Disciplinary Differences in the Perceptions of University Graduates and Faculty Members with Respect to the Development of General Employability Skills in Undergraduate Programs

By

MATTHEW KWOK

A Thesis
Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

Post-Secondary Studies
Faculty of Education
The University of Manitoba
Winnipeg, Manitoba

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FACULTY OF GRADUATE STUDIES

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Abstract

As the labour market and economy become more knowledge-based and global, the importance of developing employability skills is becoming more critical. This study was designed to address the perceptions of both university graduates and faculty members across academic disciplines with respect to the development of general employability skills in undergraduate programs.

Twenty departments, schools, and faculties, selected from a single university in Manitoba, were slotted into Biglan's classification system of hard, soft, pure, and applied fields. A total of 1057 university graduates and 256 faculty members took part in the study.

A 2x2 completely crossed factor analysis of variance procedure with interaction was used to examine the differences in perceptions of university graduates and faculty members on the development of general employability skills in undergraduate programs across Biglan categories.

General findings from this study revealed that there are variations in the perceptions of university graduates across Biglan categories on the development and use of employability skills. Perceptions of faculty members across Biglan categories varied along the importance of teaching employability skills. According to faculty members, they integrate a variety of employability skills into their courses. Further, faculty members across Biglan categories believed that different patterns of opportunities exist for students to develop general employability skills across course levels. Overall, faculty

members are quite satisfied with the range of employability skills possessed by students and recent university graduates. As well, statistically significant differences in perceptions with respect to the development of employability skills were more often found in soft fields compared to hard fields, and in applied fields compared to pure fields.

Specifically, university graduates of soft fields perceived greater development of writing and oral communication skills than graduates of hard fields. Meanwhile, graduates of applied fields perceived greater development of teamwork skills than graduates of pure fields. Faculty members from soft fields integrated writing skills and oral communication skills in their courses more so than those in hard fields. Faculty members from soft fields and applied fields believed there were greater opportunities for students to develop employability skills than faculty members from hard fields and pure fields. Across all three years of a typical undergraduate program, statistically significant differences in perceptions by faculty members from soft fields more so than hard fields were found with respect to the development of 5 of 10 employability skills. Faculty members from soft fields believed students had opportunities to develop the following five skills in each of the three years of a typical undergraduate program: writing skills, research skills, decision-making skills, critical thinking skills, and evaluation skills. Likewise, statistically significant differences in perceptions by faculty members from hard fields were found with respect to the development of 1 of 10 employability skills (namely, mathematical skills) across all three years of a typical undergraduate

program. Similarly, statistically significant differences in perceptions on the development of 1 of 10 employability skills (namely, teamwork skills) were more often found by faculty members in applied fields compared to pure fields.

This study was intended to increase our knowledge and understanding of the pattern of disciplinary differences in the development of general employability skills as perceived by both recent university graduates and faculty members. The findings from this study showed that academic disciplines vary in their emphasis on the types of employability skills developed. A better understanding of how employability skills are developed within undergraduate programs is a critical issue for future research and practice in university teaching and learning.

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Chapter One: Background and Introduction

The changing nature of the labour market and economy over the past several years has had an impact on the role that post-secondary education and training systems play in the preparation of graduates for the contemporary workplace. Dynamic changes in the labour market over time have made the task of post-secondary education institutions in keeping up with developing general employability skills and preparing graduates for work increasingly difficult and challenging. This challenge is further exacerbated by the need to prepare individuals to continuously update existing skills and obtain new skills and qualifications. With the future economy and labour market needs changing rapidly and becoming difficult to anticipate (Fisher, Rubenson, & Schuetze, 1994), the importance of upgrading one's skills and qualifications to meet these needs is mounting.

Several reports in Canada (Industry Canada, 2000; MacLeod, 2000) have noted that in preparing university graduates for work, there is growing realization that job-specific or technical skills alone will not be adequate to deal with changes in the modern workplace. Rather, these reports suggest that general employability skills must be developed to complement the wide array of specialized and technical skills already possessed by graduates.

General employability skills are defined as the foundational academic, personal, and teamwork skills that employers expect of workers and which they expect to be developed by the education system (Conference Board of Canada, 1998). General employability skills, in the broadest sense, are a

form of human capital. Lowe and Schellenberg (2001) alluded to the fact that, at an individual level, the acquisition of general employability skills contribute to personal development through improved participation in society and professionally, in relation to favourable labour market outcomes and earnings, for example. Consequently, individuals invest time and money in order to become more skilled. Firms and societies typically invest in the human capital development of their employees and citizens in hopes of a future return on these investments. The underlying premise is that skill development builds the human capital framework that becomes the cornerstone for a knowledge-based economy (Lowe & Schellenberg, 2001).

The skills needed in today's knowledge-based economy for tomorrow's workplace are barely met by the skills currently being developed by university graduates or taught by university faculty members (Evers, Rush, & Berdrow, 1998; Industry Canada, 2000). Often, the skills most in demand by employers are typically the least in supply. By definition, supply refers to the skills and competency levels that university graduates bring to the job such as writing skills, interpersonal skills, and positive attitudes toward a task. Demand deals with what skills are needed by future employers such as leadership skills or the ability to think critically (Evers et al., 1998). In their research, Evers et al. found that students and graduates rated themselves highly on skills related to self-management and communication but lower on competencies related to managing people and tasks, and initiating and managing change.

Further, employers express considerable dissatisfaction and discontent with the general level of preparedness of their employees, in particular with entry-level employees and recent graduates. Many graduates leave post-secondary education without the knowledge or foundational skills necessary to find and hold a good job. This general sentiment can be illustrated in a recent government report:

> In the knowledge economy, the speed of economic and technological change demands increasingly higher and higher technical and scientific competence and a broad and evolving set of essential and management skills, often called "soft skills". The skills development process must start early in life and last for life...Without skills, nothing works. (Industry Canada, 2000, p.53)

Several recent studies have echoed similar sentiments and advocate the importance of enhancing and developing general employability skills in the labour market and economy. For example, in a recent survey of one hundred and fifty chief information officers from various Canadian industries each with over one hundred employees, executives were asked their opinions on the importance of general employability skills, or soft skills in job candidates (CIO Canada, 1998). Chief information officers reported that the most important skills for a prospective employee to possess were interpersonal skills, followed by written or verbal communication skills, and the ability to work under pressure (CIO Canada, 1998). Least important from the view of senior executives were technical skills and job-specific knowledge.

One possible reason for this low priority is that technical competency for the job may be already assumed by employers.

The Expert Panel on Skills, an independent group established by the Prime Minister's Advisory Council on Science and Technology in 1998, was tasked with determining whether the Canadian economy was experiencing a shortage of critical skills. One of their recommendations was that all levels of the educational system - from elementary education through to post-secondary education - be reformed to meet the needs of business and employers. Their final report, *Stepping Up: Skills and Opportunities in the Knowledge Economy* (Industry Canada, 2000), concluded that while there is no shortage in technical skills (Finnie, 1995), Canadians in general do lack essential communication and teamwork skills that are needed for today's business environment. The onus was on the educational system to better serve the needs and interests of employers.

However, the debate as to whether graduates should possess technical or non-technical skills is not the central issue. In fact, to be successful participants in the changing labour market and economy, university graduates ought to possess both job-specific and general skills. The combination of both job-specific and general skills can potentially enhance the employability and marketability of university graduates (Kitagawa, 1998) while at the same time raise the awareness level of university graduates to the importance of developing these skills and for

faculty members to teach a number of employability skills at university (Dean, 1999).

University programs in the humanities, social sciences, and natural sciences typically do not prepare university graduates directly for work or for specific occupations, unlike their counterparts in professional programs. In professional programs there may be conscious and explicit attempts to prepare graduates for specific occupations. In non-professional programs, their focus and attention has been more on the value of a liberal arts education (Dean, 1999; Kitagawa, 1998) and building general employability skills such as the ability to think critically or to reason logically.

In another study by Evers and Gilbert (1991), a sample of recent graduates and those who had graduated more than seven years earlier from a variety of undergraduate programs reported that they developed a wide range of skills including the ability to reason, problem solve, organize, and learn time management. Employers, when asked what skills they thought would be in greatest demand in the future or what skills they wanted to see improved in university graduates listed written communication, creativity, visioning, and leadership skills as the most important (Evers & Gilbert, 1991). The fact that differences in perceptions between university graduates and employers existed suggests that more attention needs to be placed on how various stakeholders view employability skills.

This analysis, however, does not imply that graduates of non-professional programs cannot find gainful employment in a wide range of

professional, managerial, and/or technical positions. It may be that they are more likely to take longer to find a job in their specific field of study partly because their knowledge, skills, and abilities may not be as widely recognized or marketable (Kitagawa, 1998) as graduates from professional programs.

Further, the Expert Panel on Skills (Industry Canada, 2000) was encouraged to hear that universities were developing interdisciplinary degree programs and establishing co-operative education streams in areas as diverse as architecture, business, computer science, and engineering. Through consultation with educational and business stakeholders, they also found that many post-secondary institutions have set up advisory committees for academic programs which allows for representatives of business and industry to provide input. This is one way to provide stronger links between classroom instruction and workplace application (Industry Canada, 2000).

This suggestion was reinforced by a key recommendation made by the Expert Panel on Skills that:

> Ministers responsible for post-secondary education encourage colleges and universities to establish advisory committees of representatives from industry and other appropriate stakeholders, for programs in science and technology, business and administration, and all other program areas that could benefit from closer links with the world of work (e.g., applied arts, social sciences, and humanities). (Industry Canada, 2000, p. 60)

With this in mind, Evers et al. (1998), in their own research program entitled *Making The Match Between University Graduates and Corporate*

Employers, suggested that development of general employability skills is a more important issue for educational institutions now than ever before as the knowledge-based economy and changing learning environment begins to take shape. *Making The Match* was a research program which began in 1985 to investigate the skill development of university students and graduates at several universities in Ontario. In particular, the study looked at the match between the skills of university graduates and the needs of corporate employers. The program grew out of the recognition that social and economic forces were changing organizational structures and that university graduates had to be able to cope with these changes. The focus was initially on job-specific skills developed by graduates, but as the research program unfolded, the investigators found greater discontent and dissatisfaction among university graduates and corporate employers with the development of general skills such as written communication (Evers et al., 1998).

Evers et al. argued that universities have a role to play not only in helping students learn the content of a discipline but also complementary general employability skills. Universities will need to move beyond traditional forms of learning and offer students a learning environment that teaches and promotes general skills development. The problem, however, is that educational institutions and employers that employ university graduates are for the most part isolated entities.

Purpose of the Study

As the labour market and economy becomes more knowledge-based

and global, the importance of developing employability skills in post-secondary programs is becoming more critical. Universities, through faculty members who teach students, have a contributing role to play in addressing the general discontent currently expressed by employers as to the development of general employability skills in recent university graduates. To respond to these concerns, university programs first, need to become more aware of the employability skills developed in programs of study and second, develop curricula to more systematically and explicitly address employability skills. These responses require a better understanding of how students and faculty experience the development of employability skills in existing programs.

Consequently, the purpose of the study was:

1. To determine the differences in perceptions between university graduates across academic disciplines and programs with respect to the types of general employability skills developed and used.

2. To determine what kinds of general employability skills faculty members across academic disciplines judge as important to teach students.

3. To assess differences in faculty member's perceptions with respect to general employability skills developed by students in their courses and programs.

Significance of the Study

The significance of this study resided in addressing the differences in perceptions of a recent cohort of undergraduates at one university in

Manitoba from non-professional programs (which include programs in humanities, social sciences, and natural sciences) and professional programs as to the types of general employability skills they developed. Likewise, the perceptions of faculty members across academic disciplines about their perceptions of the importance of teaching a variety of general employability skills to students were undertaken, including identification of the types of general skills important for student learning.

Examining the differences in perspectives of university graduates and faculty members across academic disciplines at one university in Manitoba on the types of general employability skills developed provide insights into ways of addressing recent employer concerns over the lack of preparedness of new university graduates for work. Equally important, it may dispel the myths that university graduates of particular programs do not commonly possess particular general employability skills.

General employability skills such as oral and written communication, the ability to work with others, critical thinking skills, and interest in lifelong learning are foundational to both academic and workplace success. They are skills that are needed not only in the workplace but can be useful in daily living and just about any social context (Conference Board, 1993, 1998; MacLeod, 2000). Further, developing and using these employability skills can also help ease the transition of young people from school to work (Donaldson, Hiebert, Pyryt, & Arthur, 1998). The Conference Board of Canada (1993) report, *Employability Skills Profile: What are Employers*

Looking For?, refer to foundational skills as the generic intellectual skills, attitudes, and behaviours that employers look for in new recruits and that they seek to develop through on the job training programs for employees. A critique of the report, however, is that it fails to address what actual skills employers require of their employees.

As a result, identifying, articulating, and developing these general skills ought to be important issues for both university graduates and for those connected with higher education. Today's generation of university graduates and entry-level employees will increasingly need to develop a set of general employability skills to meet the ever-changing demands of the knowledge-based economy and the growing expectations required by employers. As Donaldson et al. (1998) correctly pointed out, today's generation of young people will likely require contemporary skills such as those outlined by the Conference Board of Canada in order to be successful. University students and graduates ought to think in terms of preparing themselves for lifelong employability (Evers et al., 1998) or enhanced employability (Human Resources Development Canada, 1996) as opposed to simply lifelong employment in a single job. It is expected that workers will be changing jobs and careers several times throughout their working lives, unlike previous generations (Evers et al., 1998). Consequently, the need to identify, enhance, and develop general employability skills are more important now than ever before. This study examined the types of employability skills deemed important by university graduates and by faculty members across

various university programs in Manitoba. Another facet of the research sought to examine whether disciplinary differences influence the perceptions of recent university graduates and faculty members on the range and types of general employability skills developed.

Several reports and accounts concerning the types of employability skills desired by university graduates or the general preparedness of entry-level employees typically come from the perspective of employers. There is currently a paucity of information and research regarding the perceptions of other stakeholders such as university graduates and faculty members on what constitutes appropriate employability skills development. This study addressed some of the gaps in the research literature by addressing multiple stakeholder perspectives (both university graduates and faculty members) on the employability skills issue.

Faculty members will also benefit by focusing attention on the types of general employability skills deemed important for students to develop. An understanding of the types of general employability skills that are important for student learning can be helpful in the design of their own courses and programs, as well as for the effective teaching of these general skills. As the use of new instructional technologies and innovative curriculum replaces traditional classroom instructional methods, for example, the need for identification and development of general employability skills is a key source of information required to shape curricula. This study can support curriculum development by determining whether there are program differences in the

perceptions of faculty members on the importance of developing selected employability skills.

Scope of the Study

Using existing data obtained from a comprehensive follow-up survey of post-secondary graduates in Manitoba (Angus Reid, 1999) as well as a researcher-designed survey of faculty members, this study examined and identified differences in perceptions of the types of general skills developed by graduates of the humanities, social sciences, natural sciences, and professional programs. Faculty members across academic disciplines were asked similar questions as well to determine whether differences in perceptions exist on students' development of selected general employability skills.

Definition of Terms

Throughout this study, the following definitions were used:

General Employability Skills *(or Non-Technical Skills, General Skills, Soft Skills)* are the skills, abilities, attributes, and attitudes of employees, other than technical competence, that make them an asset to the employer. The Conference Board of Canada (1993, 1998) has identified three types of employability skills. These areas include: *academic skills,* such as oral and written communication, problem-solving, and lifelong learning; *personal management skills,* such as having a positive attitude; and *teamwork skills,* such as the ability to work with others, appreciation of cultural diversity, and decision-making abilities. In this study, the following list of ten general

employability skills will be examined: writing skills, computer skills, oral communication, mathematics, research, decision-making, critical thinking, evaluating and critiquing statements, ability to work with others, and lifelong learning.

Biglan Categories (Biglan, 1973a; 1973b) consist of three dimensions characterizing the subject matter of academic areas in most institutions. The three dimensions are: (a) the degree to which a paradigm exists (soft-hard), (b) the degree of concern with application (pure-applied), and (c) concern with life systems. In this study, only the first two dimensions will be examined. The life-nonlife dimensions will be excluded because it was under-represented in the institution and has been shown to have the weakest evidence of validity of the three dimensions according to the literature.

