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Associate Vice-President, Office of Research & Development, and Dean of the Faculty of Engineering & Technology, INTI International University College, Nilai, Malaysia

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## EDITOR'S NOTE

I wish to welcome you to this edition of JIRSEA.

I am pleased to say that in this edition we have a good representation of papers from the Middle East. In itself this signifies an increasing awareness of Institutional Research (IR) matters in the geographical area, but hopefully also signifies the general expansion of the readership of JIRSEA.

It is also important to note that the scope of topics has also enlarged somewhat to include university-business partnerships and their impacts on various aspects of teaching and learning, as well as the relationships between sex-role characteristics and leadership behaviors of faculty members.

The proliferation of seminars, workshops and conferences on Teaching and Learning in the member countries of SEAAIR is also heartening as they too aim at improving the effectiveness of learning in higher education institutions in the region.

To be sure, much is still to be done to eliminate spoon-feeding for example, but those seminars, workshops and conferences have done much in terms of raising the awareness of better teaching and learning methods. The Malaysian Qualifications Agency (MQA) for example has clearly stated in its accreditation requirements that higher education institutions in Malaysia must use a variety of learning methods and that lectures must not be the only method used.

Indeed lectures are rapidly becoming anachronistic, for information transfer is now better facilitated through on-line means. Thus the nature of "lectures" must inevitably change and the MQA audit panels would now expect to observe scholarly exchanges and interactions between the lecturer and his/her students in the class or lecture rooms.

Somebody says, perhaps in jest that: *A lecture is the transfer of information from the lecturer to the students, without going through the brains of either.* The point is well made though.

For those who wish to contribute to JIRSEA please visit our website <http://www.seair.info> . Also please note that the next SEAAIR Conference will be held on 4-7 November 2008 in Surabaya, Indonesia and hosted by STIE PERBANAS a higher education institution supported by major banks in the country. Further information is available on the Conference website <http://seair2008.com>

Happy reading,

*Nirwan Idrus*

Editor

## **Fuzzy Logic approach to evaluate the characteristics of Teaching at a university**

**Mohd Lazim Abdullah,**

Department of Mathematics, Faculty of Science and Technology, Universiti Malaysia Terengganu, 21030 Kuala Terengganu, Malaysia E-mail: [lazim\\_m@umt.edu.my](mailto:lazim_m@umt.edu.my)

**Abu Osman Md Tap,**

University of Toibah, Medina, Kingdom of Saudi Arabia [amantap@yahoo.com](mailto:amantap@yahoo.com)

**Wan Salihin Wong Abdullah,**

Quality Assurance Centre, Universiti Malaysia Terengganu, 21030 Kuala Terengganu, Malaysia [salihin@umt.edu.my](mailto:salihin@umt.edu.my)

### **Abstract**

This paper provides a reports on the application of a fuzzy set decision making approach in evaluating the characteristics of teaching among lecturers at a university. The approach outlined here is based on the fuzzy sets theory with the objectives of normalising the data on teaching characteristics evaluation into fuzzy numbers and to rank the degree of contribution in five teaching characteristics from two faculties. The study employed a questionnaire which consisted of five major characteristics of teaching and learning sampled from one hundred and twenty three lecturers from a public university in the east coast of the Peninsular Malaysia. The five teaching characteristics were Planning and preparation of teaching, Lecture room/lab teaching, Preparation of teaching resources, Course evaluation system, and Relationship between student-lecturer. The questionnaires were distributed to students by the general staff at the end of every semester for three consecutive semesters. Two definitions of contributions in teaching as linguistic labels were defined to represent the five characteristics prior normalization to fuzzy numbers. In the process of decision making, specified goals had to be attained and specified constraints had to be fulfilled. Decision making by intersection of fuzzy goals and constraints was used to analyze the data. The study found that various degrees of membership were recorded for every teaching characteristics ranging from 0.28 to 0.73. The application of fuzzy sets theory in the decision making environment positively leads to useful numerical hierarchy which provides an effective indicator to the decision makers.

### **Keywords:**

university teaching, effective teaching, fuzzy sets, degrees of contributions, fuzzy decision making.

## Introduction

Excellence is one of the most commonly used words among education institutions. In spite of the positive attributes borne from the fruits of excellence, the word excellence is very vaguely defined and does not have definite boundaries. Some people would suggest that to excel in a job might be measured in terms of mass volume of productivity and for the others it is just a measurement of quality. However excellence plays an enormous role in shaping organisations. There are many attributes governing excellence at a university. One of the much-talked about issues was the quality of academic staff and their effectiveness in teaching. Academic staff must excel in delivering knowledge and information to students. They are expected not only to give their best in teaching but more importantly they must give a sense of satisfaction to their main customers i.e. students. Centra (1993) provided a comprehensive list on the characteristics of effective teaching. These include good organisation of subject matter and course, effective communication, knowledge of and enthusiasm for subject matter and teaching, fairness in examinations and grading, flexibility in approaches in teaching and positive attitude toward students. These are among the very common characteristics in determining effectiveness of teaching at university. Other researchers have also derived similar sets of characteristics (Boyle, 1995; Ramsden, 1991). It should be noted at the outset that the characteristics of teaching comprise a list of elements in teaching which may include the commitment of teachers toward teaching and students.

These characteristics are indeed subjective and there are no clear cut definitions for them. Despite this subjectivity of explaining effective teaching, fuzzy sets theory offers an alternative mean to accommodate the unclear boundaries and the subjective nature (Zadeh, 1965). The fuzzy sets theory was developed in response to the need to have a mathematical measurement of effectiveness. Indeed, it was fortunate that the fuzzy sets theory provides a framework to cope with subjective uncertainty (Mukaidono, 2001).

A (crisp) set  $A$  in the universal set  $U$  is a collection of well-defined object raveling nal by  $\mu_A(x): U \rightarrow \{0, 1\}$  such that  $\mu_A(x) = 1$  if  $x \in A$  and  $\mu_A(x) = 0$  if  $x \notin A$ . Zadeh (1965) proposed the idea of fuzzy set which stated that objects can belong to different degrees in  $[0,1]$  called the grades of membership which reflects strength of belongingness of that element with respect to the set  $A$ . A fuzzy set  $A$  described by a membership function  $\mu_A(x)$  that takes an element in the universe of discourse  $U$  to a value in interval  $[0, 1]$ ,  $\mu_A(x) \in [0, 1]$ . Thus,  $A$  can be represented as  $\mu_A: A \rightarrow \mu_A(x)|x, \text{ where } x \in U$ .

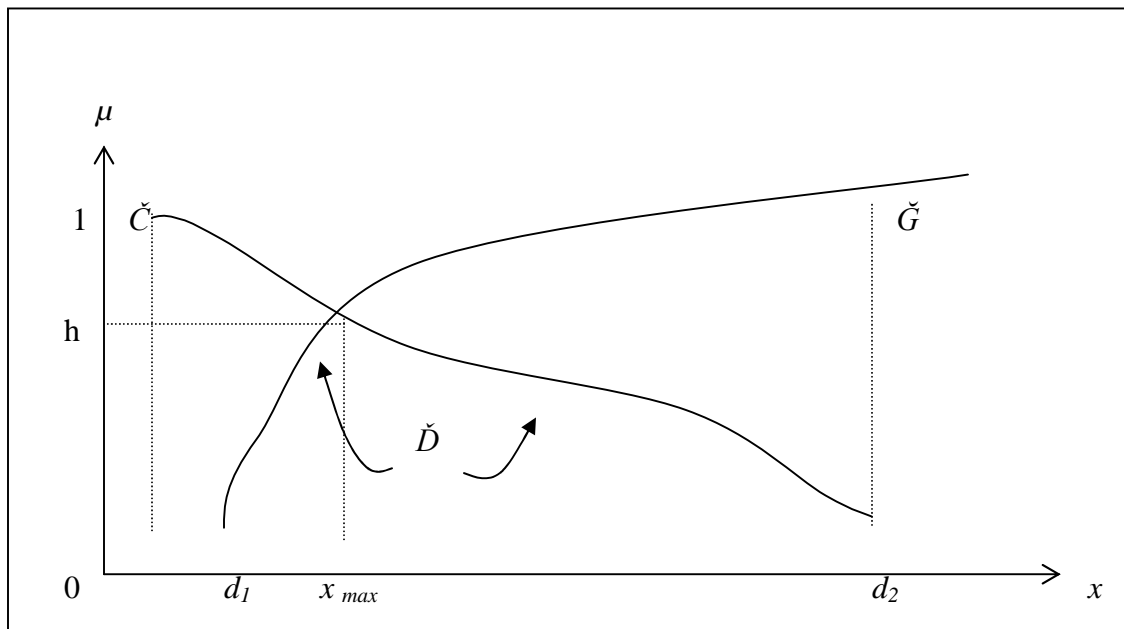
It is said that the formal mathematical knowledge comes from the very exactness of the science of mathematics. Hence, there is no possible space in mathematics for any lack of definition or vagueness. However contrary to this statement, as briefly explained above, Zadeh's fuzzy sets provide the alternative answer for subjectivity. The effective teaching characteristics are considered as untouchable elements rather subjective in nature. Contributions of every characteristic in an effective teaching list that lecturers possessed and assessed by the other parties is usually subjective, raveling nal by a different degree of depth of the effectiveness. This suggests that the application of the fuzzy sets theory in measuring the contribution in effective teaching characteristics is appropriate. Fuzzy sets

theory offers a promising tool in search the highest degree of contributions or recognise the best characteristic. Therefore the purpose of this study is to apply a fuzzy decision making approach to measure degrees of contributions of effective teaching characteristics for the lecturers at two faculties from a public university in Malaysia. In keeping with the nature of the instrument used in this study, the effective teaching characteristics considered in this study were confined to planning and preparation of teaching, delivery of teaching in lecture room/lab, preparation of teaching resources, course evaluation system, and the relationship between student-lecturer.

### Decision Making by Intersection of Fuzzy Goals and Constraints

Decision making is traveling nal by selection or choice from alternatives that are available (Bojadziev & Bojadziev, 1999). In the process of decision making, specified goals have to be attained and specified constraints have to be fulfilled. For the purpose of making decisions, consider a simple model consisting of a goal described by a fuzzy set  $\check{G}$  with membership function  $\mu_{\check{G}}(x)$  and a constraint described by a fuzzy set  $\check{C}$  with membership function  $\mu_{\check{C}}(x)$ , where  $x$  is element of crisp set of alternatives  $\check{A}_{alt}$ . By definition (Bellman and Zadeh, (1987)) the decision is a fuzzy set  $\check{D}$  with membership function  $\mu_{\check{D}}(x)$  expressed as intersection of  $\check{G}$  and  $\check{C}$ .

$$\check{D} = \check{G} \cap \check{C} = \{ x, \mu_{\check{D}}(x) | x \in [ d_1, d_2] \}. \quad M_{\check{D}}(x) \in [0, h \leq 1] \quad (2.1)$$



**Figure 1 Fuzzy goal  $\check{G}$ , constraint  $\check{C}$ , decision  $\check{D}$ , max decision  $x_{max}$ .**

It is a multiple decision resulting in selection of the crisp set  $[ d_1, d_2]$  from the set alternatives  $\check{A}_{alt}$ :  $\mu_{\check{D}}(x)$  indicates the degree to which any  $x \in [ d_1, d_2]$  belongs to the



decision  $\check{D}$ . A schematic representation is shown on Figure 1 when  $x \in \check{A}_{alt} \subset R$  and  $\check{G}$  and  $\check{C}$  have monotone continuous membership functions.

Using the membership functions and operation intersection on fuzzy sets, formula (2.1) gives

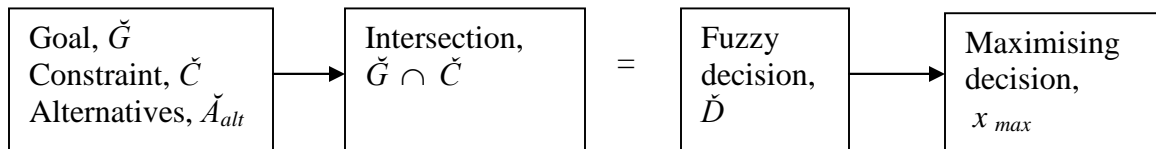
$$\mu_{\check{D}}(x) = \min(\mu_{\check{G}}(x), \mu_{\check{C}}(x)), \quad x \in \check{A}_{alt} \tag{2.2}$$

The operation intersection is commutative, hence the goal and constraint in (2.1) can be formally interchanged, i.e.  $\check{D} = \check{G} \cap \check{C} = \check{C} \cap \check{D}$ . Actually there are real situations in which, depending on the point of view, a goal can be considered as constraint and vice-versa. Sometimes there is no need to specify the goal and constraint. Instead these are simply called the objectives of a problem.

Usually the decision makers want to have crisp result, a value among the elements of set  $[d_1, d_2] \subset \check{A}_{alt}$  which best or adequately represents the fuzzy set  $\check{D}$ . That requires defuzzification of  $\check{D}$ . It is natural to adopt for that purpose the value  $x$  from the selected set  $[d_1, d_2]$  with highest degree of membership in the set  $\check{D}$ . Such a value  $x$  raveling  $\mu_{\check{D}}(x)$  and is called raveling decision. It is expressed by

$$x_{max} = \{x \mid \max \mu_{\check{D}}(x) = \max \min (\mu_{\check{G}}(x), \mu_{\check{C}}(x))\} \tag{2.3}$$

The process of decision making is shown as a block diagram on Figure.2



**Figure 2 Process of decision making by intersection**

The formulae (2.1) – (2.3) have been raveling n for decision making model with many goals and constraints (Bellman and Zadeh, 1987). For  $n$  goals  $\check{G}_i, i = 1, \dots, n$ , and  $m$  constraints,  $\check{C}_j, j = 1, \dots, m$ , the decision is

$$\check{D} = \check{G}_1 \cap \dots \cap \check{G}_n \cap \check{C}_1 \cap \dots \cap \check{C}_m, \tag{2.4}$$

the membership function of  $\check{D}$  is

$$\mu_{\check{D}}(x) = \min (\mu_{\check{G}_1}(x), \dots, \mu_{\check{G}_n}(x), \mu_{\check{C}_1}(x), \dots, \mu_{\check{C}_m}(x)), \tag{2.5}$$

and the traveling decision is given by

$$x_{max} = \{x \mid \mu_{\bar{D}}(x) \text{ is max}\} \quad (2.6)$$

A case study of evaluation of teaching characteristics at a university is presented showing the process of decision making in fuzzy environment. The decision process was adopted from Case Study 9 based on material in the book by Li and Yen (1995) on the evaluation of learning performance.

### **Measuring the Contributions of Effective Teaching Characteristics: A Numerical Example**

The fuzzy decision making is applied to determine the degree of contribution to effective teaching characteristics in a case study of teaching evaluation at a university college in the east coast of the Malaysian Peninsula. As a newly established university, more than sixty percent of the academic force is relatively young. In many cases this is their first experience in teaching in tertiary education. Thus, it is appropriate that the University included the evaluation of teaching as part of their programmes to improve the quality of teaching. When the university was first established, there were two faculties operating. In this study they are named  $f_1$  and  $f_2$ . The faculty  $f_1$  focuses mainly on sciences and technology courses while the faculty  $f_2$  offers courses in the fields of economics and management. In the faculty  $f_1$ , there were seven departments denoted as  $s_1, s_2, s_3, s_4, s_5, s_6, s_7$  whereas in the faculty  $f_2$ , there were five departments denoted as  $m_1, m_2, m_3, m_4, m_5$ . In this study, a fuzzy decision making will be applied to determine the degree of contribution of the effective teaching characteristics from these two different faculties.

Scores on the evaluation of teaching were deduced from a questionnaire. The Likert-type questionnaire was distributed to students by general (non-academic) staff at the end of every semester for three consecutive semesters. Some lamented that students are not the sole group that has the right to evaluate nor is their evaluation always right. However, with the recent empowerment of departmental leaders, students are seen to be in an excellent position to observe and judge the teaching processes. Students can provide valid and useful evaluation information on certain important aspects of course units (Boyle, 1996). Students' views on all aspects of their higher education experiences are now being widely canvassed and regarded as essential to the effective monitoring of quality in universities. Their views will form some of the wide range of data that will be in the public domain so that members of the various higher education stakeholder groups have the information to make judgment about levels of performance in particular universities (HEFCE, 2002; QAA, 2002).

The questionnaire focuses on five characteristics of teaching and learning categorized as,

- a\_: Planning and preparation of teaching,
- b\_: Lecture room/lab teaching,

- c\_: Preparation of teaching resources,
- d\_: Course evaluation system, and
- e\_: Relationship between student-lecturer.

Answers given by students were marked on a four-point scale (4 = most agreeable to 1 = least agreeable). A total of 123 courses/lecturers were sampled and all the data were analysed using a fuzzy set decision making approach. A total score for every characteristic was calculated by adding sub-scores of items before being converted to percentages. The total score for every characteristic represents the degree of contribution of the samples. The word ‘contribution’ to effective teaching characteristics must be defined prior to the computational procedures.

