diversification and SOTL, this paper proposes a framework, which could enable the academics to support and facilitate GE development while performing their varied tasks. In other words, the framework signifies the academics' contribution in enhancing GE regardless of their diversification. The framework is as illustrated in the following diagram.



Note:

ACADEMIC LEADERSHIP is a task available across four quadrants as academics are naturally leaders in each capacity; teach, research and community service. It is more so for the appointed academic leaders.

Figure 3: Proposed Framework for Enhancing GE through SOTL

As reported in the Employability Skills for the Future (ACCI/BCA 2002), there are eight GE skills that need to be developed in enhancing the students' employability. The skills identified comprise communication, teamwork, problem solving, initiative and enterprise, planning and organizing, self-management, learning and technology.

The proposed framework highlights specific SOTL as outlined by Boyer which could be leveraged to enhance relevant GE skills. A brief description of the proposed framework is as follows.

The teaching task of the academics is obvious in the scholarship of discovery. Scholarship of discovery could be leveraged to enhance communication, teamwork, problem solving, learning and technology. The main teaching strategies that could be applied in leveraging on this

scholarship in enhancing the relevant GE skills are Dialogic Pedagogy and Socratic Questioning.

The research task is apparent in the scholarship of integration. Scholarship of integration could enhance communication, teamwork, planning and organizing, learning and technology. Some teaching strategies-cum-student activities that could be employed and conducted to train the relevant GE skills include problem-based learning, case studies and industry visit or field trips.

The community service task is relevant in the scholarship of application/engagement. Scholarship of application/engagement could enhance initiative and enterprise, planning and organizing, self-management, communication, learning and technology. Academics could leverage on this scholarship in enhancing the identified GE skills by including community projects, entrepreneurial projects and innovation competitions in their syllabus or assessments.

The tasks of teaching and research are prime in the scholarship of teaching and learning. Scholarship of teaching and learning could enhance learning, communication, teamwork and technology. Teaching strategies such as reflective practices and peer feedback could help develop those GE skills.

An important note to consider is that academics need to be industry conscious as they engage in SOTL. In other words, besides being pedagogically competent, the academics need to also become industry aware. Collaborating with industry partners at a micro level could enable the academics to be within the industry as much as the industry could be within the academics' classrooms. All in all, this framework hopes to have paved the way forward and that it is the academics who need to start making friends with the industry in embracing a teaching culture that is industry-friendly.

CONCLUSION

This paper has addressed an issue which is relevant to any higher education institute. GE has become one of the national agenda as portrayed in the 11th

Malaysian Plan. The National Education Blueprint (Higher Education) 2015-2025 and the 2017 Budget have put GE an agenda of prime importance. The Graduate Employability Blueprint 2012-2017 is now coming into its final year, yet much is to be desired with the trends of GE as reported by TalentCorp (2014). The proposed framework is seen as a pragmatic alternative in facilitating the academics to run their core business, amidst their diversification, not at the expense of GE development. The issue raised by Barrie (2005) as quoted at the beginning of the paper could perhaps be resolved eventually.

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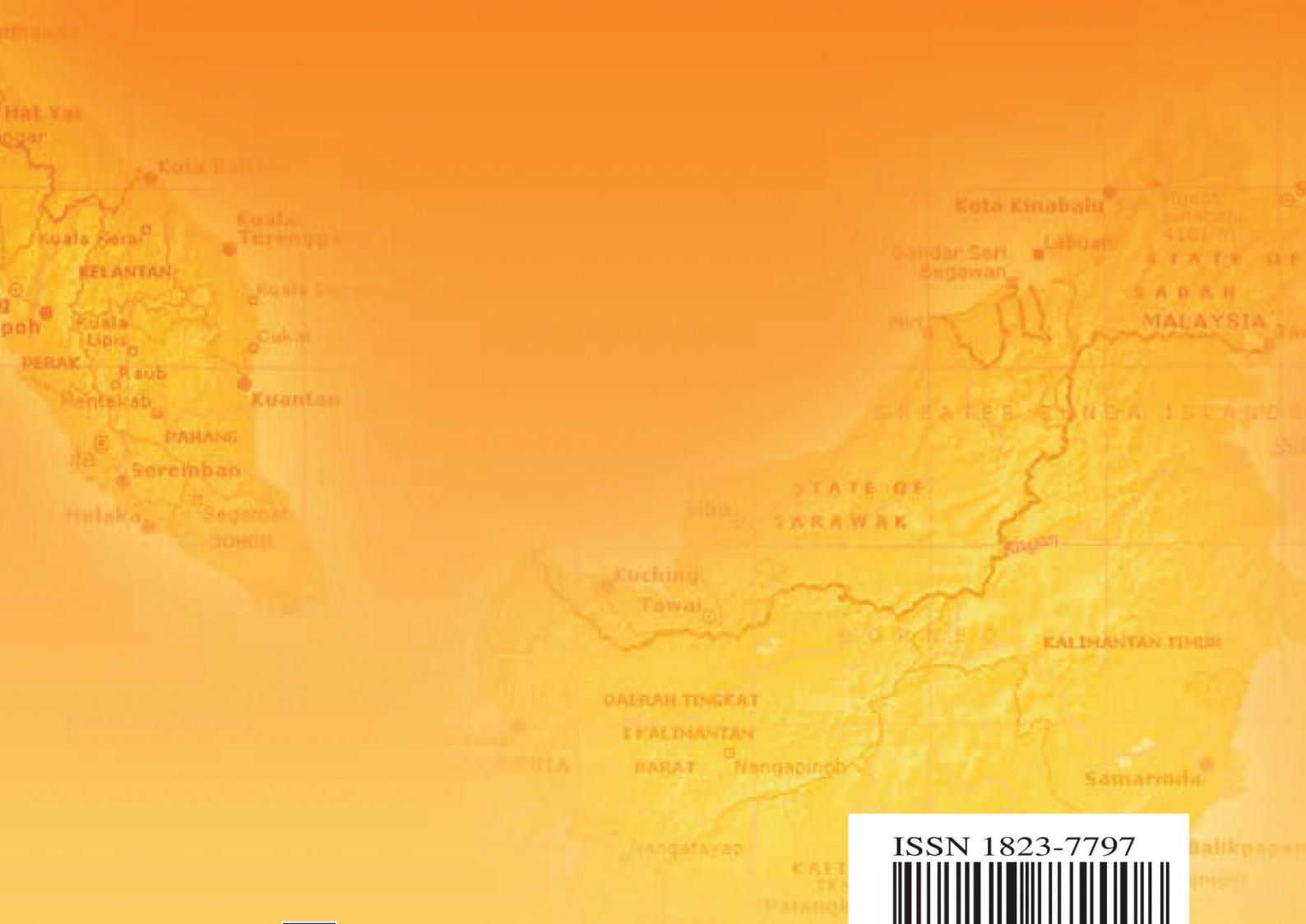
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