Academic Disciplines will be defined as a specific department, school or faculty. The department, school, or faculty, will be randomly selected and placed according to characteristics found in one of four Biglan categories.

Chapter Two: Review of Literature

The Review of Literature will build upon the context and purpose set out in Chapter One. This chapter will be broken down into three areas guided by the following questions:

1. What are employability skills? What are the types of employability skills valued by employers of recent university graduates and entry-level employees?
2. To what extent are employability skills currently developed and fostered across academic disciplines? How does an emphasis on employability skills impact on the purpose of a university education and shape curriculum from the perspectives of students and faculty members?
3. What is the impact of disciplinary differences on student and faculty perceptions of general employability skills developed at university?

Employability Skills

Introduction.

As a result of changing labour market and economic conditions, the general employability skills required in today's knowledge-based economy do not appear to be well-developed by university graduates or well-taught by university faculty members (Evers, Rush, & Berdrow, 1998; Industry Canada, 2000). Often, the skills most in demand by employers, as measured by the wide range of skills asked of future employees, are typically the least in

supply, as measured by the skills, abilities, and competencies that university graduates bring to the job (Atkins, 1999; McLaughlin, 1992).

Employers continue to express considerable dissatisfaction with the general level of preparedness of recent graduates and of entry-level employees. This raises concern for faculty members and for students. Many graduates leave post-secondary education without the knowledge or foundational skills necessary to find and hold a good job in a changing labour market (De la Harpe, Radloff, & Wyber, 2000; Evers et al., 1998).

Current analyses suggest that future graduates are likely to be either knowledge workers or symbolic analysts, members of learning organizations, and managers of their own careers (Atkins, 1999; Lowe & Schellenberg, 2001, Reich, 1991). As Reich pointed out, ideally the symbolic analyst should not only possess relevant disciplinary understanding and skills, but also the generic skills that enable the disciplinary base to be deployed to the optimal effect. Reich identifies four fundamental skills for the knowledge worker of the new century. These skills are similar to those identified as employability skills: abstraction (ability to use formulae, equations, and models), systems thinking, experimentation, and collaboration (involving oral communication, written communication, and teamwork skills).

Definition and characteristics.

One of the challenges in identifying, developing, and assessing employability skills is a clear articulation of the knowledge and skill sets that constitute employability skills. One source that helps describe employability skills is the numerous policy discussions that have centered on the need to

ensure that graduates are fully equipped for the world of work. Ever since the Conference Board of Canada released its latest *Employability Skills Profile* report (Conference Board of Canada, 1998), discussions about the types and range of skills that both educational institutions and employers ought to be developing have been framed as employability skills. Employability skills are defined as the foundational academic, personal, and teamwork skills that employers expect of workers and which they expect to be developed by the education system (Conference Board of Canada, 1998). Further, employability skills are part of a broader discourse premised on the need to provide greater linkages between the education community and employment community in order to ensure Canada's economic competitiveness and success in the global economy (McLaughlin, 1992). The belief that our young people are not adequately meeting the skill requirements for an ever-changing workforce has elevated the employability skills discourse among several federal government departments (Human Resources Development Canada, 1996; Industry Canada, 2000) and provincial government ministries (Manitoba Education & Training, 2003).

The Canadian model of employability skills development is similar to that of the Secretary's Commission on Achieving Necessary Skills (SCANS) study in the United States (U.S. Department of Labor, 1991). For example, the SCANS report not only examined the skills needed to be successful in the workplace but also included those skills that were required for entry-level positions. The report identified specific foundation skills (written and oral

communications, decision making, self-management, and integrity) and competencies (time management, interpersonal skills, leadership, and negotiating skills) as being important for workers to possess. The SCANS findings are similar to those of a parallel U.S. study completed by Carnevale, Gainer, and Meltzer (1988).

Another definition places employability skills in the context of attributes of employees, other than technical competence, that make them an asset to the employer (Buck & Barrick, 1987). Buck and Barrick defined employability skills to include reading, basic arithmetic, and other basic skills; problem solving, decision making, and other higher-order thinking skills; and dependability, a positive attitude, cooperativeness, and other affective skills and traits.

There are other concepts related to employability skills. Human Resources Development Canada (1996) consider "essential skills" as enabling skills that help people to perform tasks at work and in other activities of daily life. Human Resources Development Canada has considered essential skills to include such examples as reading text, numeracy, problem-solving, and continuous learning.

These essential skills also enable people to develop a foundation to learn other types of skills. By developing essential skills at levels required for a particular occupation, workers will have enhanced employability (HRDC, 1996). Further, many of these essential skills highlighted by Human Resources Development Canada parallel those identified by the Conference

Board of Canada and by the Secretary's Commission on Achieving Necessary Skills (SCANS) in the United States.

Both the Conference Board of Canada and SCANS frameworks categorize employability skills into three broad areas. These broad categories provide possible mappings of the list of employability skills that will be used in the study. The schema can be depicted in the following table:

Table 1: Categorical Mapping of Employability Skills

SCANS (1991)		
BASIC SKILLS	**THINKING SKILLS**	**PERSONAL QUALITIES**
Writing Skills Computer Skills Oral Communication Mathematical Skills	Research Skills Decision Making Skills Critical Thinking Skills Ability to Evaluate or Critique Statements	Teamwork Skills Lifelong Learning Skills
CONFERENCE BOARD (1998)		
FUNDAMENTAL SKILLS	**PERSONAL MANAGEMENT SKILLS**	**TEAMWORK SKILLS**
Writing Skills Computer Skills Oral Communication Mathematical Skills Research Skills Critical Thinking Skills	Decision Making Skills Ability to Evaluate or Critique Statements Lifelong Learning Skills	Teamwork Skills

Awareness and need for developing employability skills.

Even though specific employability skills have been identified, the general concept of employability skills is not well understood for two reasons. The first is that many young people, such as recent university graduates, do not fully possess the types and range of employability skills necessary for success in the workplace (Evers et al., 1998; Farr, 2000). Part of the reason, unfortunately, is that educational institutions, in particular, universities, do not explicitly emphasize general employability skills development in their design of courses and programs nor in the shaping of curricula (Kitagawa, 1998).

Where employability skills are taught, students often lack the awareness to articulate the types of employability skills they are learning in the classroom. Because the idea of employability skills is becoming more prevalent in our labour market and economic environment, it is critical that employers, educators, and university graduates fully understand the issues surrounding employability skills development.

A second source of misunderstanding in the employability skills debate is that employers continually dismiss the general preparedness of new hires citing lack of essential skills, management, and leadership skills (Industry Canada, 2000). Several studies have reported that employers frequently express contradictory demands for employability skills, often times inflating their expectations while placing undue hardship on the education system for ensuring that university graduates are fully equipped with the necessary knowledge, skills, and abilities required of the workplace (Darrah, 1994; McLaughlin, 1992; Taylor, 1998).

These two reasons strengthen the argument for the need to gain a better understanding and consideration of student's own perceptions of their educational development. Learning environments typically influence students' self-perceptions (Bandura, 1993; Pascarella & Terenzini, 1991). Research into students' own perceptions of their development of a variety of general employability skills is key to a better understanding how specific disciplines differentially influence students' learning outcomes.

In the Industry Canada (2000) report, the Expert Panel on Skills also recommended that programs in post-secondary education systems be revamped to better prepare students with the employability skills needed for the changing workplace. However, the Expert Panel also recognized that there is a lack of common language or framework for defining and measuring employability skills, a similar observation made by the Conference Board of Canada when it recommended the development of assessment tools for employability skills (Gilbert & Bloom, 1998).

Further, one limitation to the Conference Board's Employability Skills Profile is the basis on which skill requirements are assessed only from the perspective of employers (Krahn, Lowe, & Lehmann, 2002). In order to engage in a multilateral discourse on employability skills, it is also important to consider the perceptions of both recent university graduates and faculty members, a gap in the literature that was addressed in this study. Concerns about the accuracy of employers' perceptions of employability skill shortages or labour market mismatches is a result of the fact that employers use educational credentials as a screening device in hiring entry level workers without fully knowing nor understanding about the skills developed within specific university programs (Darrah, 1994).

Even among employers, there are differing views of what constitutes appropriate employability skills. While an entry-level employee certainly will experience a rough transition if he or she is not adequately prepared, critics such as Darrah (1994) and Taylor (1998) focus the debate on ideological

grounds, arguing that the responsibility for employability skills development has moved away from employers to rest squarely on the shoulders of educators and students.

Darrah (1994) provided a critical examination of employers' needs and three possible limitations on the notion of skill requirements. First, Darrah argued that having employers present a list of employability skills that are defined *a priori* ignores the question of how these skills are demonstrated by a skilled worker (Darrah, 1994). The decontextualization of skills results in highlighting the deficiencies and failures of workers on skill development and in failing to focus on the actual nature of the work required or performed.

A second critique of the skill requirements concept is that it assumes that all workers must be capable of performing all the employability skills required by employers. Darrah argued that in actual work settings, no single worker needs to possess all of the required skills desired by employers but rather, workers are typically held together by "networks of assistance with expertise distributed throughout" (Darrah, 1994, p. 77). Lists of skill requirements also assume employability skills are isolated from the actual work contexts within which they are generated and exercised.

A final critique set forth by Darrah is the idea that workplaces are seen to be operating smoothly only if employers can attract properly skilled individuals. The result of not attracting skilled individuals into the workplace, argued Darrah, leads to the possible exaggeration of skill deficiencies in young people and entry-level workers while challenging those in the

education system to be responsible for ensuring that these individuals are equipped for the workplace.

The concerns raised by Darrah's analysis are worth noting; however, it does appear that what is really required is for various stakeholders to become more fully aware of how, in a changing economy, the need to develop a range of employability skills is likely required as individuals become less attached to a single job or career, for example. For university graduates and entry-level workers to develop and possess some of the employability skills required of the workplace is better than none at all. Employers ought to be less restrictive to both individuals and the educational system in its demand for the possession of a multitude of employability skills once they are in the workplace.

Distinction between employability and employment.

Another source of confusion in the employability skills literature is that employability and employment are not the same concept. To be employed means having a job, whereas to be employable means possessing the desired qualities needed to maintain employment and progress in the workplace (Evers et al., 1998). Further, Human Resources Development Canada (1996) refers to the notion of "enhanced employability" as a requisite for success in the current workplace. Within the education system, employability refers to producing graduates who are capable and able of performing tasks successfully. This success ultimately enhances the student learning experience and in the delivery of academic programs and shaping of curricula (Evers et al., 1998).

Employability is a difficult concept to define, for it is multi-dimensional in nature. There is a need to distinguish between factors related to obtaining a job and factors relevant to the preparation for work (Little, 2001). Employability is not merely asking students to collect a set of generic skills. Rather, some commentators view the concept of employability to be a "synergic combination of personal qualities and skills of various kinds" (Knight & Yorke, 2003). For the individual, employability depends on the knowledge, skills, and attitudes acquired and how they are used and deployed. Employability also depends upon the context within which the individual works, for example, in different sectors of the labour market or in other social circumstances.

The notion of employability challenges traditional concepts of higher education by raising the question of whether the role of higher education is mastering subject knowledge or learning how to learn. De la Harpe et al. (2000) suggested that there is a growing concern that existing undergraduate programs are not producing the type of graduates with lifelong learning skills needed in order to be successful in their careers. Others, such as Atkins (1999), concluded that universities need to enhance the employability of graduates by adopting general employability skills into the university curriculum. Atkins says that graduates heading for the workplace need to be "oven-ready" and "self-basting" (Atkins, 1999, p. 267). The following section of the Review of Literature will examine the state of employability skills development across academic disciplines.

Employability Skills Development across Academic Disciplines

Ideally, an undergraduate education ought to provide current university students and recent graduates with the necessary knowledge, skills, attitudes, and values critical to navigate the dynamic complexities of the changing workplace. Universities are continually asked: "what are students learning and what will they be able to do upon graduation from university?" One response from universities focuses on a developmental approach (Donald, 1990; Donald, 2002), which turns its attention to how the curriculum is organized to enable students to develop competence in several general employability skill areas such as communication, analysis, critical thinking, and problem solving. Underlying this developmental approach is the notion that student knowledge and skills in different subject matter areas can be measured in a way that can be generally understood by all educational stakeholders. However, a lack of a general vocabulary or framework for understanding the nature of knowledge and skill development across disciplines continues to be evident at most universities.

Despite ongoing concerns by employers (and even government) about the need for graduates to possess and develop non-technical skills and abilities, there continues to be little synthesis and analysis of the progress that has been made in response to criticisms. Most universities, however, have attempted to provide curriculum reform in the social sciences, humanities, natural sciences, and professional programs such as emphasizing the value

of a liberal arts education (Dean, 1999; Farr, 2000; Kitagawa, 1998), which makes the development of employability skills more explicit.

The notion of employability skills development in the university environment continues to challenge traditional thinking and concepts of higher education and raises questions about the role of a university education. The rapidly changing economy has fuelled the desire for university graduates to adapt accordingly and this poses a problem for universities because of the growing dichotomy between the purposes of education for employment and education for its own sake. Current students view the purpose of a university education as a step to career preparation (Astin, 1993). Many faculty members, on the other hand, continue to uphold the preserving, transmitting, creation of knowledge, and the development of the intellectual mind (Bok, 1974). How will the resolution of these competing views influence the university curriculum in terms of teaching and learning practices? It is the focus of the following section to address some of the issues in light of competing goals for university education faced by students and faculty members.

Impact of differences in purposes of university education on curriculum.

Clark Kerr once said that curriculum is the battleground on which society debates the purpose of education (Kerr, 1977). The debate about whether education should be general or vocationally-oriented has been fuelled not only by changing societal and economic needs but also with the growing diversity in the student population. Students' backgrounds, interests,

and expectations often influence the type of university education they pursue (Astin, 1993). As a collective group, they are one of the most important stakeholders in the learning process. Consequently, students' experiences with the curriculum ought to be given greater attention.

Faculty members' discipline and pedagogical orientation impacts on their position on what the role of university ought to be (Levine, 1978; Stark & Lattuca, 1997). Faculty members typically are responsible for, and have the authority to, determine the curriculum at either the course level or program level. Some commentators suggest that faculty should determine curriculum, given that students do not possess sufficient expertise and concise knowledge of what constitutes a sound curriculum or course of study (Twombly, 1995).

Others, such as McMurty (1991), claimed that it is in the best interest of both students and society to acquire employment-related skills. Proponents for this position base their argument along the lines of a contract between universities and society. That is, in return for the public monies invested in it, the post-secondary education system must make a significant contribution to the economic prosperity of the country and its people. However, opponents of incorporating the employability agenda into the university curriculum cite differences in a university's purpose (McMurty, 1991). These opponents do not want to see the role of universities to be primarily servicing of the economy and the profitability of employers, for

example. As a result, the goals and purposes of universities are quite different from those of the market place (McMurty, 1991).

Nevertheless, the university curriculum has been, and continues to be, shaped by institutional, internal, and external influences (Stark & Lattuca, 1997). The following discussion will locate the positions of each stakeholder groups on how the university curriculum can impact on the types of general employability skills developed.

Student expectations on purpose of university education.

Students are the major consumer of post-secondary education. Students often enter university with a number of beliefs, values, and expectations about what higher education entails, what is required, and what it can provide for them in the future. A closer look at how students form their expectations and views about higher education should be encouraged in light of structural changes in both the economy and society.

Over the past half century, and certainly within the past three decades, some commentators have pointed out that the characteristics of students and the educational goals they hold have changed significantly towards a market orientation (Astin, 1985; Astin, 1993; Gaff & Davis, 1981; Holdaway & Kelloway, 1987; Stickgold, 1975). That a major purpose of university education is preparing students for the world of work is no longer in dispute. Educators are often heard criticizing students who pursue a university education simply by enrolling in courses that will only benefit them later in either finding employment, gaining wealth or obtaining status as opposed to developing their intellectual capacities and thirst for knowledge simply for its

own sake. The result is a further widening of the dichotomy between vocational training in the former and liberal education in the latter situation. Some of the reasons cited for this shift in the approach to a university education may include a rapidly changing job market, the need for advanced technical skills in an information-based economy, a growing uncertainty of what the future holds, and to a questioning of traditional societal values (Fisher, Rubenson, & Schuetze, 1994). Current university students, as a result, view university as a place where one goes to be "trained" for a particular job, with hopes that a bachelor's degree almost guarantees them employment, and not a place where one necessarily becomes "educated" for its own sake (Astin, 1993).