***Definition of contributions in effective teaching characteristics***

The measure of contribution to effective teaching characteristics was based on the scores given by students to lecturers in the respective departments. Contribution is a linguistic label which described separately into two trapezoidal numbers. The two different definitions were given primarily because of the different weights recorded from two faculties. Contributions to the five characteristics from the departments of  $s_1, s_2, s_3, s_4, s_5, s_6, s_7$  ( $Cs_i$ ) defined as equation (3.1) while contributions to the five characteristics from the departments of  $m_1, m_2, m_3, m_4, m_5$  ( $Cm_j$ ) is defined as equation (3.2) by using part of trapezoidal numbers on the universe  $[0, 100]$  of scores.

*Definition1: Membership function,  $\mu_{Cs_i}(x)$  of  $s_i \in f_1$*

Using the trapezoidal fuzzy numbers, the membership functions of contributions in teaching characteristics for  $s_i$  is defined as

$$\mu_{Cs_i}(x) = \begin{cases} 0 & \text{for } 0 \leq x < 80 \\ \frac{x-80}{10} & \text{for } 80 \leq x < 90 \\ 1 & \text{for } 90 \leq x \leq 100 \end{cases} \dots\dots\dots (3.1)$$

*Definition2: Membership functions,  $\mu_{Cm_j}(x)$  of  $m_j \in f_2$*

The trapezoidal number of contribution in teaching characteristics for  $m_j$  is defined as

$$\mu_{Cm_j}(x) = \begin{cases} 0 & \text{for } 0 \leq x < 80 \\ \frac{x-80}{15} & \text{for } 80 \leq x < 95 \\ 1 & \text{for } 95 \leq x \leq 100 \end{cases} \dots\dots\dots (3.2)$$

These two definitions definitely offer a different grade of membership for every contribution. For instance, if total score in a characteristic from a department in  $f_1$  is 85 then it has grade of membership 0.50 in the set  $Cs_i$  while the same score in teaching characteristics from a department in  $f_2$  has grade of membership 0.33 in the set  $Cm_j$ .

Details of the computation procedures and results will be explained in the following section.

### ***Computations and Results***

Computation procedures to reach the decisions will be presented in the following two sub-sections.

#### **What are the degrees of contributions in the effective teaching characteristics from the departments in the faculty of $f_I$ ?**

Total scores of five characteristics are segregated to the seven departments denoted as  $s_1, s_2, s_3, s_4, s_5, s_6, s_7$  and converted to percentages (Table 1). The conversion must be made to conform to the definition of contributions and fuzzy model.

**Table 1 Total Scores in Five Teaching Characteristics at  $s_i \in f_I$**

Characteristics/ Departments	a_	b_	c_	d_	e_
$s_1$	89.28	88.46	88.77	90.03	90.57
$s_2$	89.87	87.16	89.30	89.36	85.78
$s_3$	88.35	87.15	85.32	82.79	87.61
$s_4$	86.95	85.30	82.90	87.75	89.64
$s_5$	88.45	84.15	85.64	88.56	90.60
$s_6$	85.85	84.02	87.92	86.03	89.41
$s_7$	87.39	86.81	86.07	86.35	87.02

Substituting scores in five characteristics into the equation (3.1) gives the degree of contribution from departments.

The degrees of contributions attached to each department produce the fuzzy sets of contributions in five effective teaching characteristics (Table 2).

**Table 2 Degree of Contributions of Teaching Characteristics at  $s_i \in f_I$**

Characteristics/ Departments	a_	b_	c_	d_	e_
$s_1$	0.93	0.85	0.88	1.00	1.00
$s_2$	0.99	0.72	0.93	0.94	0.58
$s_3$	0.84	0.72	0.53	0.28	0.76
$s_4$	0.70	0.53	0.29	0.78	0.96
$s_5$	0.85	0.42	0.56	0.86	1.00
$s_6$	0.59	0.40	0.79	0.60	0.94
$s_7$	0.74	0.85	0.61	0.64	0.70

The decision formulae (2.4), (2.5) and (2.6) give

$$\begin{aligned} \check{D} &= \check{G}_1 \cap \check{G}_2 \cap \check{G}_3 \cap \check{G}_4 \cap \check{G}_5 \cap \check{G}_6 \cap \check{G}_7 \\ \check{D} &= \{(a_-, 0.59), (b_-, 0.40), (c_-, 0.29), (d_-, 0.28), (e_-, 0.58)\} \end{aligned}$$

The teaching characteristics and their degrees of contributions (in brackets) can be written in descending order as

1. Planning and preparation of teaching (0.59)
2. Relationship between student-lecturer (0.58)
3. Lecture room/lab teaching (0.40)
4. Preparation of teaching resources (0.29)
5. Course evaluation system (0.28)

*What are the degrees of contributions in the teaching characteristics from the departments in the faculty of  $f_2$ ?*

Total scores of five characteristics in departments of  $m_1, m_2, m_3, m_4, m_5$  were formulated into percentages. The total scores of each department in the faculty of  $f_2$  are presented in Table 3.

**Table 3 Total Scores in Five Teaching Characteristics at  $m_j \in f_2$**

Characteristics/ departments	a <sub>-</sub>	b <sub>-</sub>	c <sub>-</sub>	d <sub>-</sub>	e <sub>-</sub>
$m_1$	90.91	86.45	89.85	91.28	90.78
$m_2$	92.66	85.48	86.01	89.83	88.27
$m_3$	96.66	93.49	94.03	95.06	95.37
$m_4$	92.80	86.87	90.02	88.90	90.68
$m_5$	92.78	89.16	91.07	88.92	90.75

Substituting the scores of the five characteristics into equation (3.2) gives the degrees of contributions corresponding to the scores. The degrees of contributions from each department produce the fuzzy sets of contributions in five teaching characteristics (Table 4).

**Table 4 Degree of Contributions of Teaching Characteristics at  $m_i \in f_2$**

Characteristics/ departments	a <sub>-</sub>	b <sub>-</sub>	c <sub>-</sub>	d <sub>-</sub>	e <sub>-</sub>
$m_1$	0.73	0.43	0.66	0.75	0.72
$m_2$	0.84	0.37	0.40	0.66	0.55
$m_3$	1.00	0.89	0.94	1.00	1.00
$m_4$	0.85	0.46	0.67	0.59	0.71
$m_5$	0.85	0.61	0.74	0.59	0.72

In the same fashion, the decision formulae (2.4), (2.5) and (2.6) give

$$\check{D} = \{(a_-, 0.73), (b_-, 0.37), (c_-, 0.40), (d_-, 0.59), (e_-, 0.55)\}$$

The teaching characteristics and their degrees of contributions can be written in descending order as

1. Planning and preparation of teaching (0.73)
2. Course evaluation system (0.59)
3. Relationship between student-lecturer (0.55)
4. Preparation of teaching resources (0.40)
5. Lecture room/lab teaching (0.37).

The degrees of contributions of teaching characteristics from two faculties were ranging from the lowest 0.28 to the highest 0.73.

### **Discussion and Conclusion**

Analysing the common findings in the two faculties, it was found that the characteristics of planning and preparation for teaching contributed the highest to the two faculties. Students were very observant and they recognised that planning and preparation are an important characteristic in teaching. This finding is in line with the findings of Nicholls (2001). He observed that planning and preparation become paramount when delivering to large numbers of students. One of the keys to effective teaching is good planning. A well-constructed and planned session is much more likely to produce effective students' learning than an ill-prepared session.

The second characteristic that is commonly accepted by both faculties was the relationship between students and lecturers. The importance of students-lecturers relationship was shown in the rank of five characteristics. These relationships were ranked at second and third place in both faculties with slight differences in degree. The students in the sample from two faculties made the point that they highly valued their relationship with lecturers. The relationships between students and lectures had been said as one of the qualities of the lecturer (Hill et. Al., 2003). They highlighted some comments by students to stress the importance of student-lecturer relationships. Among other, they pointed out that students expected their lecturers to be good communicators, who interact easily with students, who facilitate debates and discussions, who are supportive and do not make students feel inadequate, who have a light touch and can be fun with, as well as who can encourage risk taking and creativity in the group. Anderson (2000) also emphasized the importance of these interactions and stressed the students' engagement with the subject and the passion and enthusiasm conveyed to them by the lecturer. This passion and enthusiasm help to demonstrate to students that the lecturer cares about them and that there is concern about their intellectual growth.

It is worth noting here that the faculties see the other three characteristics in teaching rather differently as evidenced by the different degrees of membership and different priorities. The differences may perpetuate the variety of meanings and perceptions in characteristics of effective teaching. The empirical work of Lammers & Murphy (2002), which studied the delivery of sessions in a range of academic disciplines in a US university, indicated that

lecturers had a role in giving information. However, the research indicated that they do not necessarily stimulate thought, change attitudes or develop behavioural skills that are necessary for complex interactions that are essential in higher education. Effective teaching, they argue, involves the appropriate blend of physical factors such as the teaching resources and classroom arrangement and human factors such as preparation, evaluation and relationship with students.

In summary, the decision making model has ranked all the characteristics of effective teaching by placing two human factors as the two most important characteristics. The other factors also play their parts in effective teaching but with the smaller degrees of contributions. Despite using the different definitions of contributions for each faculty, the fuzzy decision model approach seemed modestly applicable as an alternative method for evaluation purposes. The study was meant for evaluation purposes by using a fuzzy approach and no intention to compare between faculties against the teaching characteristics. It is relevant to focus on the whole characteristics of effective teaching as prescribed in the analyses.

Looking at the final results, one could think of other approaches which may look easier and produce a rather simpler method to determine the highest contributions. Normally in any decision involving integers, researchers tend to find the mean scores and standard deviations. Value of means as a central value of the whole data sometimes is not very accurate to reflect the distribution of data. This is especially more complex if each group of data carries different weights and definitions or that the distribution is not normal.

This paper has successfully shown a new method in determining the strength of each characteristic or in this case, effective teaching characteristics. Limitations about the nature of mean values and the unclear definition of contribution in effective teaching have lead to the use fuzzy decision making approach. Decisions are not limited to the degree of membership but also can be ranked accordingly. Ultimately, decision making in fuzzy environment offers an alternative mean to highlight the best characteristics among others. Ying and Ling (2002) showed another example of the use of fuzzy logic in determining the performance of university teachers in Taiwan.

From the computations in the previous section, it becomes evident that the use of fuzzy sets theory in decision making environment leads to useful numerical hierarchy which can give an effective indicator to decision makers. It also becomes evident that the same method with appropriate goals and constraints could be used in many other decision making environments. For example, Novak (1989) showed its use in building construction. A broader application of fuzzy sets in social sciences and management is expected to flourish and could become one of the alternative methods in traveling data.

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## **The University-Business Partnership in Jordan: The Key to Human Resource Education and Workforce Development**

**Samer Khasawneh**

Assistant Professor, Faculty of Educational Sciences, the Hashemite University, Jordan

**Fathi Ihmeideh**

Assistant Professor, Queen Rania Faculty for Childhood, the Hashemite University, Jordan

**Ayman Al-Omari**

Assistant Professor, Faculty of Educational Sciences, the Hashemite University, Jordan.

**Lana Khasawneh**

Instructor, the Ministry of Education, Jordan.

### **Abstract**

The primary purpose of this study was to determine the level of university-business partnership as perceived by faculty members at the Hashemite University in Jordan. A random sample of 220 faculty members participated in the study by completing the researchers' designed questionnaire named the "University-Business Partnership Questionnaire (UBPQ)". The results indicated that participants perceived an overall high level of partnership between the Hashemite University and businesses. Moreover, based on t-test and ANOVA analyses, significant differences were found in faculty members' perceptions based on academic rank and country of graduation. However, significant differences were not found based on gender, years of experience, and type of faculty. Faculty members' academic rank and country of graduation are strong predictors of the level of university-business partnership. The study ended by offering a number of practical and theoretical implications for the field of study. This study is also beneficial to academics and practitioners worldwide.

**Keywords:** University-Business Partnership, Economic Development, Workforce Development, Human Resource Education, and Jordan.

## **Introduction and Theoretical Framework**

One of the most prominent reform movements of the 21<sup>st</sup> century has been the university-business partnerships. Recent changes in the world system represented by Globalization, economic competitiveness, industrialization (Mowery & Nelson, 2004), increasing numbers of university researchers engaging in academic entrepreneurship (Shane, 2005), a growing share of industry subsidy in university budget (Hall, 2004), as well as increasing policy pressure for universities to help improve national economic growth (Greenaway & Hayne, 2000) have greatly contributed to a growing partnership between universities and business organizations. This partnership can help retain and develop a highly skilled workforce, provide a competitive advantage to universities and businesses, accomplish organizational goals and objectives, and can address the demands of both parties concerning human resource education and workforce development (Glenn, 2005; Salter & Martin, 2001; Shane, 2005; Slaughter & Rhoades, 2004).

Educators, employers, and policy makers have found it increasingly important for universities and business organizations to engage in collaborative efforts and to form partnerships (Holtin & Naquin, 2002). Being an essential part of the modern society, they should be closely connected to and cooperate with each other for the ultimate goal of pursuing social and economic development. These collaborations may ultimately lead to economic growth, an improved standard of living, and an extension of humanity's capital and intellectual research (Camilleri & Humphries, 2005; Ferguson, 2001; Newfield, 2004). University-business partnership is extremely important to the development of universities, industries, societies, and the whole life. Therefore, it is vital to invest in and insure the success of this university-business partnership.

Due to constant changes in the competitive environment and considering the fact that both universities and businesses face challenges for limited resources, Settle (1996) mentioned that partnerships should be considered because they are a wise use of resources for all parties. Therefore, universities and businesses have joined together in various ways to improve the academic and technical skills of their future workers. They find themselves in need for continuous learning, knowledge, and skills in the workplace (Curry, 1997). On the one hand, to satisfy this need, businesses are moving toward local universities seeking learning opportunities to help develop a competitive workforce which ultimately can improve organizational performance. Moreover, working with a multitude of partnerships and alliances is considered an important part of an organization's culture (Davis & Botkin, 1994). Business organizations are making a commitment to invest in workforce education and learning for a competitive edge as well as long-term services (Van Burn & Erskine, 2002).

Business leaders are eager to reap the benefits of working with individual universities on research ultimately leading to the training of the next generation workforce, the transfer of basic research into commercial applications, and increased competitiveness (Mowery & Nelson, 2004; Salter & Martin, 2001). This work may require universities to generate scientific knowledge through publications, perform specific research on behalf of business

organizations for the purpose of technology transfer, customization of curricula to address workforce development needs, train of current industry workforce, and provide access to university expertise and facilities, which all have long been recognized as an important source for industrial innovation (Agrawal, 2001; Bozeman, 2000; Hall, 2004; Harman, 2001; Lawrence, 1998).

Finally, business organizations' employees can attend these universities to receive further education and training. These organizations expect their employees to continue to learn and apply what they learn to keep their skills and talents updated to improve their performance and the performance of the organization. Organizations that fail to provide on-going learning and development opportunities for their workforce may encounter worker retention problems and knowledge drain in a highly mobile and competitive labor market.

On the other hand, universities may greatly benefit from partnering with business organizations. For example, Cantor (2000) and Hasseltine (2000) emphasized that such partnership between individual universities and businesses enables university students to acquire internships from local business organizations during their course of study. These internships permit students to engage in practical operation in businesses, to put their academic knowledge into practice, to get deeper understanding of what they have learned, and to find jobs that best meet their skills, abilities, values, and needs. Such approaches can set the pathways for their prospective career development. Moreover, by going into internship in businesses, university students can get rewards that can help reduce their financial burden during their course of study. Furthermore, this partnership can improve students' ability to succeed in job placements and raise the reputation of universities within the industrial sector (Harman, 2001).

Based on that, universities will be able to attract high quality students because of the potential benefits of these partnerships. In addition, due to the increasingly heavy pressure to get employment, high school graduates take employment rate and business connections as important factors when they choose universities (Clark, 1992). With regard to the issue of internships, business organizations can also acquire benefit, in that, internships for students will effectively help businesses reduce the costs of pre-job training and shorten training periods. Thus, organizations will be able to hire quality graduates that meet their needs (Davis & Botkin, 1994).

Another potential benefit to universities resulting from partnering with business organizations include additional operational funding. As educational funds granted by the government continue to be reduced, universities can reap the benefits of the money and equipment provided by local businesses for scholarships and research. Such funding provides an opportunity to conduct academic research, allowing universities to pursue knowledge and make positive contributions to society. In addition, many businesses are willing to provide universities with sabbaticals, employment, and advisory committees for their faculty members (Salter & Martin, 2001). At the same time universities may have an opportunity to contract training programs, access industry facilities and equipment for research, and feedbacks provided by businesses concerning teaching quality and curricula

design, which, in turn, can narrow the gap between education and actual needs of businesses (Hasseltine, 2000; Mowery & Nelson, 2004; Settle, 1996).