In fact, enhancing the employability and marketability of university graduates of both liberal arts and vocational education programs has been a growing area of priority at most Canadian universities (Di Matteo, 1999; Kitagawa, 1998). Liberal arts programs are slowly making ground in addressing this challenge. While most professional schools within the university – such as Education, Nursing, Law, and Medicine – consciously prepare their students for specific occupations by teaching explicit skills related to critical thinking, decision-making, and problem-solving, for example, programs in the humanities and social sciences are beginning to make explicit the value of liberal arts training for work. Some universities, such as the University of Calgary, set out a list of core competencies such as critical and creative thinking, problem solving, gathering and organizing information,

and logical calculation, that are to be developed by students from their program of studies. As Donaldson (1998) pointed out, the skill competencies learnt at university only provide some limited opportunities for practice. To be even more successful, these skill competencies ought to be viewed as being developed or enhanced over the lifespan.

Other universities such as Dalhousie University in Halifax, are beginning to attach a notation on transcripts of graduates of liberal arts programs a list of such skills as collaborative work, oral communication, and analytical work. While this makes the value of a liberal arts education more explicit and obvious, it is now being marketed to graduates and those outside the university acknowledging that these graduates do possess and have developed a range of employability skills parallel to their counterparts in professional programs. In essence, liberal arts graduates are prized because of their ability to think creatively and laterally using skills acquired in analysis, synthesis, research, and communication (Di Matteo, 1999).

This also demonstrates that employability skills can be developed under both types of education – liberal arts and vocational education programs. It is not intended to fuel the "either-or" debate about the relative merits of a liberal arts education or vocational education. While the latter programs have made explicit these skills in their courses and programs, those connected with the liberal arts are showing steady progress in making skills as critical thinking, problem-solving, and communication skills more explicit to faculty members and students. These skills should not be viewed as add-ons

to course content nor should it be seen as changing the curriculum in substantive ways. Rather, its contribution lies in communicating to the university community that the acquisition of employability skills is complementary to content knowledge of an academic discipline without having to alienate faculty members, students, and employers. Consequently, the explicit development of employability skills can bridge the dichotomous debates between the perspectives of a liberal arts education to that of vocational training by demonstrating that these skills are taught explicitly to students in all university programs, regardless of its liberal arts or vocational orientation. Further, the explicit development of employability skills can serve to enhance the accountability of university programs.

However, with that said, there is increasing evidence indicating that student expectations about the value of a university education may not be meeting the needs and demands of today's labour market (Gaff & Davis, 1981; Holdaway & Kelloway, 1987). Some would argue that the career-oriented approach to higher education may, in fact, limit students in their employment prospects by making them less flexible and unable to meet the ever-changing demands of a growing technological society (Bok, 1986). If this view holds true, then the result is that individuals will be unable to deal with new challenges because university no longer expands and develops their cognitive and intellectual capabilities, such as their ability to solve problems or to think critically.

It is important to assess how the two broad purposes of university education, namely liberal education and vocational training, affect students during their undergraduate studies and beyond graduation. Holdaway and Kelloway (1987) have made attempts to determine how students perceive and experience university, how students reflect vocational concerns in their pursuit of an university education, and how students' expectations and perceptions of university evolve throughout their program of studies and beyond graduation once in the labour market. A growing number of students are entering university with a variety of academic orientations and these orientations may often have a bearing on the way in which they make curricular choices, approach their university education, determine the level of effort to expend on university studies, and select their careers, for example.

Developing a wide range of employability skills in the undergraduate curriculum was deemed important by some students in a study done by Gaff and Davis (1981). They reported that the majority of students wanted to learn effective communication skills, critical thinking skills, and interpersonal skills within a general education program. However, at the same time, the majority of students value a broad general education only if they can relate their education to other goals such as self-knowledge or career preparation. Students were equally critical of general courses that carried with them the perception of additional workload and lack of relevance to other immediate goals such as finding employment or achieving success in society, for example.

However, the emphasis by today's generation of university students on the career aspects of higher education coupled with the massive reduction in education budgets over time has resulted in higher education policy and a university curriculum that is more likely to be influenced by economic factors and market conditions than solely by educational considerations (Astin, 1993). The career concerns expressed by students combined with the tightened budgetary constraints in the recent past have led university administrators and government policymakers to find ways to modify the academic requirements of the undergraduate curriculum towards a more specialized, career-oriented curriculum (Bercuson et al., 1984). At times, this shift has even resulted in a loosening of university admission requirements or a lack of preparedness in basic academic skills such as reading and writing by incoming university students, for example. These trends also have been observed in Canada. A report on Canadian university education identified the struggle with dealing with curriculum issues related to the dichotomy between specialization and general knowledge, or, with taking a disciplinary versus interdisciplinary approach, for example (Smith, 1991).

In recent years, the growing problems of university students lacking basic academic skills and higher level cognitive abilities have been further compounded by extensive curriculum implemented in an attempt to be more responsive to the external environment, in partnership with the employment community. Examples of granting external degrees, introducing short courses (such as workshops, compressed courses, or pilot projects) or

instituting co-operative or internship programs in some university programs is evidence of the shift to address labour market needs or to enhance the vocational component of a university education (Fisher, Rubenson, & Schuetze, 1994; Kitagawa, 1998). Employers regularly have voiced a desire for such courses or programs. They usually express their willingness and readiness to cooperate with the university in developing these courses or programs to enhance student learning. However, the employment orientation varies widely from subject to subject and from discipline to discipline depending on the extent to which courses are preparing for specific professions or not.

In order to succeed in today's labour market, individuals require greater adaptability and flexibility. One way to exhibit this adaptability and flexibility is for workers to have transferable skills to take with them from one job to another with ease (Donaldson, Hiebert, Pyryt, & Arthur, 1998).

Even governments, as major funders of post-secondary education, have asked institutions to justify to what extent their university programs can meet the needs of the labour market. Governments also ask institutions to demonstrate how their programs address possible skills shortages in a particular area or industry. In turn, government funding of new university programs is partially determined by such labour market analysis and needs assessment (Council on Post Secondary Education, 2002).

Critics of the move toward vocationalism in university education point to how the demand for relevance and applicability in course materials has

resulted in programs that seek to train students in a narrow range of techniques and vocational skills in "specialist" programs (Bercuson et al., 1984; Moodie, 1986; Stickgold, 1975). The resulting effect has led to the churning of students that "know more about less" (Bercuson et al., 1984). However, recent research has shown that certain soft disciplines placed greater emphasis on general skills such as critical thinking and communication skills than hard disciplines (Li, Long, & Simpson, 1999). The general nature of employability skills in the university curriculum can help address some of the concerns raised by employers of graduates lacking appropriate general workplace skills.

It is no surprise then that the shifting emphasis by university students with adopting a career-oriented approach and the desire to acquire general skills within their own education is partly due to the increasing uncertainty regarding their future employment prospects as well as the changing skills and information requirements needed in an advanced global-intensive and service-oriented industry. The rising costs of university education (such as tuition and books) have also increased the number of university students relying on various forms of financial assistance (such as bursaries, student loans, scholarships, and even from parents). This has also impacted on students' views of what a university education should provide, which is stable employment upon graduation. In fact, as Stickgold (1975) pointed out several decades ago, many students are viewing their university education:

> as a place to be trained, not educated; to be given answers, not asked questions; ...in short, to be certified for employment, not credentialized for citizenship (Stickgold, 1975, p.176).

Further, Astin (1985) also pointed out that many students today believe "learning is for earning" (Astin, 1985, p. 220) and that a university education offers few additional benefits. Students are choosing to attend university, not for the benefits found from the knowledge gained from the subject matter and the associated learning, but for the opportunity a university degree offers in either minimizing undesirable career prospects or maximizing their chances for obtaining "a better job" (Astin, 1993, p. 245). Hence, most current university students take labour market conditions into consideration when making the decision of whether to pursue higher education or not. Thus, job attainment from a students' perspective is one main purpose for their participation in post-secondary education. Overall findings seem to suggest that today's generation of students view the purpose of a university education based on extrinsic factors that are tied to finding a satisfying job, gaining high incomes, and obtaining positive societal status. These student demands certainly impact the learning components of the university curriculum.

Faculty members' perceptions on purpose of university education.

One purpose of a university education is that students become acquainted with a body of facts, theories, generalizations, and ideas through the acquisition of information and knowledge (Bok, 1974). It enables students to engage in discourse, inquiry, choice, and reflection. For some students, a

liberal education helps to create a web of knowledge that can enlighten judgement and enhance experience during one's lifetime.

Another purpose of a university education is to impart a variety of basic intellectual skills and habits of thought. Bok (1974) pointed out that because most students have little idea as to what to do with their lives after graduation, it becomes more difficult for universities to orient their curricula along vocational lines. However, there are certain intellectual skills and habits of thought that are so fundamental that it would serve students well regardless of type of job or position in society. These skills, which parallel the general employability skills identified in this study, include the ability to communicate orally and in writing with clarity and style, including the ability to speak and read a foreign language (Bok, 1974). Finally, another form of intellectual competence is the knowledge of an academic discipline which is the hallmark of the undergraduate program – the academic major. Bok questions, however, the value of the academic major for students who will likely devote their lives or careers to very different endeavors. Although the university response typically is that students need to gain a sense of mastery in at least one subject, it is clearly the case that a great number of students, especially in the humanities and social sciences, are likely to pursue advanced work in professional programs such as business or engineering.

More recently in Canada, several university administrators have recognized how the changing nature of the university curriculum over a period of several decades will likely impact on current and future undergraduate

students (Farr, 2000). Educators are realizing that students' needs and expectations have changed as surely as the world they are ideally being educated to occupy as either public citizens, members of the workforce and as private individuals has also changed.

As an example of the changing nature and direction of curricula, the former principal of McGill University, Bernard Shapiro, argued that the undergraduate curriculum should not necessarily be over-specialized but rather open to a broad spectrum of disciplines and learning approaches. As Shapiro stated:

> the new undergraduate curricula of Canadian universities will increasingly be concerned with providing that exposure to students through interdisciplinary studies, smaller classes, an emphasis on explicit statements of required learning outcomes and skills, and subject matter and teaching techniques that are more obviously meaningful for the student. (Farr, 2000, p. 12).

From a pedagogical perspective, some Canadian educators have argued that at the heart of all curriculum changes, regardless of the purpose of university education, is the desire to be more explicit and concrete about precisely what is to be taught and what students are supposed to be learning. Students should leave university with a documented account of their learning, one that students themselves have participated in creating and documenting. As Fred Evers stated:

> we tend to reward regurgitation of course content, when in fact we should be developing leadership and creativity, not the skill of taking multiple-choice exams, which just doesn't reflect the real world. (Farr, 2000, p.14).

He argued that, even though society has changed over the decades and there is greater consideration of labour market needs, courses can still be delivered with the same content but in exciting and innovative ways. What is required is for faculty members to be challenged to try new pedagogical techniques within their courses.

Faculty members will need to be convinced that a university's insistence on incorporating employability skills into their teaching and curriculum is not to be viewed as an attack on academic freedom in terms of content, but merely a request that they consider how they teach their subject matter. Harvey (2000) advocated that the main role of faculty members is to train students by enhancing their knowledge, skills, attitudes, and abilities while empowering them to be lifelong learners and critical thinkers. That is, employability skills development ought to be viewed as supportive of good learning rather than in opposition to it. A culture that strives to improve the learning environment for the benefit of students and faculty members is essential for the successful implementation of curriculum change (Stark & Lattuca, 1997; Harvey, 2000).

One way to understand employability skills development in undergraduate programs is through an understanding of the characteristics associated with different disciplines. Knowledge of differences in disciplinary affiliation of faculty members can help us enhance the educational experience of students from different undergraduate programs (Eimers, 1999). The next section addresses some of these characteristics and differences.

Impact of Disciplinary Differences in Student and Faculty Perceptions on General Employability Skills

Biglan's classification system of academic disciplines.

Several frameworks for classifying academic disciplines can be used to characterize or group disciplines for research purposes (Becher & Trowler, 2001; Biglan, 1973a, 1973b; Carnegie Foundation, 1987; Statistics Canada, 1996). One widely used application is Biglan's classification system (Biglan, 1973a; 1973b). This classification of academic disciplines examines the relationship between subject matter characteristics and the structure and output of disciplinary groups. The three criteria examined were: (a) social connectedness with faculty members (i.e., likelihood of working with others, influence of people on others, and degree of actual collaboration with others), (b) commitment to teaching, research, and service (i.e., likelihood of engaging in activity and amount of time spent on activity), and (c) scholarly output (quantity of research and quality of research).

Biglan (1973a; 1973b) proposed three scales on which academic disciplines can differ: *hard-soft* (based on the existence of a paradigm within the discipline); *pure-applied* (based on emphasis on application) and *life-nonlife* (based on concern with life systems). Each of the three scales yielded differences in the balance between teaching and research activities and in its emphasis on teaching effectiveness and research publication record.

Not only is this a useful analytical framework for viewing differences in academic disciplines, Biglan's typology is also useful in terms of the degree of paradigmatic development found in academic disciplines, a construct referred

to as the "hard-soft" dimension. This dimension is derived from the extent to which members of a discipline share beliefs about theories, methods, and techniques of the discipline.

Some general characteristics found along the *hard-soft* dimension of Biglan category is that scholars in hard disciplines report greater collaboration with faculty members on teaching activities, are more likely to work with people on research activities, and produce significantly greater number of journals with co-authors than with colleagues in soft disciplines (Biglan, 1973a; 1973b). Scholars in hard fields tend to rely on teaching and learning activities that are focused, fixed, and linear compared with those in soft fields whose focus is more on open interpretation, reflective, and non-linear patterns (Eimers, 1999; Neumann, Parry, & Becher, 2002).

While scholars in soft fields indicate a greater preference for teaching and tend to spend more time on teaching, scholars in hard fields have a greater preference for research and tend to spend more time on this activity. In terms of research output, those associated with hard fields typically produce more journal articles but fewer monographs than those in soft areas (Biglan, 1973a; 1973b). While scholars from hard fields have greater collaboration with others on research and consultancy work, those in soft fields tend to focus more on activities which enhance teaching, scholarly knowledge, and professional practice (Eimers, 1999; Neumann, Parry, & Becher, 2002).

Another construct that emphasizes the degree of application is referred to as the *pure-applied* dimension. Scholars in applied fields prefer service activities to a greater extent than do their colleagues in pure areas. Applied scholars tend to publish more technical reports than pure scholars (Biglan, 1973a; 1973b). In terms of discipline knowledge, pure fields tend to make greater use of knowledge through verification of the correctness of a theory more so than in applied fields. In applied fields, by contrast, there is still a need to understand how processes work and how to apply them, but the difference is that the correctness or validity of a theory is often given as fact without any need to verify (Hativa, 1995).

In addition, the Biglan typology of academic disciplines can provide a better understanding as to how general employability skills are taught by faculty members or developed by university students. In order to do so, it may be useful to look at how various factors such as teaching goals, teaching practices, and the links between teaching and research are influenced by disciplinary differences.

Faculties in soft fields tend to place greater emphasis to teaching goals such as providing a broad general education and knowledge (Gaff & Wilson, 1971). Lattuca and Stark (1995) found that hard disciplines tend to emphasize cognitive concerns related to learning of facts, principles, and concepts. This contrasts with soft fields which place greater importance to effective critical thinking skills.

There are also variations between hard and soft disciplines in terms of teaching approaches, curriculum planning, and classroom teaching strategies. In soft disciplines, Stark, Lowther, Bentley, and Martens (1990) found that greater focus is placed on curriculum planning that is student-centred. Awareness of student's growth and development, and learning needs are more prevalent in soft fields rather than in hard fields. Further, faculty in soft fields rely more on classroom behaviors which are discursive (Gaff & Wilson, 1971) such as discussions, group work, and relating course topics to other discipline areas.

Soft fields prefer an emphasis on oral and written communication skills and active learning as methods of pedagogy (Lattuca & Stark, 1995). Faculty in soft disciplines are more likely than those in the hard disciplines to rely on scholarly-based activities that focus on current journal readings as part of their course outlines.

Finally, Braxton (1995) demonstrated that differences between soft and hard fields of study impact on the nature of undergraduate education. Those connected with soft fields value student character development, emphasize critical thinking skills, and other higher-order thinking skills (such as synthesis and analysis), and emphasize student-centred learning (Chickering & Gamson, 1987). Consequently, Braxton argued that efforts to improve undergraduate education are more likely to be successful in soft fields rather than hard fields.

Disciplinary differences and general employability skills: Astin framework.

The impact of post-secondary educational experiences faced by university students depend on three areas of academic and intellectual development. They are academic achievement, educational attainment, and cognitive development (Astin, 1993). It is the latter area (cognitive development) that is the focus of attention in this section of the Review of Literature because it has the most relevance to understanding gains in general employability skills faced by university students. Typically, one's cognitive development is measured by whether there have been improvements in knowledge and intellectual skills over time.

Astin (1993) examined the before and after assessments of student's own cognitive development from a list of eleven general skill areas. Astin found that those who majored in certain academic disciplines reported either positive or negative self-reported gains along the list of eleven general skills identified by undergraduates. The list of eleven skill areas were: general knowledge, knowledge of the discipline, critical thinking, problem solving, writing skills, foreign language skills, public speaking, leadership abilities, interpersonal skills, preparation for professional or graduate school, and job-related skills.

One way to measure student's cognitive development is through self-reported gains on a variety of general employability skills. The results of Astin's study are summarized below:

Table 2: Student Self-Reported Growth in Skill Area by Discipline

Skill Area	*Positive*	*Negative*
General Knowledge	Sciences History	Education
Knowledge of Discipline	Education Nursing	---
Critical Thinking	Humanities	---
Problem Solving	Engineering Physical Sciences	Education Arts (Fine Arts)
Writing Skills	Humanities Psychology Social Sciences Arts (Fine Arts)	Engineering
Foreign Language Skills	Social Sciences Arts (Fine Arts) Humanities	Engineering Nursing Health Professions
Public Speaking	Education	Sciences
Leadership Abilities	Physical Sciences	Humanities English
Interpersonal Skills	---	Business
Preparation for Professional Or Graduate School	Sciences	Agriculture
Job Related Skills	Nursing Education Engineering	Social Sciences Biological Sciences

Note. (---) = not reported

In the context of Biglan's taxonomy, Astin's work on cognitive development and the post-secondary educational experiences of undergraduates found that:

- those majoring in the humanities (soft-pure) had positive gains in skills development related to critical thinking and writing, but negative relationship in leadership skills.
- those majoring in the social sciences (soft-pure) reported positive gains in foreign language skills, but negative relationship in job-related skills.
- those majoring in engineering (hard-applied) reported positive gains in problem-solving skills and job-related skills. Negative relationship in writing skills were reported for those in engineering.
- those majoring in education (soft-applied) reported positive gains in skills and knowledge of the disciplines but negative growth in skills related to general knowledge and problem solving.
- those majoring in fine arts (soft-applied) reported positive growth in writing skills and foreign language skills but negative growth connected with problem-solving skills. (Astin, 1993, p.241-243)

General employability skills and undergraduate education practices.

The distinctions between academic disciplines along the soft-hard, pure-applied categories developed by Biglan demonstrate the impact that such differences may have on general employability skills development. Students generally recognize the importance and need to develop written and oral communication skills, problem-solving skills, and time management skills regardless of academic discipline. The development of these skills contributes to effective teaching and positive classroom dynamics and to overall satisfaction with university learning experiences (Krahn & Bowlby, 1997).

Chickering and Gamson's (1987) framework for good practice in undergraduate education is useful in developing the employability skills of university students and in guiding faculty members to teach these skills (Chickering & Gamson, 1987). Encouraging contacts with students and faculty, developing cooperation among students, and using active learning techniques are effective strategies to foster positive learning outcomes and enhanced skills development. According to Chickering and Gamson (1987), frequent student and faculty contact both in and out of the classroom setting can influence student motivation and involvement. Working in teams through cooperation among fellow classmates is another good practice of undergraduate education. Effective learning, according to Chickering and Gamson is collaborative and social, not competitive and isolated.

Faculty members will often mention that learning is not a spectator sport. Students who go beyond passive learning (simply memorizing facts and concepts) and relate concepts to past experiences and to new contexts will help to foster their own skills development. Working in teams and engaging in classroom discussions also help develop student's critical thinking skills. Sharing one's own ideas and responding to others' reactions can sharpen individuals' critical thinking skills, logical reasoning skills, and oral communication skills, for example (Chickering & Gamson, 1987).

As well, activities outside the classroom, such as internships and cooperative education programs, contribute to exposing the students to some aspects of the workplace. As an applied learning method, internships and cooperative programs enable students to experience firsthand what the actual work environment is like. Ultimately, this attaches greater meaning to the students' academic program, engages students in learning, and provides opportunities to examine career possibilities and to develop appropriate employability skills (Grosjean, 2003).

In essence, good practice in undergraduate education can help foster the development of general employability skills, regardless of whether the program is liberal arts or vocational in scope, or type of student population. Chickering and Gamson argued that students and faculty members hold key responsibilities for improving undergraduate education. Students ought to take ownership of their own learning while faculty members ought to have a better understanding of how their teaching practices influence student

learning. As Chickering and Gamson noted, an undergraduate education should ideally prepare students "to understand and deal intelligently with modern life" (Chickering & Gamson, 1987, p. 3). Their seminal work has created an avenue to support appropriate employability skills development.

Summary of Review of Literature

An understanding of the definition of general employability skills used by various groups such as the Conference Board of Canada's *Employability Skills Profile*, Human Resources Development Canada's *Essential Skills*, or the United States' *SCANS* framework provides a useful starting point to answer the research questions in this study. A preliminary examination of the definition of employability skills in both Canada and the United States resulted in clustering of general skills into roughly similar categories.

In the various studies and frameworks reviewed in this Chapter, there is a general acceptance by employers, university graduates, and faculty members of the need for appropriate employability, or non-technical, skills. Oftentimes, however, employers have expressed contradictory demands for employability skills, typically inflating their expectations while placing undue hardship on the education system for ensuring that university graduates are fully equipped with the necessary knowledge, skills, and abilities required of the workplace (Darrah, 1994; McLaughlin, 1992; Taylor, 1998). This statement is often made while blaming the educational system for not producing quality university graduates with the desired set of skill requirements necessary for the changing workplace.

This chapter has utilized the Biglan framework of academic disciplines along the soft-hard and pure-applied dimensions to address whether disciplinary differences impact the perceptions of university graduates and faculty members on the types of general employability skills developed. In the next chapter, the methodological issues of not only the Biglan framework, but also of the survey instruments and data analyses used in the research, will be discussed in more detail.

Research Questions

Based on the literature review presented in this chapter, the following research questions were addressed in the study:

1. Do student perceptions of their development and use of general employability skills at a single university differ across academic disciplines reflected in Biglan categories?

2. What kinds of general employability skills do faculty members from different academic disciplines reflected in Biglan categories at a single university judge as important to teach students?

3. Do faculty member perceptions about the development of general employability skills at a single university differ across academic disciplines reflected in Biglan categories?

Chapter Three: Methodology

The purpose of this study was to examine whether there are disciplinary differences in perceptions between recent university graduates and faculty members across academic disciplines on the range and types of general employability skills developed in undergraduate programs.

Research Questions Revisited

To better understand the impact of disciplinary differences on learning outcomes with respect to employability skills, this study aimed to fill a gap in the current literature by: (a) comparing student perceptions of their own development of a variety of general employability skills across academic disciplines reflected in Biglan categories, and (b) comparing faculty member perceptions of the development of general employability skills in courses across academic disciplines reflected in Biglan categories.

Consequently, the study addressed a number of research questions:

1. Do student perceptions of their development and use of general employability skills at a single university differ across academic disciplines reflected in Biglan categories?

2. What kinds of general employability skills do faculty members from different academic disciplines reflected in Biglan categories at a single university judge as important to teach students?

3. Do faculty member perceptions about the development of general employability skills at a single university differ across academic disciplines reflected in Biglan categories?

Selection of Fields of Study

Historically, most institutions adapt program areas to include such categories as the social sciences, humanities, natural sciences, and professional programs (Gaff & Wilson, 1971). In order to compare differences in perceptions of recent undergraduates and faculty members across academic disciplines and program areas, a suitable framework for categorizing disciplines was required.

While there were several disciplinary frameworks considered (Biglan, 1973a; 1973b; Carnegie Foundation, 1987; Statistics Canada, 1996), the chosen framework was based on the work of Biglan. The advantages and disadvantages of the Biglan framework were critically assessed. Some aspects of this assessment are described below in order to provide a context as to how academic disciplines were categorized in this study and its relation to the purpose and research questions set out in the study.

Based on the relationship between subject matter to the structure and output of university departments, Biglan (1973a; 1973b) proposed three scales on which academic disciplines can differ: *hard-soft* (based on the existence of a paradigm within the discipline), *pure-applied* (based on emphasis on application), and *life-nonlife* (based on concern with life systems). As discussed in Chapter Two, the three scales reflect the balance

between teaching and research activities and in its emphasis on teaching effectiveness and research publication record.

Biglan's classification of academic disciplines can be broken down into four categories:

Table 3: Examples of Academic Disciplines by Biglan Categories

CLASSIFICATION	*CATEGORY*	*EXAMPLES*
HARD-PURE	Natural Sciences	Chemistry, Mathematics, Physics
SOFT-PURE	Humanities & Social Sciences	English, Sociology, Economics
HARD-APPLIED	Science-Based Professions	Engineering, Agriculture
SOFT-APPLIED	Social Professions	Education, Nursing

Because of the ease of replication and validation used in other similar educational studies, clustering along Biglan categories provided better comparability and consistency across both faculty and graduate survey instruments when examining disciplinary differences in perceptions of recent university graduates and faculty members on the development and teaching of employability skills.

Population and Setting of the Study

In Manitoba, there are seven publicly-funded post-secondary institutions (Council on Post Secondary Education, 2002). Four of the seven provide university education – namely, the University of Manitoba (which also includes College Universitaire de St-Boniface), the University of Winnipeg, and Brandon University. The remaining three post-secondary institutions are

college-based: Red River College, Assiniboine Community College (in Brandon), and Keewatin Community College (in The Pas).

The University of Manitoba, located in the capital city of Winnipeg, is the largest of all Manitoba universities with a student population of 25,000. According to the Maclean's categorization of universities (Dowsett-Johnston, 2002), this university is considered "medical-doctoral" with a heavy emphasis on teaching and research at both the undergraduate and graduate program levels. The University of Manitoba offer programs at the undergraduate and graduate levels, including medical and doctoral programs.

Because the purpose and focus of a university education is becoming more blurred, attention was focused on universities and not colleges in this study. Typically, the college system focuses on applied programs and vocational training. As a result, it often has closer ties to both industry and the labour market.

In this study, the focus was on a single university in Manitoba. In particular, the University of Manitoba was selected because of its wide range of programs and departments as well as its diversity of both student and faculty populations.

The University of Winnipeg is "primarily undergraduate" (Dowsett-Johnston, 2002) and largely focuses on undergraduate education with relatively few graduate programs. Its area of teaching emphasis is primarily in the liberal arts offering programs in the humanities and social sciences. In addition, the University of Winnipeg offers few professional-level programs in

education and in business as well as Master-level programs in disciplines such as history and theology.

The smallest of the three universities, Brandon University, is situated in the southwest corner of Manitoba in the city of Brandon. Also a "primarily undergraduate" university (Dowsett-Johnston, 2002), this institution provides undergraduate education in the arts and sciences as well as programs in music, education, and rural development.

While there has been some research utilizing Biglan categories in understanding disciplinary differences (Braxton, 1995; Cashin & Downey, 1995), little known research has been conducted that examines how disciplinary differences influence student learning and faculty teaching in terms of the development of general employability skills at university.

Hence, using data from a single university in Manitoba (i.e., University of Manitoba), the purpose of the study was to examine the impact of disciplinary differences on student and faculty perceptions of general employability skills developed. The research questions identified previously were addressed in this study.

Examinations of disciplinary differences in general skills development often fail to consider student perceptions of their own educational development. Learning environments typically influence students' self-perceptions (Bandura, 1993; Pascarella & Terenzini, 1991). Research using students' own perceptions of their development in a variety of general employability skills (such as critical thinking and oral communications) is key

to understanding how specific disciplines differentially influence students' learning outcomes.

Likewise, little research has been gathered on understanding how faculty members' own perceptions of teaching a variety of general skills in the classroom can help to not only enhance the cognitive development of student learning, but also to shape the university curriculum. A better understanding of the goals of faculty members is required to help alleviate concerns by external stakeholders such as employers, governments, and the general public as to the quality of education that is being delivered to students and recent university graduates.

Research Design Issues

The particular method of inquiry used in this study was survey research. Survey research was appropriate for this study because little is known about the perceptions of both university graduates and faculty members regarding the importance of employability skills and how these skills are developed across academic disciplines. One purpose of survey research is to generalize from a sample to a population so that inferences can be made about some characteristic, attribute, or behaviour pertaining to this population (Babbie, 1990; Fowler, 1988). Generalizability is the extent to which the results of one study can be applied to other populations or situations (Gay & Airasian, 2000). As Gay and Airasian pointed out, typically in most studies, the chosen population is based on realistic choice (i.e., accessible population) and not on idealistic grounds (i.e., target population).

Quantitative research methods such as the use of surveys, in the form of either telephone surveys or mailed-in questionnaires, has as prime advantages a rapid turnaround in data collection and the ability to identify attributes of a population from a small group of individuals (Creswell, 2003). Surveys are also often undertaken to "obtain information about the preferences, attitudes, practices, concerns or interests of some group of people" (Gay & Airasian, 2000, p. 11). In this study, the principal data gathering instrument were telephone surveys for students (existing data instrument) and paper questionnaires for faculty members (researcher-designed instrument), respectively.

Sampling has historically been an important topic in the research methodology literature. All research, including both quantitative and qualitative methods, involve some type of sampling. As Miles and Huberman (1994) clearly stated, "you cannot study everyone everywhere doing everything." (p. 27).

The logic of quantitative sampling is that the researcher analyses data collected from a sample but ultimately would like to make inferences or statements about the whole target population from which the sample is drawn. The data collected are from the sample and analyzed to produce the study's findings. The next step is to generalize the sample findings back to the general population. One key question to consider is how representative is the sample to the rest of the population. As a form of probability sampling, random selection is one useful method to achieve representativeness.

Respondents will be randomly selected, wherein each individual in the sample has an equal probability of being selected. The random sampling procedure is more rigorous (Creswell, 2003) than non-probability sampling techniques such as purposive or convenience sampling. With these latter techniques, potential respondents are chosen on the basis of one's own personal experience and convenience of location, for example. (Babbie, 1990; Fowler, 1988).

Researchers are often faced with the dilemma of determining the appropriate sample size to use in a study. If a sample is too small, the results and findings may not be generalizable to the entire population. The larger the sample, however, the more likely it is to find differences between groups and to generalize to the entire population.

Graduate Follow-Up Survey

Survey instrument.

In 1999, a survey research firm, Ipsos-Reid (formerly The Angus Reid Group), was commissioned by the Council on Post-Secondary Education and Manitoba's post-secondary institutions to conduct a telephone survey among recent post-secondary graduates. The Council on Post-Secondary Education (COPSE) is an arms-length provincial government agency of the Department of Advanced Education and Training in the province of Manitoba. The Council on Post-Secondary Education works to promote excellence and cooperation within the post-secondary education sector to meet the diverse educational needs of Manitobans (Council on Post-Secondary Education,

2002). The Council facilitates the coordination and integration of post-secondary services, reviews and approves university and college programming, develops policy, and promotes fiscal responsibility and accountability in the post-secondary system.