Based on the above discussion, it is concluded that forming university-business partnerships is important to the development of universities, businesses, and the whole country's economic growth. The university-business partnership is becoming an important aspect of higher education both at the national and international level. The Ministry of Higher Education (MOHE) in Jordan has been encouraging universities to work closely with business organizations not only for training purposes but also for technology development and upgrading. In an effort to become a high quality productive society, MOHE has placed increased pressure on universities to establish partnerships and alliances with the business industry in Jordan. Cooperation between universities and businesses is necessary for the development of Jordanian universities, business organizations, and the whole society (Schartinger, Rammer, Fischer, & Frahlich 2002). Therefore, determining the level of university-industry partnership in Jordan is an important topic that is worth researching.

### **Statement of the Problem**

Partnerships between universities and local businesses appear to be a valid solution to many social and economic problems in a country. Studies on the partnerships between universities and businesses have been particularly intense since the 1980s both at the national and international level (Anderson, 2001; Bowie, 1994; Clark, 1998; Davies, 2001; Geiger, 2004; Michael & Holdaway, 1992; Rhoades & Smart, 1996; Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004; White & Hauck, 2000). A study by Van Burn and Erskine (2002) indicates the lack of partnership efforts between universities and businesses from the university perspective. Researchers have indicated that more research is needed to determine the status of such partnerships (Eyler, Giles, Stenson, Gray, 2001; Gelmon, 2000; Holland, 2001; Howard, Gelmon, Giles, 2000). To conclude, the topic of university-business partnership in Jordan is a new topic and to the researchers' best knowledge, there appear to be no studies addressing and researching this area. Therefore, the purpose of this study was to determine the level of university-business partnerships in Jordan from the university perspective.

### **Research Questions**

The present study was driven by the following research questions:

1. What is the level of university-business partnerships as perceived by faculty members at the Hashemite University in Jordan?
2. Are there any statistically significant differences in the means of faculty members' perceptions towards the level of university-business partnerships based on differences in gender, years of working experience, type of faculty, academic rank, and country of graduation?

3. Does a model exist which explains a significant portion of the variance in the level of school-business partnership from selected demographic characteristics: gender, years of experience, type of faculty, academic rank, and country of graduation?

### **Significance of the Problem**

Recent changes in the world system including globalization, industrialization, and competition have prompted the need for partnerships between universities and businesses (Anderson, 2001). University-business partnerships are of growing importance to universities because of the continually decreasing financial resources available to universities on the national, regional, and international levels (Office of University Partnerships, 2002). Universities must form true partnerships with business organizations to jointly improve the educational environment, the social environment, and the economic environment of the country (Cruz & Giles, 2000). Universities and businesses can work together to build communities and empower individuals in much more powerful ways collectively than they could standing alone. Therefore, it is anticipated that this research will achieve the following outcomes: (a) add to the limited body of knowledge concerning university-business partnerships overseas; (b) help university administrators to design academic and training programs to better suit and meet the needs of the business industry; (c) provide original data to help us understand education and business partnerships; and (d) lead the way for effective future university-business partnership programs.

### **Definition of Terms**

*University-Business Partnership:* A formal relationship established by educational and business organizations for the optimal use of financial resources, research and development efforts, and human resource education and workforce development, which are mutually beneficial.

### **Research Methods and Procedures**

#### *The Study Context*

This study took place in the Hashemite University, one of the leading state universities in Jordan. Teaching began at the Hashemite University in the academic year 1995/1996. Presently the Hashemite University includes 11 faculties and the Deanery of Scientific Research and Higher Studies, the Deanery of Student Affairs, the Computer Center, the Languages Center, the Center for Environmental Studies, the Center for Distance Learning, the Center for Teaching Quality Assurance, and the Center of Studies, Consultations, and Community Service. Currently, the university hosts more than 17,000 students. The Hashemite University is located near the city of Zarqa, the second largest business district in Jordan. Moreover, the university is located on a strategic street that connects Jordan with Syria, Iraq, and Saudi Arabia. Based on the recommendations of the Ministry of Higher Education, the Hashemite University has an obligation to serve the city of Zarqa and should be committed to and cooperate with local business organizations. Finally, the Hashemite

University was chosen for this study because of the following achievements: (a) the leader in incorporating distance education tools in teaching (e.g., Blackboard), (b) earned the first places in the Qualification Testing Examinations among Jordanian universities for many academic majors within several faculties, (c) Earned prizes as a distinguished university for its academic quality locally and internationally, and (d) its location being nearby crowded business area.

### **Population and Sample**

The target population for this study was all faculty members at the Hashemite University for the academic year 2006/2007. A list of faculty members was obtained from the registrar office to determine the population frame for the study. According to the list, the target population was 500 participants. A simple random sample of 250 faculties was drawn from the established population frame. A total of 220 usable instruments were returned with a response rate of 88%. The sample distribution was 150 males (68.2%) and 70 females (31.8%). With regard to years of experience of faculty members, 81 (36.8%) had an experience less than 3 years, 67 (30.5%) had an experience between 3-6 years, 46 (20.9%) had an experience between 7-10 years, and 26 (11.8%) had an experience above 11 years. University faculties were classified as follows: the Social Sciences Faculties: 101 (45.9%) and the Science faculties 119 (54.1%). There were 28 (12.7%) instructors, 143 (65%) assistant professors, 29 (13.2%) associate professors, and 20 (9.1%) professors. With regard to the country of graduation of faculty members, 79 (35.9%) graduated from international universities, 54 (24.5%) graduate from regional universities, and 87 (39.5%) graduated from local universities in Jordan.

### **Instrumentation**

The instrument used in this study was developed by the researchers after an extensive review of related theory and research and following survey design procedures founded in the literature (Alreck & Settle, 1995; Gaddis, 1998; Leady & Ormrod, 2001; Long, 1998). Items in the instrument were drafted by the researchers and submitted to several content judges for review and to determine the face and content validity of the instrument. These judges have expertise in the field of education, business, instructional design, human resource education, workforce development, and research methodology. This panel of content judges included university faculty members, human resource professionals, and local business leaders. The researchers requested this panel to check the instrument items for clarity, length, time to complete, difficulty in understanding and answering questions, flow of questions, appropriateness of questions based on the research topic, any recommendations for revising the survey questions (e.g., add or delete), and overall utility of the instrument.

Based on their feedback, items were added, dropped or reworded where necessary. A preliminary questionnaire was pilot tested with a group of 38 faculty members who were not included in the final sample of the study. Feedback from this pilot test led to minor modifications in the wording of several items. Long (1998) considered peer reviews to be a form of survey pre-testing. All items in the instrument used a five-point Likert-type scale

with values as follows: 1 “Strongly Disagree”, 2 “Disagree”, 3 “Neutral”, 4 “Agree”, 5 “Strongly Agree”. The final instrument was named the “*University-Business Partnership Questionnaire*” (UBPQ) and consisted of two sections.

The first section of the instrument comprised 17 items that measure the level of university-business partnership as perceived by university faculty members. Examples of the instrument items were “as a result of partnering with business organizations, we were able to obtain faculty sabbaticals”; “partnership with local business organizations enhanced employment opportunities for university graduates”; and “our partnership with the industry produced patents that increased university revenues”.

The second section of the instrument included items related to demographic characteristics (e.g., gender, years of working experience, type of faculty, academic rank, and country of graduation) of respondents. Since this is an exploratory study, eight demographic variables were submitted to a focus group consisting of 15 faculty members who have expertise in the field of education and business and asked for their opinion as to the variables that should be included in the study. Their decision was to use the above mentioned five demographics.

Internal consistency coefficient for the instrument was calculated using Cronbach’s alpha and found to be .84. The standards for instrument reliability for Cronbach’s alpha by Robinson, Shaver, and Wrightsman (1991) were used to judge the quality of the instrument: .80 – 1.00 – exemplary reliability, .70 - .79 – extensive reliability, .60 - .69 – moderate reliability, and < .60 – minimal reliability. Therefore, the instrument is regarded as a reliable measure of the level of university-business partnership based on the perceptions of university faculty members.

### **Data Collection**

A descriptive research methodology was used to conduct this study. Data were collected from faculty members during the fall semester of 2006/2007 academic year. To ensure a representative sample, a certain percentage of faculty members from each faculty were randomly selected. The researchers grouped respondents into two faculties: the Social Sciences Faculty and the Sciences faculty. The researchers contacted the faculties included in the sample either in person or by telephone, explained the nature and goals of the study, and assured their confidentiality, voluntariness, and anonymity. The participants were also informed that the instrument will take less than 12 minutes to complete. The faculties who agreed to participate in the study were given the instrument and were requested to complete it within two weeks. At the end of the two weeks, the researchers collected the completed instruments.

### **Data Analysis**

This study used quantitative data analysis techniques to examine responses to a survey instrument used for this study. The alpha level was set at .05 a priori. Procedures for statistical analysis are discussed by research questions. To achieve the first research

question, descriptive statistics including means and standard deviations were utilized to describe each of the 17 items and the average of all items. To accomplish research question two, independent t-tests and one way analysis of variance (ANOVA) were utilized to compare if differences exist in perceptions of faculty members based on selected demographic characteristics. In the case where there were two levels of the variable (e.g., gender) the t-test was used while ANOVA was used when the variable has more than two levels (e.g., academic rank). Tukey's post hoc test was used in case differences were detected. The third research question was computed using multiple regression analysis with the level of university-business partnership as the dependent variable. The selected demographics were treated as independent variables and entered for stepwise analysis because this was an exploratory study. In this regression equation significant variables were added that increased the variance by .01 as long as the complete regression equation remained significant.

## Results

The data collected from all participants were coded, entered into the SPSS spreadsheets, and analyzed using software package SPSS version 11.5. Descriptive statistics of all the variables in this study were examined by using SPSS frequencies. The minimum and maximum values of each variable were examined for the accuracy of data entry by inspecting "out of range" values. An examination of these values showed that no "out of range" values were entered. In addition, missing subjects were not detected either.

### *Results Pertaining Research Question 1*

Question 1 is about the level of university-business partnership as perceived by faculty members at the Hashemite University in Jordan. Means and standard deviations were used to answer this question. It is observed from Table (1) that the overall mean value for the 17-item instrument, the "University-Business Partnership Questionnaire" (UBPQ) was 4.04. This result indicates that faculty members perceived a high level of partnership between the Hashemite University and business organizations in Jordan. With regard to the means and standard deviations of the 17 items of the UBPQ, the highest mean value of 4.27 was for item nine "our partnership with business organizations enhanced scholarly productivity among academics". In contrast, the lowest mean value of 3.75 was for item 1 "our partnership with business organizations provided students with internships during their course of study". Furthermore, it is noticeable that 13 of the 17 items had mean values above four points on a five-point scale (see Table 1).

**Table 1**  
**Means and Standard Deviations for each item and the Overall of the UBPQ**

Items	Means	Std. Deviations
Item 9	4.27	.73
Item 6	4.26	.72
Item 3	4.21	.78



Items	Means	Std. Deviations
Item 14	4.18	.89
Item 2	4.12	.90
Item 5	4.11	.88
Item 7	4.09	.73
Item 12	4.07	.90
Item 8	4.06	.83
Item 10	4.05	.71
Item 4	4.04	.76
Item 15	4.04	.89
Item 11	4.01	.69
Item 13	3.86	.79
Item 16	3.79	.84
Item 17	3.79	.89
Item 1	3.75	.84
Overall UB PQ	4.04	.32

### ***Results Pertaining Research Question 2***

Question 2 concerns the significant differences between the levels of university-business partnership based on the following individual demographics of faculty members: gender, type of faculty, years of experience, academic rank, and country of graduation. T- Tests for independent samples were used to examine the difference in means between males and females faculty members and between faculty members from the Social Sciences Faculties and faculty members from the Science faculties on the overall level of the UB PQ scores. However, one-way analysis of variance (ANOVA) was utilized to identify whether the variances of the four level groups of experience, the four level groups of academic rank, and the three level groups of country of graduation of faculty members were equal or significantly different.

Table (2) shows that there were no significant differences at the 0.05 level between male and female faculty members on their perceptions toward the level of university-business partnership ( $p=.31$ ). Moreover, significant differences were not found among the two level groups of type of faculty based on faculty members perceptions toward the level of university-business partnership ( $p=.66$ ) (see Table 3).

**Table 2**

### ***The Differences between Male and Female Faculty Members on the Overall UB PQ Scores***

	Gender	N	Means	Std. Deviations	t	p
UB PQ Overall	M	150	4.03	.31	-1.02	.31
	F	70	4.07	.33		

**Table 3**  
**The Differences between Faculty Members in Scientific Colleges (Sc.) and Faculty Members in Social Science Colleges (So) on the Overall UBPO Scores**

	College	N	Means	Std. Deviations	t	P
UPBQ Overall	Sc.	119	4.03	.33	.44	.66
	So.	101	4.05	.29		

On the other hand, utilizing one-way analysis of variance, as can be observed in Table (4), there were no significant differences among the four experience level groups (< 3 years, 3-6 years, 7-11 years, and > 11 years) of faculty members on the overall UBPO score ( $F= 1.89, p= .13$ ). However, as can be observed in Table (5), significant differences were found among the four rank level groups (instructor, assistant professor, associate professor, and professor) on the overall UBPO score ( $F= 13.46, p= .000$ ). Tukey's comparison test revealed that the difference was between assistant professors and instructor for the favor of assistant professors, between associate professors and instructors for the favor of associate professors, and between professors and instructors for the favor of professors. Finally, significant differences were found among the three country of graduation level groups (international, regional, and local) on the overall UBPO score ( $F= 28.11, p= .000$ ). Tukey's Post Hoc analysis revealed that the difference was between international and regional for the favor of international, and between local and regional for the favor of local.

**Table 4**  
**The Differences among the Four Experience Level Groups (< 3 years, 3-6 years, 7-11 years, > 11 years) on the Overall UBPO Score.**

	Sum of Squares		df	F	p
UBPQ Overall	Between Groups	.564	3	1.89	.13
	Within Groups	21.537	216		
	Total	22.102	219		

**Table 5**  
**The Differences among the Four Rank Level Groups (Instructor, Assistant Professor, Associate Professor, and Professor on the Overall UBPO Score.**

	Sum of Squares		df	F	p
UBPQ Overall	Between Groups	3.481	3	13.46	.000
	Within Groups	18.620	216		
	Total	22.102	219		

**Table 6**  
**Post Hoc Test for Differences among the Four Rank Level Groups (Instructor, Assistant Professor, Associate Professor, and Professor) on the Overall UBPO Score.**

Rank Level	Mean	Mean Difference	Std. Error	Sig.
Assistant vs. Instructor	4.10/3.72	.38	.06	.000
Associate vs. Instructor	4.01/3.72	.28	.07	.002
Professor vs. Instructor	4.07/3.72	.35	.08	.000

**Table 7**  
**The Differences among the Three Country of Graduation Level Groups (International, Regional, and Local) on the Overall UBPO Score.**

	Sum of Squares	df	F	p	
UBPQ Overall	Between Groups	4.548	2	28.11	.000
	Within Groups	17.553	217		
	Total	22.102	219		

**Table 8**  
**Post Hoc Test for Differences among the Three Country of Graduation Level Groups (International, Regional, and Local) on the Overall UBPO Score.**

Country of Graduation	Mean	Mean Difference	Std. Error	Sig.
Int. vs. Regional	4.10/3.79	.31	.05	.000
Local vs. Regional	4.14/3.79	.35	.05	.000

### ***Results Pertaining Research Question 3***

The third research question was about determining if a model exists which explains a significant portion of the variance in the level of school-business partnership from selected demographic characteristics: gender, years of experience, type of faculty, academic rank, and country of graduation. Diagnosis of the data did not reveal any serious violations of regression assumptions, multi-co-linearity, or the presence of influential observations. Because of the exploratory nature of this study, stepwise regression analysis was used with the mean of the UBPO score used as the dependent variable in this analysis. Five variables were used as potential exploratory variables: gender, years of experience, type of faculty, academic rank, and country of graduation. Table 10 presents the results of stepwise

multiple regression analysis. A variable was included in the model if it contributed one percent or more to the explained variance. The variable which entered the regression model first was academic rank. Considered alone, this variable explained 12.5% of the variance in the UBPO overall score. One additional variable (country of graduation) explained an additional 3.6% of the variance in the UBPO overall score. These two variables explained a total of 16.1% of the variance in the UBPO overall score. The variables that did not explain a significant portion of the variance were: gender, years of experience, and type of faculty. The ANOVA table for the regression analysis is presented in Table 9 and the model summary is presented in Table 10.