The Manitoba Graduates Follow-Up Survey was a telephone survey conducted with individuals who graduated in 1997 from all seven post-secondary institutions. The purpose of this comprehensive survey was threefold: (a) to learn more about how Manitobans can prepare for the labour market through an informed selection of a post-secondary program, (b) to gather information regarding graduate satisfaction with Manitoba's post-secondary programs and institutions, and (c) to assess the value of post-secondary education to Manitobans in a very concrete manner across the education system (Angus Reid Group, 1999). The Manitoba Graduates Follow Up Survey, consisting of approximately fifty to sixty questions, examined the labour market activities of Manitoba graduates and was conducted during the week of June 7th to June 11th, 1999.

Graduate follow-up surveys are one method to assess how well graduates are performing in the labour market (Angus Reid Group, 1999; Statistics Canada, 1996). Information captured from these surveys typically include the students' overall assessment of their university experiences and satisfaction with their program of studies. It also captures what skills were learned during their university education and how they relate to their current jobs. Finally, graduate follow-up surveys seek to find out student's current

employment status in the labour market and whether or not their present job correlates with their program major (Angus Reid Group, 1999; Statistics Canada, 1996).

In particular, a list of ten employability skills from two questions asked in the Manitoba Graduates Follow-Up Survey were used to address the research problem (see Appendix A). The ten employability skills included: writing skills, computer skills, oral communication skills, mathematical skills, research skills, decision-making skills, critical thinking skills, ability to evaluate or critique statements, teamwork skills, and lifelong learning skills. Using a Likert-type scale, the survey questions asked respondents the extent to which this set of employability skills was developed in their program of study and used in the workplace (i.e., two years after graduation). Further, the Manitoba Graduates Follow-Up Survey contained demographic information that can be extracted for possible analyses. These variables included gender, age, program of study, and type of university graduate.

Data collection procedures.

The list of graduating students from 1997 was supplied to COPSE from each of the participating post-secondary institutions and, in turn, was given to the Angus Reid Group. A total of 7,758 records (or student names) were received from COPSE, representing all 1997 graduates from the seven post-secondary institutions. After the data were cleaned up extensively (e.g., missing records, invalid telephone numbers, etc.), a total of 3,642 graduates had been telephone interviewed for the Manitoba Graduates Follow-Up Survey.

The graduate survey data used in the study is an example of secondary analysis. This is the term used in the re-analysis of previously collected and analyzed data (Punch, 1998). There are some clear advantages to working with an existing body of data, including cost, time, quality, and the accessibility of populations. However, some methodological difficulties exist such as the possibility that original questions and data are not related to the present research problem. Procter (1996) stated one of the greatest challenges in secondary analysis lies in finding ways of forcing the data, collected by someone else and quite often with entirely different theoretical and analytical orientations, to answer your questions. This challenge does not pose a severe problem in the study as only two survey questions from the entire graduate follow-up survey were extracted for analysis. One question asks Manitoba graduates for their perceptions of the extent to which they developed a range of employability skills in their program of studies. The second question asked to what extent graduates used such skills in the workplace (i.e., two years after graduation).

The Council on Post-Secondary Education and the participating universities and colleges in Manitoba jointly own the graduate follow-up survey dataset. A letter was sent to the Office of Institutional Analysis at the University of Manitoba in December 2003 to seek permission for the release of a portion of this comprehensive dataset, namely, data related to the University of Manitoba (see Appendixes B and C). Permission was granted from the Office of Institutional Analysis in February 2004. The release of the

Manitoba Graduate Follow-Up Survey dataset enabled analysis to be performed on the first research question.

Faculty Survey

Survey instrument.

In addition to the existing undergraduate survey, the researcher developed a parallel survey, *Faculty Survey on Employability Skills*, to address the research questions set out in the study (see Appendix D). This survey sought to determine whether disciplinary differences across academic disciplines reflected in Biglan categories influence faculty perceptions of the importance of teaching a number of specific employability skills to students and the degree to which these skills are developed. This faculty survey is adapted from a recent American dissertation conducted by Williams (1998). The purpose of Williams' survey was to determine what extent employability skills were integrated by faculty members throughout the undergraduate business curriculum at five tertiary institutions in the United States.

In this study, however, the faculty survey provided comparability of results with the recently completed graduate follow-up survey. This researcher-designed faculty survey was short and allowed faculty members to respond to a set of attitudinal statements based on the list of ten general employability skills. These questions were similar to those asked of recent university graduates in the graduate follow-up survey so that parallel analyses can be made on both datasets. The survey was field-tested beforehand with a sample of faculty members from a variety of departments at the University

of Manitoba during the summer of 2003 to establish face validity and to possibly improve on the questions and format (Creswell, 2003).

In particular, the faculty survey was broken down into four sections asking the following attitudinal questions:

- Rate the extent to which you believe the following list of ten general employability skills are *important* to teach in the curriculum.
- Rate the extent to which you *integrate* the ten general employability skills in your own teaching.
- Rate the extent to which you believe university students have *opportunities to develop* the ten general employability skills over time, in first, second, and third year courses.
- Rate the extent to which you believe university graduates *possess* the selected ten general employability skills.

In all sections of the faculty survey, a simple 6-point Likert-rating scale was adopted (with section categories ranging from "not important" to "extremely important"; from "not integrated" to "fully integrated"; from "no opportunities to develop" to "full opportunities to develop"; and from "not at all possessing" to "fully possessing", respectively) to measure the items on the survey instrument. Approximately 50 to 70 statements were asked in the survey of faculty members in which they simply circled their responses. Other pertinent demographic information about faculty members such as

department affiliation, academic rank, and year of employment, were gathered as part of the survey. While academic rank, year of employment, and gender can be useful predictors of employability skills development, for the purposes of this study, these three variables were not used in subsequent data analyses. Such demographic information, however, were presented in the form of descriptive statistics only.

In answering the pair of research questions asked of faculty members, a new survey instrument was developed, piloted, and then administered by the researcher. The faculty survey was designed to take, on average, 12 to 15 minutes to complete. One advantage of a researcher-designed faculty survey is the ability to generate responses specific to the research question. The richness of the data helps to facilitate data analysis and interpret the results.

However, some possible disadvantages may result. The researcher-designed survey may have the potential of reduced reliability and validity which may limit the applicability and usefulness of the study findings beyond the sample. The possibility of a lower response rate compared to other forms of data collection may lead to difficulties in generating valid conclusions. Further, the possibility also exists of the incongruence between what faculty members say they do and what they really do.

Data collection procedures.

Obtaining the list of names of faculty members at a single university in Manitoba can take several routes. Request can be made to the faculty union association or at the dean/director level of faculties or schools. Alternately, a

more direct approach could be to obtain a current telephone directory from the university institution or search the on-line people function from the university website, for example.

Hence, the approach used by the researcher to obtain a listing of faculty members was the on-line phone listing from the university website as it is likely the most current and up-to-date. Endorsements from key faculties and departments (e.g., by way of a memo from faculty deans to their faculty members) served to establish credibility, increase utility, and possibly enhance the response rate of the study (see Appendix E).

The researcher randomly selected participating departments, schools, and faculties from a single university in Manitoba. Academic disciplines were selected and slotted according to Biglan categories described earlier. The academic disciplines used in this study is shown in the following table:

Table 4: Academic Disciplines by Biglan Category

	HARD	**SOFT**
PURE	Botany	Economics
	Computer Science	English
	Geology	Geography
	Physics	History
	Zoology	Sociology
APPLIED	Agricultural and Food Sciences	Architecture
	Dentistry	Education
	Engineering	Law
	Management	Music
	Pharmacy	Nursing

Faculty members were invited to respond to the faculty survey following the protocol described in the next section. Faculty members who completed the survey but did not state a department, school, or faculty, on the survey itself were removed from subsequent data analyses.

During the 2003-2004 academic year, the number of full-time teaching staff at this university was 1208 (University of Manitoba, 2003). Based on the formula originally developed by Krejcie and Morgan (1970), for a given population size of faculty members at the University of Manitoba around 1000 and 1500, the minimum sample size required to ensure representativeness and generalizability of the results is between 275 and 300. After randomization of departments, schools, and/or faculties into Biglan categories, approximately 650 surveys were distributed to faculty members in total. Consequently, the number of returned surveys needed to ensure representativeness and generalizability is roughly between 275 and 300 respondents.

Data Collection Period

After the faculty survey was pre-tested, finalized, and ethical approval was received, data collection covered a three-month period from January to March 2004. The tailored design method (TDM) was used throughout the data collection period. The tailored design method, as suggested by Dillman (2000), is a four-contact sequence for conducting surveys. Its aim is to produce high quality information and high response rates. The contact sequence included a pre-notice letter (see Appendix F), original cover letter

and questionnaire (see Appendix G), reminder postcard (see Appendix H), and replacement questionnaire (see Appendix I). The pre-notice letters, questionnaires, reminder postcards, and replacement questionnaires were sent by inter-departmental mail to all faculty members within the randomly selected academic disciplines by the survey administrator. The faculty survey questionnaires were also returned by inter-departmental mail to the office of the survey administrator. Returned questionnaires were not sent back by e-mail as it would violate respondent confidentiality. Further, a statement of confidentiality was signed by the survey administrator at the start of the data collection period (see Appendix J).

The main feature of TDM is based on effective social exchange theory through knowledge of the population to be surveyed, respondent burden, and sponsorship (Dillman, 2000). The ideas of social exchange theory are applied to understand how and why respondents do or do not respond to survey questionnaires. In general, people are more likely to complete and return self-administered questionnaires if they trust that the benefits or rewards outweigh the costs. The TDM attempts to increase perceived rewards for responding, decrease perceived costs, and promote trust.

Applying the principles of TDM to the study, a pre-notice letter was sent a few days prior to survey distribution to all faculty members. A pre-notice letter helps to demonstrate the importance and value of the research study while achieving an effective response rate (Dillman, 2000). About three weeks after the original mailing of the questionnaire, a follow-up reminder

notice was sent out to those who have not yet responded. Three weeks after the follow-up mailing, a final letter and replacement survey was forwarded to those not responding. This administrative and data collection process covered a total of ten to twelve weeks.

Data Tabulation

Data collected from both the graduate follow-up survey and faculty survey contributed to data analyses by addressing the research questions set out in this study.

The ten general employability skills that are valued most by employers were selected as part of the data analyses:

Writing Skills – communicating thoughts, ideas, and information in writing

Computer Skills – ability to use keyboard and other computer related applications

Oral Communication Skills – ability to speak in oral form

Mathematical Skills – ability to perform basic operations such as adding, subtracting, multiplying, and dividing whole numbers

Research Skills – ability to gather and use ideas and information for research

Decision-Making Skills – ability to make choices and decisions from ideas and information

Critical Thinking Skills – ability to critically think about ideas and information

Ability to Evaluate or Critique Statements – ability to assess and judge ideas and information

Teamwork Skills – ability to work in groups of various sizes on tasks

Lifelong Learning Skills – desire to continually acquire new knowledge

The following null hypotheses for each of the ten general employability skill areas were addressed in the following format:

1. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their ability to communicate thoughts, ideas, and information in writing.

2. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their ability to use keyboard and other computer-related applications.

3. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their ability to speak in oral form.

4. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their ability to perform basic operations such as adding, subtracting, multiplying, and dividing whole numbers.

5. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their ability to gather and use ideas and information for research.

6. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their ability to make choices and decisions from ideas and information.

7. There is no significant difference in the perceptions of students

across academic disciplines reflected in Biglan categories in their ability to critically think about ideas and information.

8. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their ability to assess and judge ideas and information.

9. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their ability to work in groups of various sizes on tasks.

10. There is no significant difference in the perceptions of students across academic disciplines reflected in Biglan categories in their desire to continually acquire new knowledge.

Likewise, for faculty members, a similar set of ten null hypotheses were tested. An example of the type of null hypothesis that was tested for each research question is as follows:

> There is no significant difference with the kinds of general employability skills faculty members from across academic disciplines reflected in Biglan categories find important to teach students ...
>
> And
>
> There is no significant difference with the perceptions of faculty members across academic disciplines reflected in Biglan categories on the importance of ...
>
> ... Writing Skills

... Computer Skills

... Oral Communication or Speaking Skills

... Mathematical Skills

... Research Skills

... Decision-Making Skills

... Critical Thinking Skills

... Ability to Evaluate or Critique Statements

... Teamwork Skills

... Lifelong Learning Skills

The variables used in the study and as part of the data analysis were as follows:

Table 5: List of Variables Used in Study

DEPENDENT VARIABLE	INDEPENDENT VARIABLE
Writing Skills	Soft-Hard Biglan category
Computer Skills	Pure-Applied Biglan category
Oral Communication Skills	Course Level (1st, 2nd, 3rd)
Mathematical Skills	
Research Skills	
Decision-Making Skills	
Critical Thinking Skills	
Ability to Evaluate or Critique Statements	
Teamwork Skills	
Lifelong Learning Skills	

Other demographic variables collected across both survey instruments included gender and age. In addition, for the faculty survey, information on academic rank and work experience were collected.

Analysis of Data: Comparing Graduate and Faculty Surveys

Data from the graduate follow-up survey and faculty survey questionnaires were coded and entered using the statistical software program, *Statistical Package for the Social Sciences (SPSS), Release 11.5* (SPSS, 2003).

The data from both the graduate follow-up survey and faculty survey were analyzed in the following manner:

1. Comparing student perceptions of their own development of a variety of general employability skills across academic disciplines reflected in Biglan categories.

2. Comparing faculty member perceptions of the development of general employability skills in courses across academic disciplines reflected in Biglan categories.

For each of the items listed above, descriptive statistics included computing the frequencies and its corresponding percentages to a list of ten general employability skills for a particular survey question. Measures of central tendency included the mean and standard deviation for each of the ten employability skills identified in the survey.

In addition, a series of univariate *F*-tests were used to test the research hypotheses in this study. In particular, a 2x2 completely crossed factor analysis of variance procedure with interaction was used. The 0.05 level of probability was selected to determine significance. Several ANOVA procedures were carried out based on the sections captured in the survey.

For each of the ten general employability skills, a series of null hypotheses were tested for each research question as follows:

> There is no significant difference in the perceptions of faculty members across academic disciplines reflected in Biglan

categories in the importance of teaching employability skills to students ...

In total, six ANOVA procedures were carried out addressing differences in faculty member perceptions across academic disciplines corresponding to the following sections of the faculty survey:

- importance of teaching employability skills
- integration of employability skills in own teaching
- opportunities for students to develop employability skills in 1st year courses
- opportunities for students to develop employability skills in 2nd year courses
- opportunities for students to develop employability skills in 3rd year courses
- overall possession of employability skills of university graduates

The two main factors were Hard-Soft and Pure-Applied respectively. Each factor consisted of two levels (i.e., hard and soft fields for first factor, Hard-Soft; pure and applied fields for second factor, Pure-Applied). Testing for significant differences were conducted to determine whether academic disciplines reflected in Biglan categories as well as level of course are useful predictors of general employability skills developed by students and faculty members at a single university in Manitoba.

In addition to testing for significant differences, effect size estimates were reported and calculated based on Cohen's *d* statistic. This statistic is

based on the strength of the relationship between the two factors of Hard-Soft and Pure-Applied. Cohen's *d* statistic is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the factor relationship can be approximated into small effects ($d \approx 0.2$), medium effects ($d \approx 0.5$), and large effects ($d \approx 0.8$).

Ethical Considerations

Guidelines for dealing with the ethics of using human subjects were adhered to throughout all stages of this study, as stated in the ethics protocol (from participant recruitment to data collection, data entry, data analysis, and subsequent reporting of the results and findings).

Specific issues related to informed consent, privacy and confidentiality, potential risks and benefits, remuneration to participants, and vulnerable populations were observed strictly according to ethical guidelines (as established by the University of Manitoba Education/Nursing Research Ethics Board and the Tri-Council Policy Statement).

A detailed letter of intent was provided to study participants outlining general information about the background to the research study, its aims, potential benefits, and the importance of their participation in the project. Second and third mailings were sent to participants who did not respond to the first mailing. All potential respondents had the option of declining to participate at any point in the study.

Regarding privacy and confidentiality, the survey questionnaires were identified only by a set of coded numbers. Although faculty members may be

subject to easy identification by applying simple exclusion criteria (such as size of department, gender balance within a department, or type of program or discipline area in which he or she is employed), this was seen as a recognized potential risk. The returned surveys were assigned codes for the purpose of facilitating the process of tracking records during data analysis. The third-party person who administered the survey did not link these numbered codes to any specific person or mailing lists. To ensure appropriate confidentiality, returned surveys were not sent back by electronic mail, but rather by inter-departmental mail.

The returned questionnaires will be kept on file for ten years as per ethics protocol and destroyed upon completion of this period. The identity of university graduates and faculty members along with their responses were kept confidential at all times. No names were identified on either surveys as only a coded set of identification numbers was used. However, the third-party person had access to the names of faculty members tied to their coded numbers only for administrative purposes such as sending out replacement questionnaires, for example. The analyses, results, and findings of the research study were presented in aggregate form, rather than on an individual basis.

Chapter Four: Findings

Chapter Four presents findings about the initial descriptive statistics generated from the graduate survey and faculty survey used in the study. It also presents a systematic analysis of the questions asked in both the graduate survey and faculty survey. Finally, inferential statistics based on the form of the null hypotheses tested and the results of the data analyses used to test the null hypotheses will be presented in this chapter. Analysis of variance (ANOVA) tables for both the graduate survey and faculty survey can be found in Appendix K.

Response Rate

Throughout the data collection period from January 2004 to March 2004, the tailored design method (TDM) was used. The tailored design method, as suggested by Dillman (2000), is a four-contact sequence for conducting surveys aimed to produce high quality information and high response rates. The contact sequence includes pre-notice letter, questionnaire, reminder postcard, and replacement questionnaire. A copy of the pre-notice letter, cover letter, faculty survey, postcard reminder, and final reminder letter, can be found in the Appendix.

Applying the principles of TDM specifically to the research study, a pre-notice letter was sent to 647 faculty members across 20 departments, schools, and faculties at the University of Manitoba on January 15, 2004. About one week later, the original survey package consisting of a 2-page cover letter and 8-page faculty survey was sent to faculty members. On

February 20, 2004, about three weeks after the original mailing, a 1-page reminder notice was sent to those who have not yet responded. On March 15, 2004, three weeks after the reminder notice, a final reminder letter and replacement survey was sent to those not responding. The data collection period ended on March 31, 2004. This administrative and data collection process covered a total of ten to twelve weeks.

A breakdown of the numbers of faculty surveys sent and received after each event, including the response rates is presented below:

Table 6: Faculty Surveys Sent and Received

Event	Period	# of Surveys Received	# of Surveys Received (cumulative)
Pre-Notice Letter	January 15/04	---	---
Original Mailout (2-page Cover Letter and 8-page Faculty Survey)	January 26/04 to February 19/04	146	146 / 647 (23%)
Postcard Reminder Letter	February 20/04 to March 14/04	56	202 / 647 (31%)
Final Mailout (1-page Cover Letter and Replacement Survey)	March 15/04 to March 31/04	83	285 / 647 (44%)
End of Data Collection	March 31/04	---	---

Of the 285 surveys returned, 29 were deemed completely refused by respondents. As a result, the number of valid surveys used in the data analyses was 256. Nevertheless, a response rate of 40% was achieved.

Demographic Profile of Respondents: University Graduates

For the purpose of this study, only university graduates from a single institution were selected. Furthermore, only University of Manitoba graduates from the 20 randomly selected departments, schools, or faculties were included as part of the findings presented in this chapter. Basic demographic information such as gender, field of study, and Biglan category were captured.

In total, there were 1057 graduates from the University of Manitoba in the 20 departments, schools, or faculties randomly selected for inclusion in this study. The gender breakdown of graduate survey respondents were 52% female (n=548) and 48% male (n=509).

Responses of university graduates came from the following departments, schools, and faculties:

Table 7: Survey Respondents of University Graduates

Biglan Categories	Frequency	Percent	Fields of Study	Frequency	Percent
Hard-Pure	91	8.0%	Botany	12	1.1%
			Computer Science	48	4.5%
			Geology	4	0.3%
			Physics	8	0.7%
			Zoology	19	1.8%
Soft-Pure	200	19.1%	Economics	38	3.8%
			English	41	3.9%
			Geography	30	2.8%
			History	49	4.6%
			Sociology	42	4.0%
Hard-Applied	375	35.5%	Agriculture	81	7.7%
			Dentistry	12	1.1%
			Engineering	92	8.7%
			Management	167	15.8%
			Pharmacy	23	2.2%
Soft-Applied	391	37.0%	Architecture	20	1.9%
			Education	208	19.7%
			Law	51	4.8%
			Music	24	2.3%
			Nursing	88	8.3%
TOTAL	1057	100.0%		1057	100.0%

Demographic Profile of Respondents: Faculty Members

Faculty members who completed the survey provided basic demographic information that included their department affiliation, academic rank, gender, and year of first employment at the University of Manitoba.

Since an important aspect of this study was to examine disciplinary differences in the development of general employability skills, the researcher

also translated survey respondent's department affiliation into one of four Biglan categories; namely, Hard-Pure (HP), Soft-Pure (SP), Hard-Applied (HA), and Soft-Applied (SA). Throughout this chapter and the next chapter, the data results, data analyses, interpretations, and discussions were cast in terms of broad Biglan categories. No attempts are made to identify specific departments, schools, or faculties, because some units may have few faculty members who responded to the survey. Further, the purpose of the study is not to rank nor identify departments, schools, or faculties. As a result, the level of analyses were kept at the Biglan categories.

Department affiliation was one demographic information asked of respondents. Interestingly, 38 faculty members (or 13%) did not respond to this field. One reason could be the sensitivity and confidentiality of naming the department especially when the size of department was small. The number of surveys sent to, and received by, faculty members were as follows:

Table 8: Number of Surveys Sent to Faculty Members

Biglan Categories	Frequency	Percent	Department, School, or Faculty	Frequency	Percent
Hard-Pure	94	14.5%	Botany	14	2.0%
			Computer Science	26	4.0%
			Geology	12	1.9%
			Physics	22	3.4%
			Zoology	20	3.0%
Soft-Pure	119	18.4%	Economics	22	3.4%
			English	30	4.6%
			Geography	18	2.8%
			History	24	3.7%
			Sociology	25	3.9%
Hard-Applied	254	39.2%	Agriculture	79	12.2%
			Dentistry	39	6.0%
			Engineering	69	10.7%
			Management	51	7.9%
			Pharmacy	16	2.5%
Soft-Applied	180	27.8%	Architecture	38	5.9%
			Education	48	7.4%
			Law	22	3.4%
			Music	19	2.9%
			Nursing	53	8.2%
TOTAL	647	100.0%		647	100.0%

Table 9: Number of Surveys Received From Faculty Members

Biglan Categories	Frequency	Percent	Department, School, or Faculty	Frequency	Percent
Hard-Pure	42	17.0%	Botany	6	2.4%
			Computer Science	7	2.8%
			Geology	7	2.8%
			Physics	10	4.1%
			Zoology	12	4.9%
Soft-Pure	46	18.6%	Economics	11	4.5%
			English	13	5.3%
			Geography	8	3.2%
			History	8	3.2%
			Sociology	6	2.4%
Hard-Applied	90	36.4%	Agriculture	28	11.3%
			Dentistry	17	6.9%
			Engineering	23	9.3%
			Management	16	6.5%
			Pharmacy	6	2.4%
Soft-Applied	69	27.9%	Architecture	18	7.3%
			Education	18	7.3%
			Law	4	1.6%
			Music	2	0.8%
			Nursing	27	10.9%
TOTAL	247	100.0%		247	100.0%

The above total excludes the 38 respondents who did not state a department, school, or faculty affiliation.

Of the valid faculty surveys received, the gender breakdown of respondents was 65% male (n=162) and 35% female (n=89).

Survey respondents came from a wide range of academic ranks, ranging from lecturer/instructor to full professor. The breakdown by academic rank was as follows:

Table 10: Academic Rank of Respondents

Rank	Frequency	Percent
Lecturer/Instructor	42	17%
Assistant Professor	70	28%
Associate Professor	51	20%
Professor	88	35%
Total	251	100%

Respondents were asked to state their year of employment at the University of Manitoba. A wide range of years were given yielding useful information on the range of experience. To capture the years of experience required simple recalculation of the years into 10-year intervals. The years of experience data provided by survey respondents were as follows:

Table 11: Years of Experience at the U of M

	Frequency	Percent
Less than 10 years experience	115	47%
Between 11 and 20 years experience	51	21%
Between 21 and 30 years experience	42	17%
More than 30 years experience	36	15%
Total	244	100%

The totals may not add up to 285 partly because some respondents did not answer the question related to academic rank or years of experience.

Inferential Statistics: Graduate Survey Respondents

Cell means and standard deviations for each section of the graduate survey will be presented initially. A series of univariate *F*-tests were used to test the research hypotheses in this study. In particular, a 2x2 completely crossed factor analysis of variance procedure with interaction was used, with an 0.05 level of probability selected to determine significance. Several ANOVA procedures were carried out based on the results captured in the graduate survey. As well, effect size estimates were reported.

The two main factors were Hard-Soft and Pure-Applied respectively. Each factor consisted of two levels (i.e., hard and soft fields for first factor, Hard-Soft; pure and applied fields for second factor, Pure-Applied)

For each of the ten general employability skills, a series of null hypotheses were tested for each research question as follows:

> There is no significant difference in the perceptions of university graduates across academic disciplines reflected in Biglan categories in their development of employability skills related to ...

Consequently, the ten dependent variables were: writing skills, computer skills, oral communication skills, mathematical skills, research skills, decision-making skills, critical thinking skills, evaluation skills, teamwork skills, and lifelong learning skills.

Table 12: Means and Standard Deviations of University Graduates Perceptions about General Employability Skills Development by Biglan Categories

Development of Employability Skills across Biglan Categories

To what extent did your program develop the following skills?

1. Not at all
2. Not very much
3. Somewhat
4. A great deal

Variable	Mean	Standard Deviation	N
Writing			
Hard	2.920	0.808	463
Soft	3.346	0.752	589
Pure	3.148	0.873	290
Applied	3.162	0.779	762
Total Sample	3.158	0.805	1052
Computer			
Hard	3.100	0.814	466
Soft	2.500	0.955	553
Pure	2.667	1.014	274
Applied	2.814	0.911	745
Total Sample	2.775	0.942	1019
Oral Communication			
Hard	3.174	0.841	463
Soft	3.305	0.736	590
Pure	2.920	0.903	289
Applied	3.371	0.698	764
Total Sample	3.247	0.786	1053

Variable	Mean	Standard Deviation	N
Mathematical			
Hard	3.405	0.726	456
Soft	2.701	1.026	466
Pure	2.914	1.025	235
Applied	3.096	0.928	687
Total Sample	3.049	0.957	922
Research			
Hard	3.215	0.716	465
Soft	3.370	0.701	589
Pure	3.319	0.707	291
Applied	3.294	0.714	763
Total Sample	3.301	0.712	1054
Decision-Making			
Hard	3.364	0.662	466
Soft	3.199	0.719	587
Pure	3.131	0.705	288
Applied	3.325	0.690	765
Total Sample	3.272	0.699	1053
Critical Thinking			
Hard	3.433	0.640	466
Soft	3.383	0.727	589
Pure	3.453	0.638	291
Applied	3.387	0.708	764
Total Sample	3.405	0.690	1055
Evaluating Statements			
Hard	3.114	0.728	463
Soft	3.281	0.699	587
Pure	3.173	0.762	289
Applied	3.220	0.698	761
Total Sample	3.207	0.716	1050
Teamwork			
Hard	3.444	0.647	466
Soft	3.368	0.740	584
Pure	3.133	0.743	285
Applied	3.502	0.658	765
Total Sample	3.401	0.701	1050

Variable	Mean	Standard Deviation	N
Lifelong Learning			
Hard	3.210	0.735	466
Soft	3.346	0.769	586
Pure	3.336	0.707	291
Applied	3.266	0.775	761
Total Sample	3.286	0.757	1052

Table 13: Univariate *F*-Tests of Between-Discipline Effects on Development of Employability Skills in Program of Study

Dependent Variable	Main Effects		Interaction Effect
	HARD-SOFT	PURE-APPLIED	HARD-SOFT x PURE-APPLIED
Writing Skills	S>H	---	---
Computer Skills	H>S	---	---
Oral Communication Skills	S>H	A>P	---
Mathematical Skills	H>S	---	---
Research Skills	S>H	---	---
Decision-Making Skills	H>S	A>P	---
Critical Thinking Skills	---	---	---
Evaluation Skills	S>H	---	---
Teamwork Skills	---	A>P	---
Lifelong Learning Skills	S>H	---	---

Note. Significant differences between discipline groups ($p<0.05$):

S>H mean scores higher for soft fields than hard fields

H>S mean scores higher for hard fields than soft fields

A>P mean scores higher for applied fields than pure fields

Dashed lines (---) denote non-significant differences between discipline groups.

No significant differences between discipline groups were found for the following employability skills: critical thinking skills.

Significant differences were found between disciplines along the following skills. Mean scores (*M*) listed below are based on the following survey scale ratings:

1. Not at all
2. Not very much
3. Somewhat
4. A great deal

Writing skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1048) = 86.743$, $p<0.05$. Graduates from Soft Fields (M=3.346) reported writing skills were developed between somewhat and a great deal, while graduates from Hard Fields (M=2.920) felt writing skills were developed somewhat.

Overall, graduates viewed the development of writing skills in their program of study as somewhat developed (M=3.158).

Computer skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1015) = 90.383$, $p<0.05$, such that graduates from Hard Fields (M=3.100) reported computer skills were somewhat developed more so than graduates from Soft Fields (M=2.500) who felt computer skills were developed between not very much and somewhat.

Overall, graduates perceived that computer skills were the least developed of all the ten employability skills (M=2.775).

Oral communication skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1049) = 34.048$, $p<0.05$, such that graduates from Soft Fields (M=3.305) viewed oral communication skills as developed between somewhat and a great deal compared with graduates from Hard Fields (M=3.174) who felt oral communication skills were somewhat developed.

In addition, there was a significant main effect for PURE-APPLIED, $F(1, 1049) = 102.883$, $p<0.05$, such that graduates from Applied Fields (M=3.371) reported oral communication skills in their program of study were developed between somewhat and a great deal compared with graduates from Pure Fields (M=2.920) who viewed oral communication skills as less than somewhat developed.

Mathematical skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 918) = 119.388$, $p<0.05$, such that graduates from Hard Fields (M=3.405) reported the development of mathematical skills in their program of study between somewhat and a great deal compared to graduates from Soft Fields (M=2.701) who rated mathematical skills below somewhat.

Research skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1050) = 17.658$, $p<0.05$, such that graduates from Soft Fields (M=3.370) reported research skills in their program of study was somewhat developed more so than graduates from Hard Fields (M=3.215).

Decision-making skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1049) = 4.319$, $p<0.05$, such that graduates from Hard Fields (M=3.364) reported the development of decision-making skills in their program of study between somewhat and a great deal compared with graduates from Soft Fields (M=3.199) who reported their development as somewhat.

Further, there was a significant main effect for PURE-APPLIED, $F(1, 1049) = 14.111$, $p<0.05$, such that graduates from Applied Fields (M=3.325) reported decision-making skills in their program of study was somewhat developed more so than graduates from Pure Fields (M=3.131).

Evaluation skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1046) = 15.178$, $p<0.05$, such that graduates from Soft Fields (M=3.281) reported evaluation skills were developed somewhat than graduates from Hard Fields (M=3.114).

Teamwork skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 1046) = 56.532$, $p<0.05$, such that graduates from Applied Fields (M=3.502) reported teamwork skills to be developed a great deal compared with graduates from Pure Fields (M=3.133) who viewed teamwork skills as somewhat developed.

Lifelong learning skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1048) = 7.811$, $p<0.05$, such that graduates from Soft Fields (M=3.346) reported lifelong learning skills were developed somewhat more so than graduates from study than graduates from Hard Fields (M=3.210).