**Table 9**

***ANOVA Table for the Stepwise Multiple Regression Analysis of UBPO Scores***

Source	Sum of Squares	df	Mean Square	<i>F</i>	<i>p</i>
Regression	3.55	2	1.77	20.74	.000
Residual	18.56	217	.086		
Total	22.11	219			

**Table 10**

***Model Summary for the Multiple Regression Analysis of Faculty Members' Responses to the UBPO***

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of the Estimate	R <sup>2</sup> Change	F Change	df1	df2	Sig. F Change
1a	.353	.125	.121	.29	.125	31.01	1	218	.000
2b	.401	.161	.153	.30	.036	9.289	1	217	.003

1. Predictors: Academic Rank, b. Predictors: Academic Rank plus Country of Graduation.

## Discussion and Conclusions

The topic of university-business partnership has received a great deal of attention in the past decade because of its importance as a key factor leading to competitiveness, innovation, and social and economic development. On the international level, research studies were conducted and described the status, attitudes, and perceptions of in-service teachers, school principals, university administrators, and business leaders toward the cooperation that existed between schools and universities on one side and between the business industry, non-profit organizations, and governmental sectors on the other side (Anderson, 2001; Bowie, 1994; Clark, 1998; Davies, 2001; Michael & Holdaway, 1992;

Rhoades & Smart, 1996; Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004; White & Hauck, 2000). However, locally, research studies concerning university-business partnership is quite limited and to the researchers' best knowledge, no studies were identified that addressed this topic. Therefore, the primary purpose of this study was to determine the level of university-business partnership as perceived by faculty members at the Hashemite University in Jordan. Secondary purposes of the study were to test for significant differences in the level of university-business partnership based on selected demographics including gender, years of experience, type of faculty, academic rank, and country of graduation and to determine the variance explained by these variables in the level of university-business partnership.

This study is extremely important to researchers and business leaders in Jordan as well as to international business organizations. To elaborate, Jordanian economy will be nurtured if universities and businesses cooperate for the ultimate goal of organizational success which ultimately lead to improvements in the national economy. This argument is supported by the views of Greenaway and Hayne (2000) who mentioned that partnerships can lead to improved national economies. Having a healthy and balanced economy in Jordan is one of the major attributes that attracts international organizations beside other qualities such as safe investment environment, good quality labor resources, and huge markets. Therefore, international business organizations located in the United States, Europe, Africa, and Asia need to have an advanced and clear picture of the level of cooperation that exists between universities and businesses, which is an indication of growth and development in the social and economic environments in Jordan. Such environments may produce skilled labor force that can be used effectively by international business organizations.

### ***The Level of University-Business Partnership***

This study utilized a descriptive research methodology. A questionnaire was developed and validated in Jordan to better fit the purpose of the study. A random sample of 220 faculty members participated in the study. The findings of this study revealed that faculty members at the Hashemite University perceived that their university has a high level of partnership with local business organizations. According to their perceptions, businesses have provided students with internships, scholarships, on-campus career fairs, and career opportunities for graduates. This result is consistent with the educational literature, in that; Settle (1996) asserted that a true partnership should provide students with the needed financial assistance and placement opportunities. Moreover, as a result of this partnership, faculties were able to obtain sabbaticals, requests for consulting services and customized training programs, conduct joint academic research with the industry, serve on organizations' advisory committees, and access businesses research facilities and equipment. These results are similar to the study of Hasseltine (2000) who found that universities-business partnership has resulted in faculty consulting, collaborative research projects, customized workforce training programs, shared equipment and facilities, cooperative education and training, and advisory relationships.

The Hashemite university, as a result of its partnership with business organizations, has increased the rate of applied research to industry problems, produced patents that increased university revenues, doubled the joint research projects that resulted in commercial applications, increased financial resources for research and development, enhanced and developed academic curriculums that addressed the current and future workforce needs, and improved the quality of teaching and curriculum design based on industry standards. These results are consistent with previous research implications (Ballen, 1998; Decker & Decker, 2003; Lankard, 1995; Rogers, 1996).

In brief, the Hashemite University has experienced a high level of partnership with business organizations because of the following reasons: (a) increased pressure on national universities by the Ministry of Higher Education to form alliances with the business area in which the university exist for the benefit of the national economy, (b) the faculty members at the Hashemite University have an excellent teaching, communication, and business skills which enabled them to attract local businesses, (c) faculty embers at the Hashemite university are regarded as dynamic, professional, and global leaders, because of their local, regional, and international experiences, (c) the Hashemite University has worked hard since its establishment to earn the reputation as a leading university in Jordan by forming alliances with businesses, communities, and businesses for the benefits of students, faculties, and the university, (d) the Hashemite University has established many on-campus centers as mentioned earlier with the purpose of community service and production, and (e) the efforts experienced by university administrators in marketing the university locally, regionally, and internationally.

### *Demographic Variables and Group Differences*

The second research question was to determine if significant differences exist in the faculty members' perceptions towards the level of university-business partnership based on the following demographics: gender, years of experience, type of faculty, academic rank, and country of graduation. The results of the study indicated that there were no significant differences at the 0.05 alpha level due to gender, years of experience, and type of faculty. These results might be justified. With regard to gender, there is an equal opportunity for both male and female faculty members. Moreover, years of experience had no impact on the results of the study because there is an established culture within the system of the Hashemite university that encourages all faculties regardless of their experience to engage in many forms of cooperation with local business organizations to enhance the social and economic development of Jordan. Furthermore, by the same token, the culture of the university has encouraged all faculties regardless of their major to engage in this process of university-business partnership.

With regard to the academic rank and country of graduation of faculty members, significant differences were detected. Assistant professors, associate professors, and professors at the Hashemite University perceived higher levels of university-business partnership than did instructors (earned only a masters' degree). This result might be justified with the assumption that they are more involved with the business community than do instructors

because of the nature of their work as well as the culture of the society as whole. Faculties of a rank of assistant professor and higher (earned a Ph. D. degree) have more opportunities to participate in conferences, training workshops, establishing business relationships, and may serve on academic and business committees. The results also showed that faculty members who graduated from international and local universities had higher perceptions toward the level of university-business partnership than did graduates from regional universities. This result might be justified with the fact that international graduates can bring to their mother university up-to-date knowledge, skills, and abilities (KSA's) and a culture that encourages faculties to seek opportunities for themselves and for their university. These international graduates transfer their KSA's to local students who in turn, become university faculties and continue, in many instances, the path of international graduates. Not to forget, that regional graduates may have KSA's in some instances equal or higher than international graduates.

These results open the door for more demographic variables to be included in further research. Finally, a significant explanatory model was found for the level of university-business partnership in Jordan based on academic rank and country of graduation as substantial predictors. This was based on the finding that a model was found explaining a significant portion of the variance (16.1%) in the level of university-business partnership. It is recommended that the model need to be tested and to include more variables in future research.

## **Recommendations**

This study adds to the growing field of literature on university-business partnership and the following theoretical and practical recommendations are suggested.

### ***Theoretical Recommendations***

- More research is needed with a larger sample of universities in Jordan.
- There is a need to explore the levels of university-business partnerships between private and public universities in Jordan.
- A mixed-method research design of both quantitative and qualitative research should be used to gain a deeper understanding of individual, institutional, and environmental factors that may influence the level of university-business partnership.
- There is a need to explore perspectives of business organizations regarding their level of partnerships with Jordanian universities.

### ***Practical Recommendations***

- Leaders of higher education should establish a university-based center to share industry standards of expertise and real world examples.

- Business leaders should lecture on-campus to bring real world examples to the classrooms.
- Business leaders should have more active role in curriculum design to meet business needs.
- Universities should provide business organizations who have partnered with them to put their logos on machines, textbook covers, and products on a monthly basis. Monlar (1999) suggested that commercial activities (e.g., advertising, sales events) on university campus have shaped the structure of the university today.
- Jordanian universities should seek to partner with international business organizations that are planning to invest in Jordan.
- Jordanian universities need to establish specialized research units so as to be more attractive, relevant, and accessible to industry.

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## Appendix

### **“The University-Business Partnership Questionnaire” (UBPQ)**

#### **As a result of our partnership with business organizations, we were able to:**

1. Provide students with internships during their course of study.
2. Obtain faculty sabbaticals from business organizations.
3. Increase the rate of applied research to industry problems.
4. Enhance employment and career opportunities for university graduates.
5. Produce patents that increase university revenues.
6. Provide consulting services for business organizations.
7. Work on joint research projects with business organizations.
8. Enhance scholarly productivity among academics.
9. Provide customized training programs for business organizations.
10. Receive financial resources for research and development.
11. Get involved in business organizations’ advisory committees.
12. Customize of curriculums to address workforce development needs.
13. Increase the rate of student employment through holding career fairs on university campus.
14. Work on joint curricula improvement efforts with the business industry.
15. Provide students with scholarships as a form of tuition assistance from business organizations.
16. Have access to business research and training facilities.
17. Render customized training programs for industry professionals.

**The relationships between sex-role characteristics and leadership behaviors of faculty members at the Hashemite University**

**Aieman Ahmad AL-OMARI**

Assistant Professor, Higher Education Administration

Hashemite University, Zarqa, Jordan

e-mail: [aieman66@hotmail.com](mailto:aieman66@hotmail.com)

**Abstract**

The primary focus of this study was to determine the existence if any of the relationship between sex-role characteristics and the leadership behavior among faculty members at the Hashemite University in Jordan. The study involved 170 faculty members who self-rated their sex-role characteristics and their leadership behavior. Specifically, the study determined if a significant correlation existed between transformational leadership, transactional leadership total scores and sub-scores and femininity and masculinity scores.

The BEM Sex-Role Inventory – Short Form, and the Multifactor Leadership Questionnaire Form 6S (MLQ-6S) were used in this study.

The results showed that Transformational Leadership behavior was more dominant among faculty members at the Hashemite University than Transactional leadership behavior. Also, the results revealed that masculinity was more dominant than femininity among faculty members. No significant correlation existed between transformational, transactional leadership total scores, sub-scores, and femininity and masculinity scores of the faculty members. In the light of the research findings, some recommendations were made.

**Key Words:** Sex-Role Characteristics, Leadership Behavior, Faculty Members, Hashemite University, Higher Education in Jordan.

**Introduction:**

In studies examining higher education leadership, the academy is frequently characterized in literature as a “male culture” (Acquirr, 2000; and Joyner, 1998) where professional growth, status, and rank are based upon certain historically masculine cultural perceptions of competence, power, and success. Often depicted as an “ivory tower” buffered from and towering over the world outside, higher education, like other large, bureaucratic, political institutions, has been slow to change the pattern of males as the majority of those individuals achieving senior rankings, higher salaries, elevated prestige and greater leadership power.

Significant research efforts were undertaken to determine if sex-role characteristics differences existed in leadership behaviors (Cann & Siegfried, 1990; Caless, 1998; Eagly, Karau, & Makhijani, 1995; Posner & Brodsky, 1994). Because certain traits and behaviors were attributed to a particular gender, some leadership theories have been labeled as gender-specific (Eagly & Johnson, 1990). Transformational leadership, for instance, was a person-centered leadership behavior that endorsed empowerment and inclusiveness and was frequently referred to as a model associated with feminine leadership qualities (Eagly, Johannesen-Schmidt, & van Engen, 2003; Komives, 1991; Shamir, 1999). Alternately, transactional leadership was firmly articulate, methodical and goal-driven, but deemphasized subjectivity; hence, it was considered a predominantly masculine leadership behavior (Eagly, Johannesen-Schmidt, & van Engen, 2003).

Throughout history, women were relegated to positions that were traditionally labeled as feminine, such as secretaries and teachers, and rarely given equitable representation in higher-ranking positions usually reserved for men (Gatenby & Humphries, 1999; van Engen, van der Leeden, & Willemsen, 2001). Rosener (1990) indicated that as women further entrenched themselves into the corporate world, they were forced into supportive-role positions that had relatively marginal administrative but were similar to roles they assumed at home.

For decades, educational researchers vigorously examined the possibility of whether there were gender differences in the way people lead (Butterfield & Grinnel, 1999). By investigating gender, the impact that leadership had on organizations allowed for a possible explanation of other social phenomenon such as why there was such a marginal representation of women in educational administration (Eagly, Karau, & Johnson, 1992). These differences could be of further consequences because “... they are one factor that may affect people’s views about whether women should become leaders and advance to higher positions in organizational hierarchies” (Eagly & Johannesen-Schmidt, 2001, p. 781).

Cann and Siegfried (1990) contended that leadership behaviors were usually coupled with gender stereotypes. The feminine behavior of leadership was thought of as nurturing, interpersonal, inclusive, and tuned in to the needs and concerns of others. The masculine behavior of leadership, on the other hand, was more goal-and task-oriented, focused primarily on the needs of the organization, and deemphasized the subjective needs of the employee (Carbonell, 1984).

Broverman, Vogel, Broverman, Clarkson, and Rosenkratz (1972) supported the conclusions of Cann and Siegfried, noting that the general leadership behavior stereotypes of women were sensitive, warm, and tactful, whereas male stereotypes were identifiably assertive, rational, and component. Similarly, Collard (2001) highlighted the fact that women leaders tended to focus on stereotypically feminine attributes such as building relationships and collaborative efforts, whereas men were more stereotypically masculine in their leadership traits, by being bureaucratic and directive.

Parallel to the findings of Broverman et al., Klenke (1996) stated that masculine leadership behaviors were autocratic, task-oriented, and instrumental as opposed to feminine leadership behaviors that were interpersonal, inclusive and embraced collegiality. In their review of laboratory experiments that investigated leadership behaviors, Eagly, Johannesen-Schmidt, and van Engen (2003) found that the only expressed sex differences in leadership was that females tended to espouse a more democratic, participative leadership behavior, whereas men advocated a more autocratic and directive preference of leadership behavior.

Carli and Eagly (2001) noted that female leaders' likeability and perceived effectiveness could be augmented if they exhibited feelings of warmth and collaborative orientation. Other research on occupation and gender-role stereotyping indicated that women were more warm and expressive than men and that men were more competent and instrumental (task-oriented) than women (Deaux, 1984).

Van Engen et al. (2001) stated that, stereotypically, the leadership behaviors of women had a nurturing, interpersonal connotation as opposed to men whose leadership behaviors had a predominantly task-oriented tone that focused on the goals of the organization. "These behaviors relate to gender because of the stereotypes people have of men as instrumental, component, rational, and assertive and of women sensitive, warm, tactful, and expressive" (p. 582).

In Lips' (2001) study on how women envision themselves in positions of leadership, women rated images of themselves negatively when placed in positions of power and authority, particularly because of the difficulties encountered when trying to balance the gender-role expectations of femininity with authority. Similarly, a study on South African educational leaders showed that women administrators rated their leadership behaviors according to maternal attributes such as nurturance, empathy, team-building, and being supportive (Chisholm, 2001).

Carless (1998; van Engen, van der Leeden, and Willemsen, 2001) referred to transformational and transactional leaderships in gender-specific terms. Transformational leadership was viewed as feminine in nature because of the emphasis it placed on characteristics attributable to women, such as inclusiveness, intellectual stimulation, and valuing the self-worth of the employee. Transactional leadership was perceived as masculine because it was goal-driven, viewed people as tools towards completing objectives, and was disassociated with subjectivity (van Engen, van der Leeden, &

Willermesen, 2001). Consistent with these views on leadership, Rosener (1990, p. 120) noted: "The men are more likely than the women to describe themselves in ways that characterize what some management experts call transactional leadership. The men are more likely to use power that comes from their organizational position and formal authority. The women respondents, on the other hand, described themselves in ways that characterize transformational leadership-getting subordinates to transform their own self-interest into the interest of the group through concern for a broader goal. Moreover, they ascribe their power to personal characteristics like charisma, interpersonal skills, hard work, or personal contacts rather than to organization stature".

In Jordanian higher education institutions, females represented roughly 18% of professorships, 50% of the student population; nearly 51% of all bachelor's degree students and almost 50% of all graduate studies students. But, despite these significant strides in education, women represented only less than one quarter of the deans and department chairpersons of Jordanian colleges and universities (Ministry of Higher Education and Scientific Research, 2006).

Based on the above mentioned argument, the following remarks were observed: Research on the sex-role characteristics and leadership behaviors remains contradictory. However, research on the relationship between the sex-role characteristics and leadership behavior among faculty members and other variables is still worth conducting.

In reviewing the literature on this subject, the researcher found that no study has been done on Jordanian universities' faculty members. Therefore, there is a need for research on the sex-role characteristics and leadership behaviors among faculty members at the Hashemite University.

### **Aim of and Questions to be addressed in the Study**

The primary focus of this study was to determine if a relationship existed between sex-role characteristics and leadership behavior among faculty members at the Hashemite University. This could be done through answering the following questions:

- Is there any dominant leadership behavior among faculty members at the Hashemite University?
- Are there any sex-role characteristics among faculty members at the Hashemite University more dominant than others?
- Is there a relationship between certain leadership behaviors and sex-role characteristics among faculty members at the Hashemite University?



Specifically, the study attempted to determine if there is significant correlation between transformational leadership, transactional leadership, total scores and sub-scores and femininity and masculinity scores.

### **Statement of the Problem:**

The ability to lead effectively, regardless of gender, is an essential quality in any organization including in educational administration. In an attempt to define the attributes of effective leadership practices, several theories noted that perceived effectiveness, or lack thereof, was dependent upon whether an individual's leadership behavior was congruent with sex-role characteristics (Dudley, Love, & Komives, 2000; Johnson, 1976; Kent & Moss, 1994; Korabik, 1990). As further noted by Eagly, Karau, and Johnson (1992), when subordinates perceived their leader as having a leadership role that was gender-incongruent, the ability to influence others and effectively organize tasks that was necessary to complete assignments was greatly compromised. For example, Lips (2001) noted that when female leaders appear to be overly assertive and competitive, their ability to influence others, particularly males, was minimized.

### **Significance of the Study:**

This study was firmly grounded on the premise of improving leadership efficacy within higher education. Hence, this study was significant because as it appraised the potential impact of sex-role characteristics on leadership effectiveness, it also provided important insight into the nature of effective leadership practices as well as recommendations for effective leadership practices in higher education.

This study communally examined the interrelationship of two of the least understood sociological concepts: leadership, and sex-role. As a result, it not only provided data for further research of the two concepts but also further expanded the knowledge base about leadership styles and sex-role characteristics in higher education.

### **Operational Definitions:**

The following definitions are used in this study:

- **Sex-Role characteristics:** refers to those characteristics of behaviors and attributes to which one is identified with and which are typically associated with one or the other gender as defined by Bem (1981). The two sex-role characteristics used in this study are masculine, and feminine.
- **Leadership behavior:** is "the ability to influence or motivate an individual or a group of individuals to work willingly toward a given goal or objective under a specific set of circumstances" (Tucker, 1984, p. 41).

## **Methodology of the Study:**

### **Participants:**

The participants involved in the data collection process for this study were 170 faculty members at the Hashemite University in Jordan. Of the 145 valid responses, 108 were from male respondents (75%) and 37 (25%) were female. They self-rated their sex-role characteristics and their leadership behavior.

### **Instrumentation:**

#### ***Bem Sex-Role Inventory – Short Form:***

A sex-role characteristic for each participant was determined from responses to the Bem Sex-Role Inventory, Short Form (BSRI), developed by Sandra Bem in 1981 as a measure of psychology androgyny. A self-reported instrument, it can be administered to individuals as well as to large groups.

In 1974, Bem theorized that masculinity and femininity were conceptually and empirically distinct constructs and developed both a masculine and a feminine scale based on culturally desirable traits for men and women, respectively (Bem, 1974, 1981). The original BSRI contains 60 items; shortly after constructing the original version, however, Bem developed a short form comprised of the first 30 items to maximize internal consistency of the feminine and masculine scales, and for convenience in scoring (Bem, 1981). The short BSRI is considered to be more psychometrically sound than the original version (Hoffman, 2001).

The BSRI (Bem, 1981) is based on “a theory about both the cognitive processing and the motivational dynamics of sex-typed and androgynous individuals” (p. 10). According to Bem (1974, 1981) certain individuals are highly attuned to cultural definitions of sex-appropriate behavior, and use such definitions as bases upon which to evaluate their own behavior. Such individuals are motivated to maintain their behaviors to be consistent with a culturally idealized image of masculinity or femininity. Items for the Inventory, therefore, were selected based on cultural definitions of sex-typed social desirability of behaviors and not upon differential endorsements by males or females. Along with male and female associates, Bem developed the Inventory. Acting as judges, Bem (1981) and associates labeled a characteristic as feminine if it was judged more socially desirable for a woman than a man; likewise, a characteristic was labeled masculine if it was judged more socially desirable for a man than a woman.

The Short BSRI consists of 30 adjectives and phrases with 10 stereotypically feminine items, 10 stereotypically masculine items, and 10-filler items. Filler items are noted as characteristics that any individual could possess regardless of gender.

Respondents are asked to indicate how well each of the characteristics describes itself according to a seven choice Likert Scale. Response choices are: 1 Never or almost never

true; 2 Usually not true; 3 Sometimes but infrequently true; 4 Occasionally true; 5 Often true; 6 Usually true; and 7 Always or almost always true.

The original Bem Sex-Role Inventory was standardized on two normative samples of Stanford University students in 1973 and again in 1978. The first sample consisted of 279 females and 444 males; the second sample included 340 females and 476 males (Bem, 1981). In order to estimate internal consistency of the BSRI, reliability coefficients were computed separately for females and males from both samples on the femininity, masculinity, and femininity-minus-masculinity difference scores. This yielded coefficient alphas ranging from .75 to .78 on the femininity scale, .86 to .87 on the masculinity scale, and .78 to .84 on the difference score for females and males in both samples (Bem, 1981).

Since this normative data was derived, subsequent tests on subjects of various ages, races, and psychological profiles have replicated the means, medians and standard deviations of the BSRI (Bem, 1981). A study at the University of Washington (Walkup & Abbott, 1978) indicated that the social desirability of the judgments upon which the BSRI are based are relatively stable across both time and geography.

In test-retest reliability measures, correlations ranged from high of (.94) for females on the masculinity scale to low (.76) for males on the femininity scale, indicating that the BSRI is a highly reliable instrument (Bem, 1974, 1981).

#### ***The Multifactor Leadership Questionnaire Form 6S (MLQ-6S):***

This was the second survey instrument used to obtain data in order to measure leadership scores. The faculty members from each department were asked to complete the Multifactor Leadership Questionnaire (MLQ-6S) (Bass, & Avolio, 1992). A 21-item version, the MLQ-6S has been available since 1992 (Northouse, 2004).

The instrument measures how often leaders perceive their leadership behaviors: (1) Idealized Influence, (2) Inspirational Motivation, (3) Intellectual Stimulation, (4) Individualized Consideration, (5) Contingent reward, (6) Management by exception, and (7) Laissez-Faire Leadership

The first four leadership behaviors were categorized under transformational leadership and the next two were categorized under transactional leadership. The remaining leadership behavior is Laissez Faire leadership. Because the current study only necessitated transformational and transactional leadership scores, the MLQ-6S was modified only to contain 19 descriptive statements that corresponded to those particular leadership styles only.

**Idealized Influence** assesses the degree to which the leader instills pride in others, displays power and confidence, makes personal sacrifice or champions new possibilities, considers the ethical or moral consequences of decisions, and talks about the importance of having a collective sense of mission.

**Inspirational Motivation** assesses the leader's ability to articulate a compelling vision of the future as well as the degree to which he or she sets challenging standards and takes a stand on controversial issues.

**Intellectual Stimulation** is the leader's vision and those behaviors that increase followers understanding of the problems they face. Transformational leaders use intellectual stimulation to point out the problems in the current situations and contrast them with their vision of the future.

**Individualized Consideration** is the extent to which leaders treat followers as individuals and how much of a mentoring or coaching orientation leaders have for followers

**Contingent Reward** is the extent to which leaders set goals, make rewards contingent on performance, obtain necessary resources, and provide rewards when performance goals have been met.

**Management-by-exception** is the degree to which managers focus on negatives instead of positives, and the degree to which they intervene when mistakes occur. Active management-by-exception occurs when managers closely monitor follower performance and keep track of mistakes. Passive management-by-exception occurs when managers are unaware of performance problems until brought to their attention. Management-by-exception is characterized by negative feedback and punishment.

**Laissez-Faire Leadership** is neither transactional nor transformational. Leaders who avoid responsibilities, fail to make decisions, are absent when needed, or fail to follow up on requests would receive higher scores on the laissez-faire leadership factor.

### **Data Analysis:**

Using SPSS version 11 for Windows, several steps were involved in analyzing the data provided by the participants. The first step involved scoring the BSRI to attain femininity and masculinity scores. This was done by summing the ratings for each scale and dividing by the number of items rated, in this case 10, to attain a raw score.

The next step involved the scoring of the MLQ-6S to attain sub-scores and a total score for transformational and transactional leadership. Sub-scores were derived by summing the items for each scale and dividing by the number of items that make up each scale. Total scores were attained by adding the sub-scores of each scale.

### **Results of the study**

**Question One: Is there any dominant leadership behavior among faculty members at the Hashemite University??**

The mean score for total Transformational Leadership scores was 3.07 (SD, 0.24). The mean score for total Transactional Leadership scores was 1.83 (SD, 0.38). Table 1 illustrates these data. Four categories comprised the scales that measured transformational leadership; the mean score for Idealized Influence was 3.32 (SD, 0.37); the mean score for Inspirational Motivation was 3.64 (SD, 0.39); the mean score for Intellectual Stimulation was 2.54 (SD, 0.46); the mean score for Individualized Consideration was 2.75 (SD, 0.31). Two categories comprised the scales that measured transactional leadership; the mean score for Contingent Reward was 1.74 (SD, 0.46); the mean score for Management by Exception was 1.93 (SD, 0.51).

The result in Table 1 shows that Transformational Leadership behavior was dominant among faculty members than Transactional leadership behavior.

***Table 1: Means and Standard Deviation on Transformational and Transactional Leadership sub-scores***

<b>Leadership Category</b>	<b>Means</b>	<b>SD</b>
Idealized Influence	3.32	.37
Inspirational Motivation	3.64	.39
Intellectual Stimulation	2.54	.46
Individualized Consideration	2.75	.31
<b>Transformational Leadership Total Score (TFL)</b>	<b>3.07</b>	<b>.24</b>
Contingent Reward	1.74	.46
Management By Exception	1.93	.51
<b>Transactional Leadership Total Score (TAL)</b>	<b>1.83</b>	<b>.38</b>

**Question Two: Are there any sex-role characteristics among faculty members at the Hashemite University more dominant than others?**

The survey required the participants to self-rate their sex-role characteristics scores using to 30 indicators. Ten items were designed to assess masculinity and 10 items were designed to assess femininity. The remaining 10 items were filter items.

The mean score for femininity scores was 3.55 (SD, 0.31). The mean score for masculinity scores was 3.87 (SD, 0.42). The results show that masculinity was more dominant than femininity among faculty members. These data are illustrated in Table 2.

***Table 2: Means and Standard Deviation on Femininity and Masculinity Scores***

<b>Personality Category</b>	<b>Means</b>	<b>SD</b>
Femininity Score	3.55	.31
Masculinity Score	3.87	.42

**Question Three:** Is there a relationship between certain leadership behaviors and sex-role characteristics among faculty members at the Hashemite University?

***Table 3: Pearson Correlation analysis between leadership behavior (Transformational Leadership, Transactional Leadership), and sex-role characteristics (Femininity and Masculinity scores)***

		Femininity Score	Masculinity score
<b>Transformational Leadership Total Score</b>	Pearson Correlation Sig. level	(.079) (.145)	(.155) (.062)
Idealized Influence	Pearson Correlation Sig. level	(.039) (.171)	(.013) (.116)
Inspirational Motivation	Pearson Correlation Sig. level	(.179) (.116)	(.131) (.116)
Intellectual Stimulation	Pearson Correlation Sig. level	(.114) (.171)	(-.116) (.165)
Individualized Consideration	Pearson Correlation Sig. level	(.048) (.924)	(.019) (.822)
<b>Transactional Leadership Total Score</b>	Pearson Correlation Sig. level	(.147) (.639)	(.141) (.265)
Contingent Reward	Pearson Correlation Sig. level	(.166) (.460)	(.107) (.066)
Management by Exception	Pearson Correlation Sig. level	(.047) (.064)	(.001) (.998)

Table 3 indicates that no significant correlation exists between transformational, transactional leadership total scores, sub-scores, and femininity and masculinity scores of faculty members.

In the total Transformational Leadership scores and the four sub-scores on the MLQ-6S that assessed transformational leadership and the sex-role characteristics scores on the BSRI that assessed femininity and masculinity scores, five correlation coefficients with an alpha level of 0.05 were computed. To control for type I error across the five correlations, the Bonferroni Correction with a p value of less than .01 (.05/5=.01) was required for significance.

The results of the correlation analysis between femininity scores and the total Transformational Leadership scores ( $r(143) = .079$ ,  $p = .145$ ); femininity scores and Individualized Influence sub-scores ( $r(143) = -.039$ ,  $p = .171$ ); femininity scores and Inspirational Motivation sub-scores ( $r(143) = .179$ ,  $p = .116$ ); femininity scores and Intellectual Stimulations sub-scores ( $r(143) = .114$ ,  $p = .171$ ); and femininity scores and Individualized Consideration sub-scores ( $r(143) = .048$ ,  $p = .924$ ) were not statistically significant.

The results of the correlation analysis between masculinity scores and the total Transformational Leadership scores ( $r(143) = .155$ ,  $p = .062$ ); masculinity scores and Individualized Influence sub-scores ( $r(143) = .013$ ,  $p = .116$ ); masculinity scores and Inspirational Motivation sub-scores ( $r(143) = .131$ ,  $p = .116$ ); masculinity scores and Intellectual Stimulations sub-scores ( $r(143) = -.116$ ,  $p = .165$ ); and masculinity scores and Individualized Consideration sub-scores ( $r(143) = .019$ ,  $p = .822$ ) were resulted no statistical significance.

In the total Transactional Leadership scores and the two sub-scores on the MLQ-6S that assessed transactional leadership and the sex-role characteristics scores on the BSRI that assessed femininity and masculinity scores, three correlation coefficients with an alpha level of 00.05 were computed. To control for type I error across the three correlations, the Bonferroni Correction with a p value of less than .016 ( $.05/3 = .016$ ) was required for significance.

The results of the correlation analysis between femininity scores and the total **Transactional Leadership** scores ( $r(143) = .147$ ,  $p = .639$ ); femininity scores and Contingent Reward sub-scores ( $r(143) = .166$ ,  $p = .460$ ); femininity scores and Management by Exception sub-scores ( $r(143) = .047$ ,  $p = .064$ ); were not statistically significant.

The results of the correlation analysis between masculinity scores and the total **Transactional Leadership** scores ( $r(143) = .141$ ,  $p = .265$ ); masculinity scores and Contingent Reward sub-scores ( $r(143) = .107$ ,  $p = .066$ ); masculinity scores and Management by Exception sub-scores ( $r(143) = .001$ ,  $p = .998$ ); were resulted no statistical significance.

## Discussions and Conclusions

Based on the findings of the study, the following conclusions were drawn:

There is a prevalence of males as faculty members. Faculty members who score high in transformational leadership do not necessarily score high in femininity. Faculty members who score high in transactional leadership do not necessarily score high in masculinity.

The correlation analysis of the sex-role characteristics scores and leadership total and sub-scores did not reveal any remarkable findings. In Question three, the results indicated that femininity and masculinity scores were not significantly related to transformational leadership total scores or any of the four sub-scores. Similarly, the results of Question 3 revealed that femininity and masculinity scores were not related to transactional total scores or any of the two sub-score.

In general, the findings suggested that faculty members who were self rated as predominantly feminine, tended not to be rated by themselves as having a predominantly transformational or a transactional leadership style. These findings were not in agreement with results of studies like those done by (Eagly, Johannesen-Schmidt, & van Engen, 2003; Komives, 1991; Shamir, 1999). Transformational leadership, for instance, was a person-centered leadership behavior that endorsed empowerment and inclusiveness and was frequently referred to as a model associated with feminine leadership qualities.

Likewise, the findings suggested that the faulty members who were self-rated as predominantly masculine, tended not to be rated by themselves as having a predominantly transformational or transactional leadership style. This result contradicted the results reached by (Eagly, Johannesen-Schmidt, & van Engen, 2003), whose studies revealed that transactional leadership was firmly articulate, methodical and goal-driven, but de-emphasized subjectivity; hence, it was considered a predominantly masculine leadership behavior.

### **Implications**

In spite of the research findings that support sex-role characteristics as a practical method for measuring leadership effectiveness, the current study shows that given a generally representative sample of faculty members, sex-role characteristics are not always abound. Based on the results of the correlation analysis of leadership and the sex-role characteristics scale score profile developed in this study, a vast majority of the faculty members did not possess a sex-role leadership classification. A key implication of this to faculty members as well as other higher education leaders would be to make considerable efforts to become cognizant of their own sex-role identification profile. By doing so, administrators could identify the activity seek to develop the collaborative skills and attributes that necessitate a sex-role orientation.

Another implication of the results is that individuals considering administrative roles in higher education should complete a self-assessment to determine if their leadership style exists within their own personality and decide if these characteristics are compatible with their sex-role taxonomy. The review of the literature of this study revealed the relative importance of sex-role and the impact it could have on perceived effectiveness. However, among the participants in the study, sex-role did not prevail as a dominating leadership quality. Most of the leadership scores were not congruent with the sex-role scores, further defining the ongoing dilemma of how researchers can adequately measure sex-role characteristics.



### Recommendations for future study

The current study was a microcosmic examination of sex-role characteristics within higher education because it only involved faculty members. A recommendation for future research should include seeking new sample populations to compare with sex-role and leadership. Researchers are encouraged to consider crossing professional lines and examining other administrative leaders across various levels of university organizations such as presidents, vice presidents, and deans, to further determine the impact of gender-congruency on leadership effectiveness.

The variables covered in this research did not account for all the variables in leadership. While much has been accomplished in the area of leadership effectiveness, a great deal remains to be done if studies on the current trends of leadership are to accommodate personal growth among all prospective and active leaders. A recommendation for future research would be to incorporate new measures that reflect leadership effectiveness other than sex-role characteristics. One cannot consider sex-role characteristics alone. New measures might include communication, job satisfaction, and participatory decision-making, the environmental and sociological influences of one's region, education, and maturity, as well as our gender differences, factors contributing to effective leader.