Table 14: Effect Size Estimates for Development of Employability Skills

Variable	Hard-Soft		Pure-Applied	
Writing	0.53	*(S>H)	0.02	
Computer	0.64	*(H>S)	0.16	
Oral Communication	0.17	*(S>H)	0.57	*(A>P)
Mathematics	0.74	*(H>S)	0.19	
Research	0.22	*(S>H)	0.04	
Decision-Making	0.24	*(H>S)	0.28	*(A>P)
Critical Thinking	0.07		0.10	
Evaluation	0.23	*(S>H)	0.07	
Teamwork	0.11		0.53	*(A>P)
Lifelong Learning	0.18	*(S>H)	0.09	

Note. The calculation of effect size estimates was based on Cohen's *d* statistic. This statistic examines the strength of the factor relationship and is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the relationship can be approximated as follows: for $d \approx 0.2$ (small effect), $d \approx 0.5$ (medium effect), $d \approx 0.8$ (large effect).

Significant differences: * $p<0.05$.

Summary: Development of Employability Skills in Program of Study

For the Hard-Soft factor, 8 of 10 univariate *F*-tests of between-discipline effects on the development of general employability skills in their program of study were deemed significant ($p<0.05$). There were significant differences in perception by graduates across Hard and Soft Fields for the dependent variables of writing skills, computer skills, oral communication skills, mathematical skills, research skills, decision-making skills, evaluation skills, and lifelong learning skills. Mean scores were higher for soft fields than hard fields on 5 of 8 skills. Mean scores were higher for hard fields than soft fields on 3 of 8 skills.

Likewise, along the Pure-Applied, 3 of 10 univariate *F*-tests of between-discipline effects on the development of general employability skills in their program of study were deemed significant ($p<0.05$). There were significant differences in perception by graduates across Pure and Applied Fields for the dependent variables of oral communication skills, decision-making skills, and teamwork skills. Mean scores were higher for applied fields than pure fields on 3 of 3 skills deemed statistically significant.

Table 15: Means and Standard Deviations of University Graduates Perceptions about Use of General Employability Skills Development by Biglan Categories

Use of Employability Skills during Reference Week / Job

To what extent did you use these skills during the reference week (i.e., two years after graduation)?

1. Not at all
2. Not very much
3. Somewhat
4. A great deal

Variable	Mean	Standard Deviation	N
Writing			
Hard	3.017	0.911	465
Soft	3.390	0.840	586
Pure	3.178	0.959	291
Applied	3.243	0.865	760
Total Sample	3.225	0.892	1051
Computer			
Hard	3.514	0.793	465
Soft	3.119	1.009	584
Pure	3.354	0.947	291
Applied	3.271	0.936	758
Total Sample	3.294	0.940	1049
Oral Communication			
Hard	3.692	0.603	465
Soft	3.817	0.451	586
Pure	3.696	0.555	290
Applied	3.787	0.514	761
Total Sample	3.762	0.527	1051

Variable	Mean	Standard Deviation	N
Mathematical			
Hard	2.911	0.968	465
Soft	2.631	1.096	575
Pure	2.539	1.047	289
Applied	2.840	1.039	751
Total Sample	2.756	1.050	1040
Research			
Hard	2.724	1.053	465
Soft	2.703	1.107	583
Pure	2.746	1.142	288
Applied	2.700	1.060	760
Total Sample	2.712	1.083	1048
Decision-Making			
Hard	3.696	0.541	465
Soft	3.812	0.462	586
Pure	3.694	0.574	291
Applied	3.786	0.469	760
Total Sample	3.761	0.502	1051
Critical Thinking			
Hard	3.823	0.444	465
Soft	3.832	0.441	585
Pure	3.779	0.505	290
Applied	3.847	0.414	760
Total Sample	3.828	0.442	1050
Evaluating Statements			
Hard	3.172	0.889	464
Soft	3.391	0.852	582
Pure	3.264	0.896	287
Applied	3.305	0.868	759
Total Sample	3.294	0.875	1046
Teamwork			
Hard	3.762	0.565	464
Soft	3.780	0.546	584
Pure	3.733	0.548	289
Applied	3.787	0.556	759
Total Sample	3.772	0.554	1048

Variable	Mean	Standard Deviation	N
Lifelong Learning			
Hard	2.902	0.945	463
Soft	3.215	0.889	584
Pure	3.041	0.988	289
Applied	3.091	0.902	758
Total Sample	3.077	0.926	1047

Table 16: Univariate *F*-Tests of Between-Discipline Effects on Use of Employability Skills in Job

Dependent Variable	Main Effects HARD-SOFT	Main Effects PURE-APPLIED	Interaction Effect HARD-SOFT x PURE-APPLIED
Writing Skills	S>H	---	---
Computer Skills	H>S	---	---
Oral Communication Skills	S>H	A>P	---
Mathematical Skills	---	A>P	*
Research Skills	---	---	---
Decision-Making Skills	S>H	A>P	---
Critical Thinking Skills	---	A>P	---
Evaluation Skills	S>H	---	---
Teamwork Skills	---	---	---
Lifelong Learning Skills	S>H	---	---

Note. Significant differences between discipline groups ($p<0.05$):

S>H mean scores higher for soft fields than hard fields

H>S mean scores higher for hard fields than soft fields

A>P mean scores higher for applied fields than pure fields

P>A mean scores higher for pure fields than applied fields

Dashed lines (---) denote non-significant differences between discipline groups

No statistical differences between discipline groups were found for the following employability skills: research skills and teamwork skills. Further, all but one employability skill had no significant interactions between Hard-Soft and Pure-Applied fields.

Significant differences were found between disciplines along the following skills. Mean scores (*M*) listed below are based on the following survey scale ratings:

1. Not at all
2. Not very much
3. Somewhat
4. A great deal

Writing skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1047) = 35.910$, $p<0.05$, such that graduates from Soft Fields (M=3.390) rated writing skills used in their job between somewhat and a great deal, compared with graduates from Hard Fields (M=3.017) who viewed writing skills as somewhat used in their job.

Computer skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1045) = 33.765$, $p<0.05$, such that graduates from Hard Fields (M=3.514) reported the use of computer skills in their job between somewhat and a great deal, compared with graduates from Soft Fields (M=3.119) who viewed computer skills as somewhat used in their job.

Oral communication skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1047) = 14.390$, $p<0.05$, such that graduates from Soft Fields (M=3.817) reported oral communication skills was used in their job a great deal, compared with graduates from Hard Fields (M=3.692) who viewed it as above somewhat used.

Likewise, there was a significant main effect for the factor PURE-APPLIED, $F(1, 1047) = 9.492$, $p<0.05$, such that graduates from Applied Fields (M=3.787) reported a greater usage of oral communication skills in their job than graduates from Pure Fields (M=3.696). Both groups viewed oral communication skills in their job was used somewhat to a great deal.

Mathematical skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 1036) = 17.250$, $p<0.05$, such that graduates from Applied Fields (M=2.840) reported a greater usage of mathematical skills in their job than graduates from Pure Fields (M=2.539), even though the usage fell between not very much and somewhat.

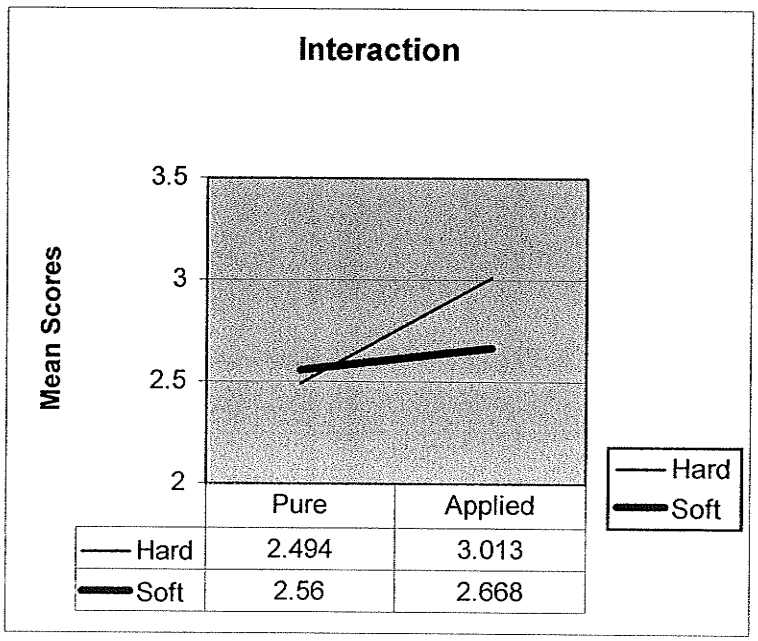
Interestingly, the use of mathematical skills in their job was rated the second lowest of all ten employability skills by university graduates (M=2.756). Overall, graduates felt mathematical skills were used between not very much and somewhat.

There was a significant interaction between both factors of HARD-SOFT and PURE-APPLIED, $F(1, 1036) = 7.420$, $p<0.05$, on the use of

mathematical skills in their job. In particular, graduates of soft-pure fields reported greater use of mathematical skills in their jobs than graduates of hard-pure fields. Likewise, graduates of hard-applied fields viewed the use of mathematical skills more strongly than graduates of soft-applied fields.

Graphically:

Figure 1: Use of Mathematical Skills in Job



Using Fisher's least significant difference (LSD) procedure, tests of simple effects were used to decompose the interaction.

University graduates from hard fields who were connected with applied fields (M=3.013) found greater use of mathematical skills in their jobs than if connected with pure fields (M=2.494),CV_{LSD}=0.17, p<0.05. In essence, graduates of hard-applied fields found greater use of mathematical skills than graduates of hard-pure fields.

The simple effects of Pure-Applied factor:

Along Hard Fields: Applied > Pure HA > HP

Along Soft Fields: Pure ≈Applied SP ≈ SA

The simple effects of Hard-Soft factor:

Along Pure Fields: Hard ≈ Soft HP ≈ SP

Along Applied Fields: Hard > Soft HA > SA

Decision-making skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1047) = 10.210$, $p<0.05$, such that graduates from Soft Fields (M=3.812) reported a greater usage of decision-making skills in their job than graduates from Hard Fields (M=3.696), even though the usage fell between somewhat and a great deal.

Likewise, there was a significant main effect for the factor PURE-APPLIED, $F(1, 1047) = 8.721$, $p<0.05$, such that graduates from Applied Fields (M=3.786) reported a greater usage of decision-making skills in their job than graduates from Pure Fields (M=3.694). Both groups rated the usage between somewhat and a great deal.

Critical thinking skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 1046) = 4.405$, $p<0.05$, such that graduates from Applied Fields (M=3.847) reported critical thinking skills in their job was used a great deal more so than graduates from Pure Fields (M=3.779).

Overall, graduates rated critical thinking skills in their job as the most highly used skill (M=3.828).

Evaluation skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1042) = 10.020$, $p<0.05$, such that graduates from Soft Fields (M=3.391) reported evaluation skills in their job was somewhat used more so than graduates from Hard Fields (M=3.172).

Lifelong learning skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 1043) = 15.839$, $p<0.05$, such that graduates from Soft Fields (M=3.215) reported lifelong learning skills in their job was somewhat used, compared with graduates from Hard Fields (M=2.902) who viewed lifelong learning skills as below somewhat used.

Table 17: Effect Size Estimates for Use of Employability Skills

Variable	Hard-Soft		Pure-Applied	
Writing	0.42	*(S>H)	0.07	
Computer	0.42	*(H>S)	0.09	
Oral Communication	0.24	*(S>H)	0.17	* (A>P)
Mathematics	0.27		0.29	* (A>P)
Research	0.02		0.04	
Decision-Making	0.23	*(S>H)	0.18	* (A>P)
Critical Thinking	0.02		0.15	* (A>P)
Evaluation	0.25	*(S>H)	0.05	
Teamwork	0.03		0.10	
Lifelong Learning	0.34	*(S>H)	0.05	

Note. The calculation of effect size estimates was based on Cohen's *d* statistic. This statistic examines the strength of the factor relationship and is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the relationship can be approximated as follows: for $d \approx 0.2$ (small effect), $d \approx 0.5$ (medium effect), $d \approx 0.8$ (large effect).

Significant differences: * $p<0.05$.

Summary: Use of Employability Skills in Job

For the Hard-Soft factor, 6 of 10 univariate *F*-tests of between-discipline effects on the use of general employability skills in their job revealed significant differences ($p<0.05$). There were significant differences in perception by graduates across Hard and Soft Fields for the dependent variables of writing skills, computer skills, oral communication skills, decision-making skills, evaluation skills, and lifelong learning skills. Mean scores were higher for soft fields than hard fields on 5 of 6 skills. Mean scores were higher for hard fields than soft fields on 1 of 6 skills.

Likewise, along the Pure-Applied factor, 4 of 10 univariate *F*-tests of between-discipline effects on the use of general employability skills in their job was deemed significant ($p<0.05$). There were significant differences in perception by graduates across Pure and Applied Fields for the dependent variables of oral communication skills, mathematical skills, decision-making skills, and critical thinking skills. Mean scores were higher for applied fields than pure fields on 4 of 4 skills.

Inferential Statistics: Faculty Survey Respondents

Cell means and standard deviations for each section of the faculty survey will be presented initially. Similarly, a series of univariate *F*-tests were used to test the research hypotheses in this study. In particular, a 2x2 completely crossed factor analysis of variance procedure with interaction was used, with an 0.05 level of probability selected to determine significance.

Several ANOVA procedures were carried out based on the results captured in the faculty survey. As well, effect size estimates were reported.

The ten dependent variables were: writing skills, computer skills, oral communication skills, mathematical skills, research skills, decision-making skills, critical thinking skills, evaluation skills, teamwork skills, and lifelong learning skills. For each of these ten general employability skills, a series of null hypotheses were tested for each research question as follows:

> There is no significant difference in the perceptions of faculty members across academic disciplines reflected in Biglan categories in the importance of teaching employability skills related to ...

In total, six ANOVA procedures were carried out addressing differences in faculty member perceptions across academic disciplines corresponding to the following sections of the faculty survey:

- importance of teaching employability skills
- integration of employability skills in own teaching
- opportunities for students to develop employability skills in 1st year courses
- opportunities for students to develop employability skills in 2nd year courses
- opportunities for students to develop employability skills in 3rd year courses
- overall possession of employability skills of university graduates

Table 18: Means and Standard Deviations of Faculty Member Perceptions about Importance of General Employability Skills Development by Biglan Categories

To what extent do you believe it is important to teach the following general employability skills in your academic discipline?

1. Not at all important
2. Not important
3. Slightly important
4. Moderately important
5. Very important
6. Extremely important

Variable	Mean	Standard Deviation	N
Writing			
Hard	5.363	0.733	132
Soft	5.535	0.822	114
Pure	5.620	0.719	87
Applied	5.345	0.795	159
Total Sample	5.443	0.779	246
Computer			
Hard	4.689	1.224	132
Soft	4.342	1.218	114
Pure	4.287	1.328	87
Applied	4.660	1.157	159
Total Sample	4.528	1.231	246
Oral Communication			
Hard	5.189	0.734	132
Soft	5.368	0.904	114
Pure	5.172	0.838	87
Applied	5.327	0.807	159
Total Sample	5.272	0.820	246

Variable	Mean	Standard Deviation	N
Mathematical			
Hard	4.628	1.437	132
Soft	4.087	1.706	114
Pure	4.160	1.866	87
Applied	4.496	1.404	159
Total Sample	4.378	1.588	246
Research			
Hard	4.939	1.009	132
Soft	5.157	0.917	114
Pure	5.310	0.825	87
Applied	4.893	1.016	159
Total Sample	5.040	0.972	246
Decision-Making			
Hard	5.265	0.808	132
Soft	5.350	0.968	114
Pure	5.046	1.088	87
Applied	5.446	0.717	159
Total Sample	5.304	0.885	246
Critical Thinking			
Hard	5.560	0.542	132
Soft	5.736	0.679	114
Pure	5.620	0.750	87
Applied	5.654	0.527	159
Total Sample	5.642	0.614	246
Evaluating Statements			
Hard	5.318	0.723	132
Soft	5.508	0.719	114
Pure	5.459	0.759	87
Applied	5.377	0.708	159
Total Sample	5.406	0.726	246
Teamwork			
Hard	4.818	1.039	132
Soft	4.824	1.199	114
Pure	4.275	1.207	87
Applied	5.119	0.937	159
Total Sample	4.821	1.114	246

Variable	Mean	Standard Deviation	N
Lifelong Learning			
Hard	5.053	0.975	132
Soft	5.132	1.048	113
Pure	4.804	1.199	87
Applied	5.246	0.849	158
Total Sample	5.089	1.008	245

Table 19: Univariate *F*-Tests of Between-Discipline Effects on Importance of Teaching Employability Skills

The first ANOVA procedure compared the perceptions of faculty members across Biglan categories on the importance of teaching employability skills.