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## APPENDICES

**First: Multifactor Leadership Questionnaire-6S (MLQ-6S)**

This questionnaire is to describe your leadership behavior as you perceive it. Please answer this questionnaire anonymously. Twenty-one descriptive statements are listed on the following pages. Judge how frequently each statement fits you. Use the following rating scale:

Not at all	= 0
Once in a while	= 1
Sometimes	= 2
Fair often	= 3
Frequently, if not always	= 4

	Items	Not at all	Once in a while	Some times	Fair often	Frequently, if not always
1	I make others feel good to be around me.					
2	I express with a few simple words what we could and should do					
3	I enable others to think about old problems in new ways					
4	I help others develop themselves					
5	I tell others what to do if they want to be rewarded for their work					
6	I am satisfied when others meet agreed-upon standards					
7	Others have complete faith in me					
8	I provide appealing images about what we can do					
9	I provide others with new ways of looking at puzzling things					
10	I let others know how I think they are doing					
11	I provide recognition/ rewards when others reach their goals					
12	As long as things are working, I don not try to change anything					
13	Others are proud to be associated with me					
14	I help others find meaning in their work					
15	I get others to rethink ideas that they had never questioned before					
16	I give personal attention to others who seem rejected					
17	I call attention to what others can get for what they accomplish					
18	I tell others the standards they have to know to carry out their work					

**Second: BEM SEX ROLE INVENTORY**

Rate yourself on each item, on a scale from 1 (never or almost never true) to 7 (almost always true).

1. defends own beliefs	1	2	3	4	5	6	7
2. cheerful	1	2	3	4	5	6	7
3. moody	1	2	3	4	5	6	7
4. independent	1	2	3	4	5	6	7
5. conscientious	1	2	3	4	5	6	7
6. assertive	1	2	3	4	5	6	7
7. strong personality	1	2	3	4	5	6	7
8. forceful	1	2	3	4	5	6	7
9. reliable	1	2	3	4	5	6	7
10. sympathetic	1	2	3	4	5	6	7
11. jealous	1	2	3	4	5	6	7
12. leadership ability	1	2	3	4	5	6	7
13. sensitive to other's needs	1	2	3	4	5	6	7
14. truthful	1	2	3	4	5	6	7
15. willing to take risks	1	2	3	4	5	6	7
16. understanding	1	2	3	4	5	6	7
17. secretive	1	2	3	4	5	6	7
18. compassionate	1	2	3	4	5	6	7
19. eager to soothe hurt feelings	1	2	3	4	5	6	7
20. conceited	1	2	3	4	5	6	7
21. dominant	1	2	3	4	5	6	7
22. warm	1	2	3	4	5	6	7
23. willing to take a stand	1	2	3	4	5	6	7
24. tender	1	2	3	4	5	6	7
25. aggressive	1	2	3	4	5	6	7
26. adaptable	1	2	3	4	5	6	7
27. loves children	1	2	3	4	5	6	7
28. tactful	1	2	3	4	5	6	7
29. gentle	1	2	3	4	5	6	7
30. conventional	1	2	3	4	5	6	7

## **The Effect of Project-Based Method of Instruction on the Creativity level of Vocational Education Students at the University Level**

**Samer A. Khasawneh**

Assistant Professor, Faculty of Educational Sciences,  
The Hashemite University, Jordan

**Lana A. Khasawneh**

Instructor, the Second District of Irbid  
Ministry of Education

**Abedalbasit M. Abedalhafiz**

Assistant Professor, college of Physical Education and Sport Science,  
The Hashemite University, Jordan

**Dr. Sadeq H. Shudaifat**

Assistant Professor, Faculty of Educational Sciences,  
The Hashemite University, Jordan

### **Abstract**

The purpose of this study was to determine whether there are differences in creativity level, as measured by Test your Creativity Level Scale (TYCL) between a group of vocational education students who were taught utilizing project-based method of instruction and a comparable control group taught via traditional method of instruction. The TYCL was administered as a pre-test and post-test for both groups of students (63 in the experimental group and 62 in the control group). Analysis of Covariance (ANCOVA) on the post-test results of the TYCL with the pretest scores as a covariate indicated significant differences between the groups at the .05 alpha level in favor of the experimental group on the overall creativity level and on each dimension's scores (intuitive awareness, external locus of control, self-confidence, and originality). The study ended by offering a number of theoretical and practical implications for the field of study.

**Keywords:** Project-based instruction, creativity, vocational education, students, ANCOVA, and Jordan.

## Introduction

There is a general agreement among academics and practitioners that success in life, in general, and education, in particular is based on the ability to have a high level of creativity (Boekarts, Pintrich, & Zeidnar, 2000). To maximize human potential (i.e. improve capacity for thought, nurture feelings), which is the gateway to remaining competitive, educators need to recognize the importance of developing students' creativity to effect that special edge (Davis & Rimm, 2004; Mayers, 2003).

Creativity is defined as “the ability to produce something new through imaginative skills, whether new solutions to a problem, a new method or device, or a new artistic object or form” (Britannic Encyclopedia, 2003). According to many researchers (Csikszentmihalyi, 1996; Isaksen, Dorval, & Treffinger, 2000; Kames & Bean, 2001; Starko, 2001), most of the studies that addressed the definition of creativity pointed out that it can be approached from several perspectives:

- (a) from the person carrying out the task, which can be described with descriptors such as fluency, flexibility, origination, intuition, independence, intelligence, self-confidence, risk-taking, curiosity, complexity, imagination, openness, commitment, and external locus of control;
- (b) from the product that arises from the effects of the person; where a person is expected to come up with a new product that is novel and unconventional to the individual creator;
- (c) from the process that brings out the novel idea or product, which includes fact finding, problem definition, idea creation, solution finding, and acceptance; and
- (d) from the creative/supportive environment. Creative environments should be free of fear, structured but not rigid, and open to new ideas with respect. Such environment is necessary to support the encouragement and development of creativity (Cromwell, 1997; Tennent & Barthelsen, 1997).

Creativity is essential for students at higher education institutions. Students must have the ability to see multiple points of view, to analyze a situation and arrive at an appropriate answer, to have an open mind, and to avoid rigidity in thoughts and actions. Stenberg and Lubart (1996) stated “it is through creativity that we can cope with significant challenges in our environments in novel and appropriate ways. Indeed, given the rate at which the world is changing, the importance of creativity to our lives is likely to increase”. Kessler (2000) wrote that creating the climate and the skills for fostering creativity are essential to educating a generation of young people who can visualize new solutions to the problems of today's and tomorrow's workforce. Csikszentmihalyi (1996) stated that “creativity is a central source of meaning in our lives. Most of the things that are interesting, important, and human are the result of creativity”. If we develop creativity in educational systems then we can maximize the powerful capacity of human intelligence (Prentice, 2000). Therefore, because of the importance of creativity to the entire human society and to each individual, educational system especially higher education institutions should try to preserve and

promote the most important feature of human mind represented by its creativity (Gardner, 1991).

In order to develop students' creativity, education should become less instructor-centered and more student-centered with students taking a more active role in their learning. Moreover, there is increasing pressure on university professors to implement student-centered teaching strategies (Laserson, Wagener, Shumanis, 2000). A shift from lecture-based learning environment to a project-based learning environment in which students are encouraged to work collaboratively in solving problems and to complete projects that support curriculum outcomes is now needed so that university students are provided with a well-rounded educational experience that prepares them for the workplace (Fried-Booth, 2002; National Research Council, 1996). It is well documented that students who learn by projects either in groups or individually surpass the performance levels and motivation of students who learn via conventional teaching strategies (McGrath, 2002). Moreover, research showed that project-based learning can improve academic achievement of students (Frank & Barzilai, 2004; Holst, 2003), research skills (Diffily, 2002), higher-order thinking skills, and opportunity to work on real issues with depth, complexity, and duration (Hoyt, 1997).

Hence, based on the above discussion, we can conclude that project-based learning environments can contribute to fostering creativity level of students (Hoyt, 1997; Koh, 2000; Owens, 1997). Project-based instruction (PBI) may promote gateways for students to collaborate with others, independence in thinking, flexibility, self-confidence, taking risks, better imagination, openness to new teaching strategies, commitment to the project, and motivation to complete the project without reward (Solomon, 2003). All the above mentioned descriptors are the main features of creativity. The project-based learning approach appears to be the most effective teaching-learning tool that enhances creativity. According to Diffily (2002), PBI can be defined as a teaching/learning approach based on the principle that students work on real-life issues individually or in small groups, or "a model that organizes learning around projects" (Thomas, 2000, p. 1).

Curtis (2002) and Solomon (2003) developed a list of criteria for project-based instruction including: (a) building upon students' interest and uses that to encourage them, (b) is meaningful and authentic, (c) puts students in a real-life situation through field work, (d) allows students to create all the decisions and choices in regards to how to solve the problem, (e) utilizes expert resources from the community to aid student learning, (f) requires students to demonstrate skills and knowledge, (g) allows student opportunities for self-evaluation and reflection, (h) results in students developing useful products to demonstrate understanding, and (i) provides presentations to an authentic audience. Others (Walker, 2003; Benson, 2001) emphasized the importance of group-based collaboration and cooperative learning systems rather than individual based study in the classroom.



## Statement of the Problem

Creativity is a universal ability that needs to be recognized and developed. Past research has focused on studying the concepts of creativity and project-based instruction separately. No reference is available that studies both of these simultaneously (Livingstone & Lyrch, 2000). The importance of creativity has been recognized and yet found to be lacking in schools (Ackerman, 2003; Wolfe, 2001). Therefore, the main purpose of the current study was to investigate the effects of PBI on the creativity level of vocational education students at the Hashemite University (HU).

## Research Question

The following research question was addressed in this study:

*Is there any significant difference between the creativity level of the experimental group students (in which the project-based instruction was used) and the control group students (in which the traditional method of instruction was used)?*

## Significance of the Study

As no studies are available in the literature that relate the effect of PBI on creativity level of students, while knowledge on this is important pedagogically, any study that does investigate this relationship would be of fundamental significance. The study reported here is such an investigation. Thus the results of this study will provide valuable information and expand knowledge in this very important area.

Furthermore, the researchers hope that findings from this study can contribute to the development of the educational systems by helping faculty members at the university level to develop curriculums that address PBI and creativity. As well, policy makers will find the results of this study useful in their decision-making and planning.

## Methodology

### *The Study Context*

The present study was conducted at the Hashemite University, one of the prominent, public universities in Jordan. Its department of Curriculum and Instruction offers a number of classes in teacher education, one of which is the vocational education course. For the first semester of the academic year 2006/2007, there were two sections of the vocational education course. Both sections of the course were taught by the same instructor (the primary researcher) who decided to teach one of the sections using the project-based approach rather than the traditional approach. This was the only class that was taught in this way at the Department of Curriculum and Instruction. The class meets three times for 50-minute session each week for a period of three and a half months. The classes started in

September 2006 and ended in December 2006. The same content and materials were used for both experimental and control groups. One class was taught with PBI while the other class was taught via the traditional approach. Students in the experimental group were asked to develop projects, discussion forums, seminars, multimedia enhanced lectures, role plays, vocational songs, booklets, and training sessions related to the content of the class. Students were encouraged to work individually and in groups depending on type of projects required. Students were urged to think creatively and critically when in the process of developing their projects. The control group proceeded with regular classroom activities during the experimental period. The curriculum consists of topics in the following areas: vocational education curriculum in Jordan; teaching vocational education in regional and international countries; barriers facing vocational education implementation; developing lesson plans in vocational education; technology use in teaching vocational education; industrial education, agricultural education, and home economics education.

### *Population and Sample*

The population for this study comprised all undergraduate students with a major in teacher education from the Department of Curriculum and Instruction at the Hashemite University. The sample of the study consisted of undergraduate students with a major in teacher education registered for the vocational education course offered by the Department of Curriculum and Instruction during the first semester of the 2006/2007 academic year.

There were two sections of vocational education course with 63 students in the first session (58 females, 5 males) and 62 students in the second session (60 females, 2 males). Session one with 63 students was treated as the experimental group and session two with 62 students was treated as the control group. In the control group, eight students were aged 20 and 54 students were aged 21. The experimental group had 13 students aged 20 and 50 students aged 21. As a result, the students' genders and ages were not considered to be statistically different.

### *Instrumentation*

Data for the study were gathered using the Test your Creativity Level Scale (TYCL). This instrument was adopted from Hammadi (1999) and Suwaidan (2001) and it has two available versions, one in Arabic which was used in this study and one in English. The instrument consists of 50 items that are rated on a Likert-type scale ranging as follows:

5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree.

This instrument has been used extensively since 1999 involving more than 5000 respondents in countries including the United Arab Emirates, Saudi Arabia, Kuwait, Qatar, Bahrain, Syria, and Lebanon.

This instrument measures the creativity level among adults aged 18 or older. It is easy to use and can be scored by the administrator. It uses a simple total score that can be weighed against a seven-level creativity scale that ranges from

*substantially creative (4.5-5), to very creative (4-4.49), to creative (3.5-3.99), to moderately creative (3-3.49), weakly creative (2.5-2.99), noncreative (2-2.49), and resisting creativity (1-1.99).*

This test can be administered periodically in order to allow a person to keep track of his/her creativity level and creative development. The TYCL test is reported to have strong reliability and validity (Hammadi, 1999; Swaidan, 2001; Swaidan & Adloni, 2002). Based on their studies, a test-retest of the scale on 199 subjects provided a strong reliability of an alpha of .61 and higher. The standards for instrument reliability for Cronbach's alpha by Robinson, Shavor, and Wrightsman (1991) were used to judge the quality of the TYCL scale: .80-1.00 – exemplary reliability, .70-.79 – extensive reliability, .60-.69 – moderate reliability, and < .60 – minimal reliability. Factor structure was conducted by the above researchers on the instrument to determine its construct validity and factor structure. The results indicated a four factor model with 32 items as follows:

*intuitive awareness (11 items), (2) external locus of control (9 items), (3) self-confidence (7 items), and (4) originality (5 items).*

## **Data Collection**

The process of data collection was as follows:

- First, the TYCL test was given by the instructor during the first week of September 2006/2007 as the pretest for all students in both the experimental and control groups before the implementation of the intervention.
- The instructor collected students' surveys and stored them in the SPSS database.
- The duration of the survey was 30 minutes.
- After the intervention (PBI for the experimental group and traditional instruction for the control group), the same test was administered during the last week of December 2006/2007 for both groups to determine students' creativity levels.
- Usable data were collected from 63 students in the experimental group and 62 subjects in the control group. Finally, since both the experimental and control groups took the same pre-and posttest, and the experiment occupies the same time period for all subjects, and the same instructor teaches both classes, testing, instrumentation, maturation, mortality, history, selection, and sensitization are not an internal validity threats.

## **Data Analysis**

A quasi-experimental, pretest-posttest control group design using a sample of intact groups was used in this study (Campbell & Stanley, 1963). Quasi-experimental design is used

when intact classrooms are used as the experimental and control groups. This design is most appropriate when the researcher is not able to randomly assign subjects to groups but able to randomly assign groups to the levels of the treatment. Researchers use them to compare groups “that are defined by a naturally occurring, non-manipulated variable that is usually a subject variable or a time variable” (Gravetter & Wallace, 2000, p. 16). Moreover, this design is used to control or reduce threats to internal validity (Fraenkel & Wallen, 2003).

The independent variable is the method of instruction which has two levels (PBI and traditional), the dependent variable of the study is the creativity posttest scores for each dimension and for the total TYCL score, and the pretest is the covariate. Analysis of covariance (ANCOVA) is most suitable to be used when dealing with intact groups or subjects. ANCOVA on the post-semester TYCL scores with pre-semester TYCL scores as a covariate was used to determine whether there are differences in creativity level between the experimental and control group before and after the intervention. Data analysis was done using Statistical Package for Social Science (SPSS 11.5). A significance level of .05 was adopted (Fraenkel & Wallen, 2003). Using ANCOVA has the benefits of adjusting for preexisting differences between the intact groups prior to conducting the research, of increasing the precision of the research results by reducing the error variance, and of increasing the overall statistical power (George & Mallery, 2003).

## **Results**

Descriptive statistics for all variables in this study were examined using SPSS frequencies. The minimum and maximum values for each variable were examined for the accuracy of data entry by inspecting out of range values. An examination of these values showed that no out of range values were detected. Missing subjects were not detected either. Reliabilities for the TYCL scale was .80 and for each of the subscales as follows: intuitive awareness ( $\alpha = .82$ ), external locus of control ( $\alpha = .77$ ), self-confidence ( $\alpha = .81$ ), and originality ( $\alpha = .82$ ). These results indicate that the TYCL scale is a reliable measure for this study. Results of the study are addressed by the research question in this study.

### ***Results Pertaining to the Research Question***

The Research question was to determine whether there are significant differences between the creativity level of the experimental group (in which the PBI was used) and the control group (in which the traditional method of instruction was used).

Analysis of covariance (ANCOVA) was utilized to answer this question. In this case, the post-TYCL total score and the score for each subscale were used as the dependent variable, the group (experimental vs. control) was used as the independent variable, and the respective pre-TYCL total score and the score for each subscale was used as a covariate (in order to control for any differences between the groups at pretest). Based on the analysis, significant differences were found among the treatment groups (experimental vs. control) based on the total score for the TYCL scale. The results indicated that there was a statistically significant difference in the creativity level between the experimental and

control groups in favor of the experimental group (1, 122) = 1406.49,  $p < .001$ ). (see Tables 1 and 2). The pretest (covariate) was not found to be a significant predictor of the post-test score ( $p = .301$ ) indicating the equivalence of the treatment groups on the pretest. The Effect size and power of test were also reported to provide more detailed data.

**Table 1**  
**Means and Standard Deviations for the TYCL Scale on the Posttest**

Group	Mean	Std. Deviation	N
Control	2.21	.12	62
Experimental	3.65	.27	63

**Table 2**  
**Summary of ANCOVA for the TYCL Scale with Pretest as Covariate**

Source	SS	df	MS	F	Sig.	Effect Size	Observed Power
Corrected Model	65.933	2	32.967	735.253	.000	.923	1.00
Intercept	3.366	1	3.366	75.072	.000	.381	1.00
Covariate (Pre)	.048	1	.048	1.077	.301	.009	.177
Group	63.063	1	63.063	1406.494	.000	.920	1.00
Error	5.470	122	.045				
Total	1151.854	125					
Corrected Total	71.404	124					

Note. R Squared = .923 (Adjusted R Squared = .922).

The study also investigated whether significant differences exist in creativity level between the treatment groups (experimental and control) for each TYCL subscale. With regard to the intuitive awareness subscale, ANCOVA analysis indicated significant differences between the treatment groups in favor of the experimental group (1, 122) = 1074.578,  $p < .001$ . Moreover, significant differences were not found between the treatment groups on the pretest ( $p = .819$ ) indicating that the groups were equivalent prior to the intervention (see Tables 3 and 4).

**Table 3**  
**Means and Standard Deviations for the TYCL Awareness Subscale on the Posttest**

Group	Mean	Std. Deviation	N
Control	2.32	.20	62
Experimental	3.90	.32	63

**Table 4**  
**Summary of ANCOVA for the TYCL Awareness Subscale with Pretest as Covariate**

Source	SS	df	MS	F	Sig.	Effect Size	Observed Power
Corrected Model	78.089	2	39.044	540.459	.000	.899	1.00
Intercept	10.504	1	10.504	145.402	.000	.544	1.00
Covariate (Pre)	.004	1	.004	.053	.819	.000	.056
Group	77.631	1	77.631	1074.578	.000	.898	1.00
Error	8.814	122	.072				
Total	1300.868	125					
Corrected Total	86.902	124					

Note. R Squared = .899 (Adjusted R Squared = .897).

The ANCOVA statistics also showed significant differences between the treatment groups on the external locus of control subscale in favor of the experimental group  $F(1, 122) = 639.127, p < .001$ . The analysis also indicated that the treatment groups were equivalent on their creativity scores on the pretest ( $p = .96$ ) (see Tables 5 and 6).

**Table 5**  
**Means and Standard Deviations for the TYCL External Locus of Control Subscale on the Posttest**

Group	Mean	Std. Deviation	N
Control	2.13	.20	62
Experimental	3.64	.42	63

**Table 6**  
**Summary of ANCOVA for the TYCL Locus of Control Subscale with Pretest as Covariate**

Source	SS	df	MS	F	Sig.	Effect Size	Observed Power
Corrected Model	71.180	2	35.590	319.606	.000	.840	1.00
Intercept	18.930	1	18.930	169.997	.000	.580	1.00
Covariate (Pre)	.000	1	.000	.003	.956	.000	.050
Group	71.171	1	71.171	639.127	.000	.840	1.00
Error	13.585	122	.111				
Total	1135.049	125					
Corrected Total	84.766	124					

Note. R Squared = .840 (Adjusted R Squared = .840).

The ANCOVA analyses showed that the treatment groups differed significantly on the self-confidence subscale in favor of the experimental group ( $F(1, 122) = 345.276, p < .001$ ) (see Tables 7 and 8) and for the originality subscale in favor of the experimental group  $F(1, 122) = 346.412, p < .001$ ) (see Tables 9 and 10).

Finally, it was shown in the above mentioned tables that the treatment groups creativity scores were equivalent on the pretest for the self-confidence subscale ( $p = .219$ ) and for the originality subscale ( $p = .157$ ).

**Table 7**  
**Means and Standard Deviations for the TYCL Confidence Subscale on the Posttest**

Group	Mean	Std. Deviation	N
Control	2.21	.20	62
Experimental	3.41	.46	63

**Table 8**  
**Summary of ANCOVA for the TYCL Confidence Subscale with Pretest as Covariate**

Source	SS	df	MS	F	Sig.	Effect Size	Observed Power
Corrected Model	46.282	2	23.141	180.737	.000	.748	1.00
Intercept	8.480	1	8.480	66.235	.000	.352	1.00
Covariate (Pre)	.196	1	.196	1.529	.219	.012	.232
Group	44.208	1	44.208	345.276	.000	.739	1.00
Error	15.620	122	.128				
Total	1053.939	125					
Corrected Total	61.902	124					

Note. R Squared = .748 (Adjusted R Squared = .744).

**Table 9**  
**Means and Standard Deviations for the TYCL Originality Subscale on the Posttest**

Group	Mean	Std. Deviation	N
Control	2.09	.13	62
Experimental	3.49	.50	63

***Table 10***  
***Summary of ANCOVA for the TYCL Originality Subscale with Pretest as Covariate***

Source	SS	df	MS	F	Sig.	Effect Size	Observed Power
Corrected Model	61.397	2	30.699	221.845	.000	.784	1.00
Intercept	17.297	1	17.297	124.994	.000	.506	1.00
Covariate (Pre)	.281	1	.281	2.032	.157	.016	.293
Group	47.936	1	47.936	346.412	.000	.740	1.00
Error	16.882	122	.138				
Total	1057.160	125					
Corrected Total	78.280	124					

Note. R Squared = .784 (Adjusted R Squared = .782).

### Discussion and Conclusions

The purpose of this study was to determine the effect of project-based instruction (PBI) on the creativity level of vocational education students at the Hashemite University in Jordan. To achieve this purpose, a quasi-experimental design with intact classes was employed in this study. One vocational class with two sections was selected for this study. The first section with 63 students was used as the experimental group and the other section with 62 students was used as the control group. The Test Your Creativity Level Scale (TYCL) was utilized as the instrument to measure creativity level of students before and after the intervention. The research study took place during the first semester of the academic year of 2006/2007. Data were analyzed using descriptive statistics and ANCOVA. In what follows, we discuss the research question in light of the results presented in the previous section.

### *The Major Findings of the Study*

Students in both sections of the vocational education class were asked to respond to 32 items that measured their creativity level before and after the intervention. These 32 items were grouped into four dimensions representing creativity. Results of the analysis indicated the following:

1. Vocational education students experienced significant increase in their overall creativity score between the pre-and-posttest as a result of participation in the PBI. The posttest mean values were 2.21 for the control group and 3.65 for the experimental group. Moreover, ANCOVA analysis indicated that there are no significant differences between the control and experimental groups prior to the intervention ( $p = .30$ ). This major finding can be looked at as an evidence of the effectiveness of the PBI in improving students' creativity compared to traditional method of instruction which did not lead to any change in students' creativity level.



- We can simply describe students taught by PBI as creative while students taught by traditional instruction as noncreative.
2. The students' overall creativity score for the awareness dimension has improved between the pre-and-posttest as a result of participation in the PBI. The posttest mean value was 2.32 for the control group and 3.90 for the experimental group. Further analysis with ANCOVA indicated that there are significant differences between the treatment groups ( $p < .001$ ) in favor of the experimental group. Moreover, both treatment groups were equal on the pretest ( $p = .82$ ). During the intervention, students in the experimental group followed a logical, gradual, and step-by-step approach in solving problems; believed that they should make a contribution to their world that is satisfactory to them regardless of benefits expected; generated ideas inside and outside the classroom about the projects they are working on which has an element of appreciation for beauty; changed their mode of thinking to find solutions to problems related to their work; thought about secrets and riddles involved in their work; and believed that hard work is the best pathway to success. Overall, students who received PBI were described as creative whereas students receiving traditional instruction were described as noncreative.
  3. Students experienced a significant increase in their creativity level on the external locus of control dimension as a result of participation in the PBI. On the posttest, the mean values were 2.13 for the control group and 3.64 for the experimental group. Further analysis with ANCOVA indicated that there are significant differences between the treatment groups ( $p < .001$ ) in favor of the experimental group. Moreover, both treatment groups were equal on the pretest ( $p = .96$ ). During the intervention, students in the experimental group valued work over pleasure; liked jobs that affected others; preferred to get things done in the right way and the right time; searched for knowledge related to their future work; and were an accepted team member. Based on that, students in the experimental group were described as creative whereas students in the control group were described as noncreative.
  4. Students who received PBI experienced a significant increase in their creativity level between the pre-and-posttest on the self-confidence dimension. On the posttest, the mean values were 2.21 for the control group and 3.41 for the experimental group. Further analysis with ANCOVA indicated that there are significant differences between the treatment groups ( $p < .001$ ) for the favor of the experimental group. Moreover, both treatment groups were equal on the pretest ( $p = .22$ ). During the intervention, students in the experimental group considered themselves practical and wise; responsible and dependable; liked to adopt strange ideas; and believed in hard work as an element of success. Overall, students who received PBI were described as moderately creative whereas students who received traditional instruction were described as noncreative.
  5. Students who participated in the PBI experienced a significant increase in their creativity level on the originality dimension. On the posttest, the mean values were 2.09 for the control group and 3.49 for the experimental group. Further analysis with ANCOVA indicated that there are significant differences between the treatment groups ( $p < .001$ ) in favor of the experimental group. Moreover, both treatment groups were equal on the pretest ( $p = .16$ ). During the intervention,

students had original ideas that are expressed freely and individually; excited about generating ideas; relied on inner feelings to solve problems; daydream when thinking about an important project; and are encouraged to present new ideas. Based on that, students who participated in the PBI were described as creative whereas students who received traditional instruction were described as noncreative.

### *Conclusions*

The major findings of this study showed that the PBI is an effective tool for improving vocational student' creativity level when compared to the traditional method of instruction. Students in the experimental group did experience a significant increase in their posttest creativity scores when compared to students in the control group. Experimental group students were classified as creative whereas students in the control group were classified as noncreative. These findings lends support to the argument that the PBI should be applied to all university courses in whole or mixed with traditional methods of instruction (Shoring 1995) because of its profound effect in improving students' creativity. It is well documented in the literature the major benefits of PBI as an effective teaching tool in improving students' academic success, critical thinking skills, and research skills compared to traditional instruction which is boring to students (Boaler, 1997; Holst, 2003). Moreover, creativity must be instilled in our education system and society to better meet the needs of the competitive world (Dollinger, 2003). However, to the researchers' best knowledge, no research studies locally or internationally exist which directly investigated the effect of PBI on the creativity level of students at the university level. Therefore, this study is considered to be the first of its kind, thus becoming a major contribution to the literature.

Finally, the present research provides a number of practical and theoretical suggestions for the field of study. From the theoretical standpoint, the present study should be (a) replicated with other undergraduate and graduate courses and in other universities in Jordan (b) the instrument (TYCL) should be validated by establishing its criterion and concurrent validity with relation to other related variables such as self-concept, self-regulation, and intelligence (c) utilize advanced statistical techniques such as MANCOVA to test the impact of demographic variables such as gender, age, educational level, and socioeconomic background on the construct of creativity, (d) analyze the impact of PBI alone and a mix of PBI and traditional instruction on the creativity level of students, and (e) incorporate a qualitative element into the investigation to provide more in depth data.

From practical standpoint, university administrators should encourage faculty members to

- incorporate PBI into their teaching/learning process in an environment that is safe where learning is active and hands-on,
- plan curriculums around projects to advance the knowledge and creativity of students,
- facilitate cooperation among students to work on individual and team projects, and
- hold seminars on the university campus to provide information about the benefits of project based instruction and creativity in today's competitive world.

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## COMPARATIVE PERFORMANCE OF INTERNATIONAL STUDENTS IN AN AUSTRALIAN UNIVERSITY OF TECHNOLOGY

**Jitendra Chandra**

*Swinburne University of Technology, Lilydale Campus, Melbourne, Australia*

**and**

**R Sharma**

*RMIT University, Melbourne, Australia*

### **Abstract**

This study considers the issue of the performance of international students at an Australian University of Technology in terms of their GPA. An important finding of the study is that the local students' performance was found to be better than that observed for international students, in respect to the GPA performance measure. Comparison of quantitative and qualitative subjects again suggests that in both areas the local students outperformed the international students. Nevertheless, the older international students sustained superior GPA performance than Australian students. Implications of the findings of the study are considered and areas of future research identified.

### **Introduction**

Since the mid-nineties the Australian Government has reduced funding per student rates to higher education, mainly due to lack of full salary supplementation. A catch cry from the Government has been to increase the number of full fee paying international students and thereby to not only make up any University budgetary deficits but also help to boost Australia's exports and the economy. Indeed the ground work for such a policy shift in Australian higher education was initiated in 1986 when the then Australian Education Minister John Dawkins introduced a deregulated, competitive model of full-fee foreign student recruitment and shifting from aid (as encapsulated previously by such schemes as the "Colombo Plan") to trade in higher education (Loveday, 1995). However, the conservative Government since the mid to late nineties provided a significant impetus to this policy by rendering the traveling globalization strategy in universities a necessity rather than being the icing on the cake.

University student place sellers to international students, however, need to maintain plans and policies that will permit this aspect of Australian higher education to provide long-term financial and other gains for the universities concerned. Short-term thinking will rapidly deteriorate the image of Australian student marketers to something akin to the used car salespersons who languish at the bottom of the pile in terms of trust and respectability within the broader community. Such long-term thinking requires that the majority of international students (defined as those traveling from other countries to Australia to study at an Australian University) should experience positive educational outcomes at the conclusion of their studies.

The present study examines a particular dimension of international student positive outcomes, namely, academic success flowing from university assessment process. Clearly other student positive outcomes do exist such as graduation from the program and obtaining a professional employment consistent with their tertiary studies. However, these are beyond the scope of this study. Indeed it is the aim of the study to examine variations in international student performance according to a number of demographic variables within the environment of a technological Australian university. More specifically it will consider the GPA of the international students and analyse it according to a number of variables including:

- Comparison with Australian students
- Broad grouping of overseas countries
- Broad field of Education
- Gender
- Basis of admission
- Commencing and re-enrolling students
- Age

## **Methodology**

The previously stated objectives of the study were addressed by accessing the student enrolment records of international students and the various binary populations that will permit comparison of student performance according to a number of previously mentioned dimensions. In addition, the relevant students' academic records were obtained from the university's student records system. These records were used to calculate the Grade Point Average (GPA) and the mean mark for each student. The GPA was calculated in accordance with the procedure developed by Dobson and Sharma (1995) as shown in Table 1.

The measures were then used to compare the performance of the international students on a number of variables, as previously mentioned, such as gender, age, basis of admission, discipline and other variables. SAS was used to extract the relevant files and the SPSS computer package was used to carry out the statistical testing and analyses.

**Table 1: Calculation of GPA**

<b>Grade</b>	<b>Grade Points</b>
High Distinction	4
Distinction	3
Credit	2
Pass	1
Fail	0
Other results eg result withheld	Ignored

### **Literature Review**

Within the Australian context, the notion of University student progress has generated some interest since the late seventies when an Australian Vice Chancellors' Committee (AVCC) Working Party considered the issue of student progress (AVCC, 1985). The AVCC developed the notion of Student Progress Unit (SPU) that was defined as the successful completion of subjects weighted as one equivalent full time student unit (EFTSU in the Australian higher education vernacular). The concept was rejuvenated by Dobson and Sharma (1991; 1994) during the early to mid-nineties. They found that student attendance type (full time and part time studies), tertiary entrance score and gender were the important determinants of student progress.

Student progress studies have been relatively popular in Australian higher education due to a few important reasons. First it is regarded as an important key performance indicator by the federal government authorities. Second it can relatively easily be calculated from the higher education government statistical data collection. Nevertheless it has some limitations. The principal one being that it does not differentiate between different grades of passes in university studies. For instance, in SPU, the student who achieves a bare pass (50%) is weighted the same as a high distinction (>85%) result.

In America the notion of Grade Point Average (GPA) has proven to be more popular than Australia. For instance, a study undertaken by Eghbali (1985) examined stress and academic performance of international students at the University of Missouri- Columbia; it is noted that this author used the GPA as the measure of the students' academic performance. The key findings from this author's doctorate study established that:

- Older undergraduate international students achieve higher academically than their younger counterparts.
- Female undergraduate international students were higher achievers academically than male students.



It will be interesting to see whether the above findings related to age and gender in terms of international students is replicated in the present study.

Loveday (1995) studied the performance of international students enrolled in the University of Melbourne Accounting program. She found that international students admitted from the foundation program or final year of Victorian secondary education did not perform as well as other entrants, including those students entering directly from overseas. Further this research reported that international Accounting students as a group performed as well, if not better, than their Australian counterparts. Loveday (1995) advocates further institutional research into student performance, noting the limitations of her study. Again it is hoped that the present study will assist in expanding our knowledge of this important topic for higher education.

Massey University (2004) reports on the first New Zealand study that examined academic achievement of international students in that country. This study found that at the tertiary educational level, program completion rates were consistently higher for international students compared to domestic students at New Zealand universities and polytechnics. Further, international students completed their qualifications in a slightly shorter timeframe, with 40% of domestic and 50% of international students finishing university studies in four years. However, Massey University (2004) laments the lack of New Zealand databases at the subject level to permit more fine-grained analysis of the relative performance of international students. It is hoped that the present study will assist in this regard, but admittedly conducted across the Tasman from New Zealand.

RMIT University (2007) indicates that the GPA furnishes an overall view of students' performance in a program and that the measure is considered to be a leading indicator of student achievement as required by that University's Teaching and Learning Strategy. It further suggests that the GPA is an internationally recognized measure of a student's performance; indeed *inter alia* the GPA measure is used by the RMIT University to select students for prizes and scholarships within the institution. This then provides cogent reasons for the present study adopting the GPA as a student performance measure.

### **Results of the international student performance analysis**

The performance of international students within the Australian University was compared both in terms of sub-populations within the group and those external to the group. As previously stated the GPA performance measure was used, consistent with the practices of institutional researchers. The results of the analysis for the identifiable sub-groups are provided below.

### *Visa and Citizenship Type*

In Australia migrants can be issued with either Humanitarian or Non-Humanitarian Visas for residency in Australia. Humanitarian visas are normally granted to refugees or similar groups by the Australian Government. Other residents are granted the Non-Humanitarian visa, except for New Zealander's who are a separate identifiable group, given their special status in Australia historically. Table 2 compares the International students mean GPA with that of other Australian visa categories. It indicates that persons with Humanitarian visa, Non-Humanitarian visa and Australian Citizenship out-performed their international student counterparts at the Case Study University. Even the New Zealanders' generated nearly 15% greater GPA than the International students, however, the mean difference was not statistically significant in this case.

***Table 2: Comparison of Mean GPA of International Students and Other Visa Categories***

<b>Visa Category</b>	<b>Mean GPA</b>	<b>Standard Deviation</b>	<b>T*</b>	<b>P*</b>
Humanitarian	2.13	0.85	-5.92	<0.001
Non-Humanitarian	1.87	0.78	-5.07	<0.001
Australian Citizen	1.67	0.73	-4.94	<0.001
New Zealand	1.81	0.45	-1.51	>0.05
International	1.58	0.86	NA	NA

1. based on comparison with International Mean GPA

### *Comparison by Age Group*

Table 3 compares the mean and standard deviation GPA of International and Local students by age group. It permits the following observations:

- In the relatively younger age groups ranging from 18 to 23 years, the International students are significantly out-performed by Local Australian students. The performance advantage for the 18-20 year age group Locals was nearly 40% but decreasing to just under 12% for the 21-23 year age group.
- Indeed for the 24-26 year age group, international students out-performed Locals by around 8% with the superiority of International students growing to greater than 15% in relation to the 27-29 years age group.
- Although the difference in mean GPA for the two groups was not statistically significant for the 30 and over age group, still in absolute terms, the internationals performed better.

***Table 3: Student Performance by Age***

Age group	International GPA		Local GPA		“t” Statistics	Probability (P)
	Mean	S.D.	Mean	S.D.		
18-20 Years	1.14	0.71	1.59	0.66	-9.33	<0.001
21-23 Years	1.45	0.78	1.62	0.60	-8.31	<0.001
24-26 Years	1.53	0.66	1.42	0.69	2.68	<0.01
27-29 Years	1.97	0.78	1.71	1.00	2.83	<0.01
30 and over	2.62	0.88	2.47	0.95	1.86	>0.05

***Student Performance by Discipline***

Table 4 compares the relative performance of international and local students according to the discipline studied. The following are the key differences between the two sub-populations according to the discipline factor:

- International students significantly out-performed Australian students in only Business Management.
- However, the local students sustained a superior performance in comparison to their international counterparts in a number of academic disciplines including Accounting, Behavioural Sciences, Business Law, Communication and Media, Economics, Information Technology/Systems, Marketing, Statistics, Studies in Human Society and Tourism Management.
- In all other disciplines listed in Table 4, the observed difference in mean GPA between the two groups was not statistically significant.
- The top three disciplines (in descending order of mean GPA) in terms of international students' performance include Business Management, Other Management and Commerce and Communication and Media. In respect to Australian students, the top academic performance areas include Communication and Media, Business Management and Other Management and Commerce. Clearly there is complete overlap in terms of the three best performing disciplines for the two binary groups of students; however, their order is different. Further, the gap between the top three performing disciplines for locals is rather narrow (8%) in comparison to international students (32%).
- Interestingly, there is less overlap with the bottom performing disciplines; in particular the bottom three disciplines in terms of ascending GPA for international students included Accounting, Behavioural Sciences and Economics whilst for Australian students they include Business Law, Information Technology/Systems and Economics. Clearly the two groups agree that Economics appears to be the tough discipline to get across the line.

***Table 4: Student Performance by Discipline Comparison***

Discipline	International GPA		Local GPA		“t” Statistics	Probability
	Mean	S.D.	Mean	S.D.		
Accounting	1.07	0.57	1.65	0.77	-7.60	<0.001
Behavioural Sciences	1.08	0.74	1.61	0.69	-2.47	<0.05
Business Law	1.26	0.78	1.53	0.70	-3.33	<0.001
Business Management	1.98	0.81	1.83	0.75	4.85	<0.001
Communication & Media	1.50	1.05	1.87	0.89	-3.79	<0.001
Economics	1.13	0.61	1.59	0.77	-6.29	<0.001
IT/IS	1.41	0.78	1.57	0.69	-3.95	<0.001
Marketing	1.33	0.75	1.68	0.62	-5.36	<0.001
Other Management & Commerce	1.75	0.78	1.74	0.74	0.02	>0.05
Psychology	1.48	0.32	1.73	0.68	-0.90	>0.05
Sociology	1.34	0.41	1.66	0.70	-1.36	>0.05
Statistics	1.28	0.65	1.62	0.71	-4.25	<0.001
Studies in Human Society	1.19	0.59	1.60	0.70	-4.36	<0.001
Tourism Management	1.14	0.53	1.60	0.56	-4.55	<0.001

Yet another method of classifying disciplines is into the “quantitative” and “qualitative” subject areas. In Australia there is no agreed definition of these categories, however, this institution/campus mainly offers programs within the Business, IT and Social Sciences disciplines and accordingly subjects in Accounting, Economics and Statistics are defined as being quantitative whilst other areas including Management, Tourism, Marketing, IT and Social Sciences are assigned to the qualitative category. There may be some limitations of these classification systems as some subject areas have both qualitative and quantitative elements to varying degrees. Nevertheless, adoption of this definition and application of statistical analysis reveals that:

- Regarding the quantitative subjects, it was found that overall local students (Mean GPA=1.62) outperformed their international colleagues (1.1,  $t=11.4$ ,  $p<0.001$ ).
- The difference in the qualitative discipline in terms of student performance between local (mean GPA=1.69) and international students (1.65) was relatively minor in absolute terms.
- International students generated a greater mean GPA for qualitative subjects (1.65) in comparison to the quantitative subjects (1.1,  $t=10.3$ ,  $p<0.001$ ).

The above findings appear to be contrary to the general expectations that international students would be weaker in the qualitative area since many of them would be drawn from non-English speaking background and hence ought to be at a disadvantage in comparison to Australian students whose first language in general would be English.

### *Student Performance by Basis of Admission*

Students are admitted to the Australian University on a number of basis including Higher Education, TAFE, Secondary School, a Professional Qualification, Mature Age Entry and Other Basis. Table 5 compares the relative student performance according to the basis of admission for international and local students; it is noted that only those basis used by international students are included to permit pair-wise statistical analysis. The following observations are made on the information included in this table:

- Table 5 indicates that irrespective of the basis of admission, the local students outperformed their international counterparts with the mean difference being statistically significant in all three cases.
- The greatest mean difference (in terms of the “t” statistics) in GPA is noted in respect of school leavers where local students sustained a 67% greater mean GPA in comparison to students from overseas countries. Further, school leavers constituted the only international group where the mean GPA was less than one.
- The other (unspecified) basis of admission in both cases generated the best student performance; the performance gap between this and the lowest performing group (school leavers) for locals was nearly 50% and for internationals nearly 110%.

**Table 5: Student Performance by Basis of Admission Comparison**

Basis	International GPA		Local GPA		“t” Statistics	Probability
	Mean	S.D.	Mean	S.D.		
Higher Education	1.22	1.12	1.82	1.02	-4.39	<0.001
Secondary School	0.85	0.68	1.42	0.78	-5.19	<0.001
Other basis	1.76	0.79	2.08	0.96	-2.32	<0.05

### *Student Performance by Region*

Australia is a multi-cultural country with migrants arriving from all over the world. Accordingly, it is of interest to compare the performance of international students with Australian residents who have migrated from the same region to Australia. This is attempted in Table 6 (note: only regions that contribute reasonable sample sizes have been included in this table), permitting the following observations:

- In a large number of regions, including Eastern Europe, Western Europe, North East Asia, South Asia and South East Asia, the Australian migrants were outperformed by their compatriots. The greatest performance difference in terms of “t” statistics is noted for Western Europe; the latter was also the region generating the greatest mean GPA output.
- In terms of North America, the international students generated a lower mean GPA than their compatriots from Australia.
- In the case of the South Pacific, although the international students generated a greater mean GPA than their Australian counterparts the mean difference was not statistically significant.

Since many of the international students studying at the case study Australian University were drawn from the South East Asian region, their mean GPA was compared with those of other international students from other regions with reasonable number of students. It was found that with the exception of Western Europe, the South East Asian international students (mean GPA=1.73) outperformed those students drawn from North East Asia (1.4,  $t=6.9$ ,  $p<0.001$ ), South Asia (1.45,  $t=2.34$ ,  $p<0.05$ ) and North America (1.28,  $t=3.93$ ,  $p<0.001$ ). However, the Western Europeans (3.06,  $t=12.8$ ,  $p<0.001$ ) did generate a significantly greater mean GPA than was the case with the South East Asians.

***Table 6: Student Performance by Country of Origin***

Region	International GPA		Local GPA		“t” Statistics	Probability
	Mean	S.D.	Mean	S.D.		
Eastern Europe	2.07	0.96	1.71	0.58	2.29	<0.05
Western Europe	3.06	0.61	2.03	0.75	11.17	<0.001
North America	1.28	0.41	1.8	0.20	-9.57	<0.001
North East Asia	1.4	0.75	1.19	0.54	5.15	<0.001
South Asia	1.45	0.80	1.13	0.52	4.20	<0.001
South East Asia	1.73	0.84	1.53	0.74	3.86	<0.001
South Pacific	1.92	1.05	1.79	0.99	0.44	>0.05

### ***Student Performance by Other Variables***

Table 7 compares the performance of international and local students according to a number of variables including gender, entry scores and program level. The following observations are made on the information contained in this table:

- In terms of gender, the difference in mean GPA for international and local male students was not statistically significant meaning that their relative performance was very similar. However, local female students out-performed their international colleagues. Women are really on top as far as university student performance is concerned with female international students generating a greater mean GPA than their male counterparts ( $t=1.98$ ,  $p<0.05$ ); similarly female local students outperformed their Australian male colleagues ( $t=25.25$ ,  $p<0.001$ ).
- Regarding student entry scores, it is noted that with respect to the two decile final secondary school score ranges (both the sixties and seventies), Australian students generated greater mean GPAs than their international counterparts. Whether the entry scores are in the sixties or seventies makes no difference to the performance of international students ( $t=0.80$ ,  $p>0.05$ ), however, local students sustaining the higher entry score range (71-80) outperformed those with the lower score range ( $t=18.41$ ,  $p<0.001$ ).
- Regardless of level of program, the Australian students out-performed their international counterparts. However, postgraduate international students generated a greater mean GPA than their undergraduate colleagues ( $t=24.91$ ,  $p<0.001$ ). Similarly, postgraduate Australian students outperformed their undergraduate local counterparts ( $t=50.97$ ,  $p<0.001$ ).

***Table 7: Student Performance by Other Variables***

Country	International GPA		Local GPA		“t” Statistics	Probability
	Mean	S.D.	Mean	S.D.		
Gender						
-Males	1.53	0.79	1.56	0.70	-1.25	>0.05
-Females	1.61	0.90	1.79	0.75	-6.56	<0.001
ENTER Scores						
61-70	1.12	0.63	1.52	0.62	-7.04	<0.001
71-80	1.25	0.45	1.73	0.66	-2.91	<0.01
Program level						
-Postgraduate	2.58	0.65	2.96	0.88	-6.46	<0.001
- Undergraduate	1.38	0.74	1.63	0.69	-13.49	<0.001

## Conclusion

The study suggests that student performance tends to improve with their age, both for local and international students, with some exceptions. This hypothesis requires further research with the participation of a number of institutions to permit both a clear resolution, as well as possibly identifying some reasons for this outcome. Concerning the latter, could the

greater GPA for older students be due to their “maturity” or possibly more stable social settings? Again such propositions require further institutional research so that the development of strategies to enhance student performance can be based on knowledge.

The findings from the cross-tabulation of GPA against discipline yielded some interesting results as well. For instance the convergence in terms of the top performing disciplines for both Australian and Internationals may be worthy of further investigation. Similarly the fact that both groups of students struggle with the Economics discipline may be a source of concern. Does it require an improvement in terms of learning and teaching? Are some disciplines inherently more difficult to master than others and if so, why? Again these may constitute fruitful areas of further research in the future. Given that virtually all International students are fee paying and that even Local students are required to contribute towards their higher education costs (even if through deferred income contingent loans such as HECS), it is becoming increasingly important for Australian universities to invest in institutional research that can assist in enhancing learning and teaching on campus. Failure to do so could lead to “students voting with their feet” by moving to competitor universities thus resulting in revenue depletion and emerging institutional economic crises.

The study findings indicate that students entering the University from final secondary schooling performed less well than the other two groups identified (those entering from higher education and the other basis) both in respect to local and international students. Given the vulnerability of school leavers regarding their performance in academic assessments, the institution will do well to develop targeted learning and teaching strategies for this group. However, such strategies must be based on further institutional research to identify specific factors that impinge on the performance of this sub-group. Of particular note is the fact that International students entering the University via this admission mode achieved a mean GPA of less than one (that is, below the pass standard). Since failed students are more likely to withdraw from their program, all other things being equal, clearly the university needs to urgently identify the key factors contributing to such an outcome and subsequently develop and implement strategies to overcome any identified difficulties.

Since Australia is a multi-cultural country it was interesting to compare the relative performance of international students with those who were born in the same region but now residing permanently in Australia. Despite the fact that international students would not enjoy the same support from resident families as the Australian residents, with a few exceptions the International students generated a greater mean GPA than their local colleagues born in the same region. Indeed based on the “t” statistics, the performance gap was widest for Western Europe. It would be interesting to undertake further institutional research to establish why this is the case, given the “home” advantage of the local students.

The finding that higher entry scores made no difference to the relative performance of international students also requires further research. A critical question is why it makes no difference to Internationals but is important for Australian students. Further, if university entry scores really do not impact on student performance, the university may need to



consider other admissions criteria for such students. Thus there may well be policy implications of the findings of this study.

This research examined the effects of certain demographic variables on the relative performance of international students. It is acknowledged that certain other factors, particularly those related to English language proficiency and the like, would also impact on the performance of international students. This was beyond the scope of the present study, however, it is recommended that future research consider this and related variables' impact on international students' performance in universities.

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## Epilogue

It is a real pleasure to read and edit papers about some of the most important development in teaching and learning as we search for the most appropriate and relevant methodology.

In this edition we presented to you work being done in Jordan on various aspects of teaching and learning including the relationship between learning methods and creativity. In the globalized world that we are in today, it is inevitable that those who are most creative are the ones that will survive even if temporarily. It has been said in the past that the so called *first mover advantage* is no longer an assurance for continued survival.

Like Quality, Creativity will need to be continually improved and thus practiced.

The use of new technology is also underlined in the papers of this edition of JIRSEA. Technology in the broadest sense of the word, namely, *the application of scientific knowledge*. Hence the use of Fuzzy Logic for example in Institutional Research.

The global mobility of students and in many instances of their parents as well, was covered by the paper on international students in Australia. The myth of Asian-Americans are well known to institutional researchers and has been proven to be just that. Sharma and Chandra also presented survey results that point to a number of myths in regards to international students in Australia.

The many factors that academics and educational managers must address in order to do the best job in teaching and learning will continue to multiply as time go. The job of academics and educational managers are changing rapidly and more work will need to be done in order to anticipate the changes that lie ahead.

Nirwan Idrus