Dependent Variable	Main Effects		Interaction Effect
	HARD-SOFT	PURE-APPLIED	HARD-SOFT x PURE-APPLIED
Writing Skills	---	P>A	---
Computer Skills	H>S	A>P	---
Oral Communication Skills	---	---	---
Mathematical Skills	H>S	---	---
Research Skills	---	P>A	---
Decision-Making Skills	---	A>P	*
Critical Thinking Skills	---	---	---
Evaluation Skills	S>H	---	---
Teamwork Skills	---	A>P	*
Lifelong Learning Skills	---	A>P	---

Note. Significant differences between discipline groups ($p<0.05$):

S>H mean scores higher for soft fields than hard fields

H>S mean scores higher for hard fields than soft fields

A>P mean scores higher for applied fields than pure fields

P>A mean scores higher for pure fields than applied fields

Dashed lines (---) denote non-significant differences between discipline groups.

Significant differences were found between disciplines along the following skills. Mean scores (*M*) listed below are based on the following survey scale ratings:

1. Not at all important
2. Not important
3. Slightly important
4. Moderately important
5. Very important
6. Extremely important

Writing skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 242) = 6.443$, $p<0.05$, such that faculty members from Pure Fields (M=5.620) rated the teaching of writing skills in their discipline as less than extremely important, compared with faculty members from Applied Fields (M=5.345) who rated it as very important.

Computer skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 242) = 7.259$, $p<0.05$, such that faculty members from Hard Fields (M=4.689) believed the teaching of computer skills in their discipline as moderate to very important, compared with faculty members from Soft Fields (M=4.342) who viewed it as moderately important.

Further, there was a significant main effect for the factor PURE-APPLIED, $F(1, 242) = 4.916$, $p<0.05$, such that faculty members from Applied

Fields (M=4.660) believed the teaching of computer skills in their discipline as moderate to very important, compared with faculty members from Pure Fields (M=4.287) who viewed it as moderately important.

Mathematical skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 242) = 11.264$, $p<0.05$, such that faculty members from Hard Fields (M=4.628) believed the teaching of mathematical skills in their discipline as moderate to very important, compared with faculty members from Soft Fields (M=4.087) who viewed it as only moderately important.

Research skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 242) = 9.782$, $p<0.05$, such that faculty members from Pure Fields (M=5.310) believed the teaching of research skills in their discipline as very important, compared with faculty members from Applied Fields (M=4.893) who viewed it as less than very important.

Decision-making skills.

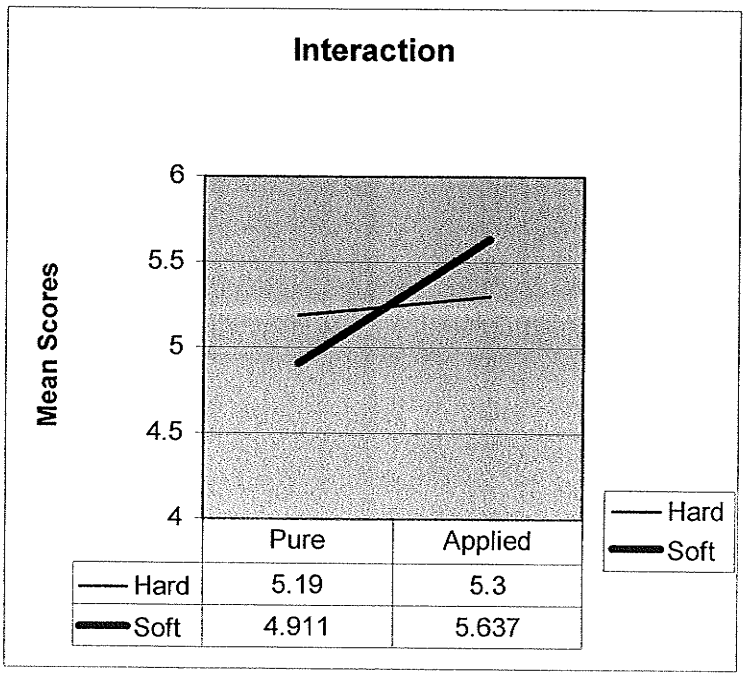
There was a significant main effect for the factor PURE-APPLIED, $F(1, 242) = 13.345$, $p<0.05$, such that faculty members from Applied Fields (M=5.446) believed the teaching of decision-making skills in their discipline to be either very important or extremely important, compared with faculty members from Pure Fields (M=5.046) who viewed it as only very important.

In addition, there was a significant interaction between both factors of HARD-SOFT and PURE-APPLIED, $F(1, 242) = 7.268$, $p<0.05$, on the

importance of teaching decision-making skills. In particular, faculty members from hard-pure fields reported greater attachment to teaching decision-making skills than faculty members from soft-pure fields. Likewise, faculty members from soft-applied fields viewed the importance of teaching decision-making skills greater than faculty members from hard-applied fields.

Graphically:

Figure 2: Importance of Teaching Decision-Making Skills



In a Fisher LSD test for simple effects, faculty members from soft fields found greater importance of teaching decision-making skills if they were associated with applied fields (M=5.637) than with pure fields (M=4.911), CV_{LSD}=0.30, p<0.05. That is, faculty members from soft-applied fields found it more important to teach decision-making skills than faculty members from soft-pure fields.

Further, faculty members of applied fields who are more attached to soft fields (M=5.637) than hard fields (M=5.300), CV_{LSD}=0.17, p<0.05, reported a greater importance of teaching decision-making skills. In essence, faculty members from soft-applied fields found the importance of teaching decision-making skills greater than those in hard-applied fields.

The simple effects of Pure-Applied factor:

Along Hard Fields:	Applied > Pure	HA > HP
Along Soft Fields:	Applied > Pure	SA > SP

The simple effects of Hard-Soft factor:

Along Pure Fields:	Hard ≈ Soft	HP ≈ SP
Along Applied Fields:	Soft > Hard	SA > HA

Evaluation skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 242) = 5.138$, $p<0.05$, such that faculty members from Soft Fields (M=5.508) believed the teaching of evaluation skills in their discipline to fall between very important and extremely important, compared with faculty members from Hard Fields (M=5.318) who viewed it as very important.

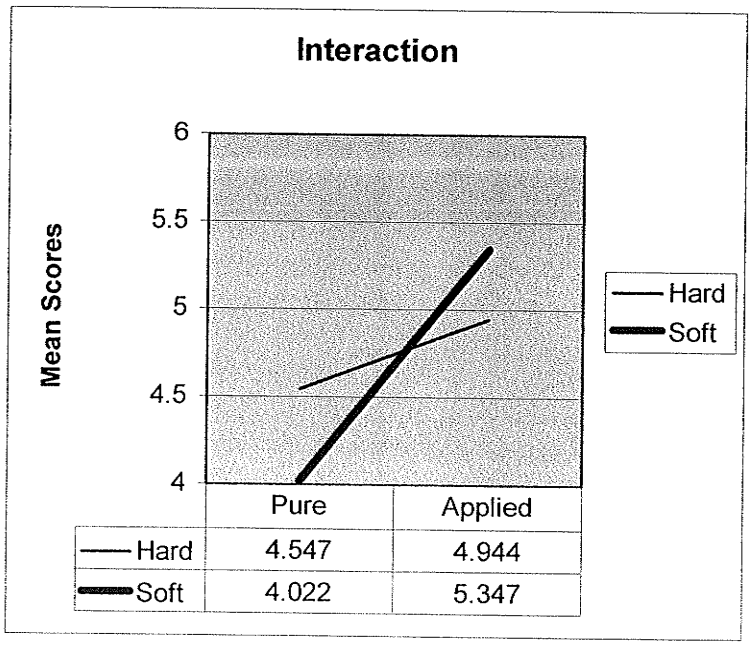
Teamwork skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 242) = 39.810$, $p<0.05$, such that faculty members from Applied Fields (M=5.119) believed the teaching of teamwork skills in their discipline to be very important, compared with faculty members from Pure Fields (M=4.275) who viewed it as moderately important.

In addition, there was a significant interaction between both factors of HARD-SOFT and PURE-APPLIED, $F(1, 242) = 11.575$, $p<0.05$, on the importance of teamwork skills. In particular, faculty members from hard-pure fields reported greater occurrences of teaching teamwork skills into their courses than faculty members from soft-pure fields. Likewise, faculty members from soft-applied fields viewed the importance of teamwork skills greater than faculty members from hard-applied fields.

Graphically:

Figure 3: Importance of Teaching Teamwork Skills



	Pure	Applied
Hard	4.547	4.944
Soft	4.022	5.347

Using Fisher's LSD procedure, tests of simple effects were used to decompose the interaction.

Faculty members from hard fields found greater importance of teaching teamwork skills into their courses if they were connected to applied fields (M=4.944) than pure fields (M=4.5476), CV_{LSD}=0.36, $p<0.05$. That is, faculty

members from hard-applied fields viewed greater importance of teaching teamwork skills in their courses than faculty members from hard-pure fields. Faculty members from pure fields found greater importance of teaching teamwork skills into their courses if they were connected to hard fields (M=4.547) than soft fields (M=4.022), CV_{LSD}=0.36, p<0.05. That is, faculty members from hard-pure fields viewed greater importance of teaching teamwork skills in their courses than faculty members from soft-pure fields. Faculty members from soft fields found greater importance of teaching teamwork skills into their courses if they were connected to applied fields (M=5.347) than pure fields (M=4.022), CV_{LSD}=0.36, p<0.05. That is, faculty members from soft-applied fields viewed greater importance of teaching teamwork skills in their courses than faculty members from soft-pure fields. Finally, applied faculty members reported greater importance of teaching teamwork skills in their courses if they were aligned with soft fields (M=5.347) than hard fields (M=4.944), CV_{LSD}=0.36, p<0.05. In essence, faculty members from soft-applied fields viewed greater importance of teamwork skills in their courses than faculty members from hard-applied fields.

The simple effects of Pure-Applied factor:

Along Hard Fields:	Applied > Pure	HA > HP
Along Soft Fields:	Applied > Pure	SA > SP

The simple effects of Hard-Soft factor:

Along Pure Fields:	Hard > Soft	HP > SP
Along Applied Fields:	Soft > Hard	SA > HA

Lifelong learning skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 241) = 12.135$, $p<0.05$, such that faculty members from Applied Fields (M=5.246) believed the teaching of lifelong learning skills in their discipline to be very important, compared with faculty members from Pure Fields (M=4.804) who viewed it as moderate to very important.

Table 20: Effect Size Estimates for Importance of Teaching Employability Skills

Variable	Hard-Soft		Pure-Applied	
Writing	0.22		0.35	*(P>A)
Computer	0.28	* (H>S)	0.30	*(A>P)
Oral Communication	0.22		0.19	
Mathematics	0.34	*(H>S)	0.21	
Research	0.22		0.43	*(P>A)
Decision-Making	0.10		0.45	*(A>P)
Critical Thinking	0.29		0.06	
Evaluation	0.26	*(S>H)	0.11	
Teamwork	0.01		0.76	*(A>P)
Lifelong Learning	0.08		0.44	*(A>P)

Note. The calculation of effect size estimates was based on Cohen's *d* statistic. This statistic examines the strength of the factor relationship and is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the relationship can be approximated as follows: for $d \approx 0.2$ (small effect), $d \approx 0.5$ (medium effect), $d \approx 0.8$ (large effect).

Significant differences: * $p<0.05$.

Summary: Importance of Teaching Employability Skills

For the Hard-Soft factor, 3 of 10 univariate *F*-tests of between-discipline effects on the importance of teaching general employability skills in their discipline revealed significant differences ($p<0.05$). There were significant differences in perception of faculty members across Hard and Soft Fields for the dependent variables of computer skills, mathematical skills, and evaluation skills. Mean scores were higher for soft fields than hard fields on 1 of 3 skills. Mean scores were higher for hard fields than soft fields on 2 of 3 skills.

Likewise, along the Pure-Applied factor, 6 of 10 univariate *F*-tests of between-discipline effects on the importance of teaching general employability skills in their discipline revealed significant differences ($p<0.05$). There were significant differences in perception of faculty members across Pure and Applied Fields for the dependent variables of writing skills, computer skills, research skills, decision-making skills, teamwork skills, and lifelong learning skills. Mean scores were higher for applied fields than pure fields on 4 of 6 skills. Mean scores were higher for pure fields than applied fields on 2 of 6 skills.

Finally, a significant interaction took place between both factors for the dependent variable related to decision-making skills and to teamwork skills.

Table 21: Means and Standard Deviations of Faculty Members Perceptions about the Integration of General Employability Skills by Biglan Categories

Thinking of a course you have taught recently, to what extent did you integrate these general employability skills in your teaching?

1. Not at all integrated
2. Not integrated
3. Slightly integrated
4. Moderately integrated
5. Strongly integrated
6. Fully integrated

Variable	Mean	Standard Deviation	N
Writing			
Hard	4.292	1.260	130
Soft	5.105	1.170	114
Pure	4.747	1.374	87
Applied	4.630	1.231	157
Total Sample	4.672	1.282	244
Computer			
Hard	3.707	1.591	130
Soft	3.307	1.557	114
Pure	3.172	1.593	87
Applied	3.713	1.552	157
Total Sample	3.520	1.585	244
Oral Communication			
Hard	4.153	1.465	130
Soft	4.543	1.256	114
Pure	3.942	1.473	87
Applied	4.554	1.283	157
Total Sample	4.336	1.382	244

Variable	Mean	Standard Deviation	N
Mathematical			
Hard	4.023	1.709	130
Soft	2.570	1.634	114
Pure	3.195	1.957	87
Applied	3.426	1.743	157
Total Sample	3.344	1.822	244
Research			
Hard	4.200	1.314	130
Soft	4.921	1.213	114
Pure	4.827	1.322	87
Applied	4.375	1.288	157
Total Sample	4.536	1.315	244
Decision-Making			
Hard	4.600	1.103	130
Soft	4.877	1.176	114
Pure	4.425	1.254	87
Applied	4.898	1.045	157
Total Sample	4.729	1.144	244
Critical Thinking			
Hard	4.876	0.956	130
Soft	5.473	0.843	114
Pure	5.092	1.041	87
Applied	5.191	0.899	157
Total Sample	5.155	0.951	244
Evaluating Statements			
Hard	4.600	1.138	130
Soft	5.105	1.092	114
Pure	4.724	1.300	87
Applied	4.898	1.045	157
Total Sample	4.836	1.143	244
Teamwork			
Hard	3.884	1.573	130
Soft	4.070	1.561	114
Pure	3.264	1.558	87
Applied	4.363	1.432	157
Total Sample	3.971	1.567	244

Variable	Mean	Standard Deviation	N
Lifelong Learning			
Hard	3.869	1.337	130
Soft	4.289	1.361	114
Pure	3.931	1.445	87
Applied	4.140	1.312	157
Total Sample	4.065	1.362	244

Table 22: Univariate *F*-Tests of Between-Discipline Effects on Integration of Employability Skills in own teaching

The second ANOVA procedure compared the perceptions of faculty members across Biglan categories on the integration of employability skills in their own teaching

Dependent Variable	Main Effects		Interaction Effect
	HARD-SOFT	PURE-APPLIED	HARD-SOFT x PURE-APPLIED
Writing Skills	S>H	---	---
Computer Skills	H>S	A>P	---
Oral Communication Skills	S>H	A>P	---
Mathematical Skills	H>S	---	---
Research Skills	S>H	P>A	---
Decision-Making Skills	---	A>P	---
Critical Thinking Skills	S>H	---	---
Evaluation Skills	S>H	---	---
Teamwork Skills	---	A>P	---
Lifelong Learning Skills	S>H	A>P	---

Note. Significant differences between discipline groups ($p<0.05$):

S>H mean scores higher for soft fields than hard fields

H>S mean scores higher for hard fields than soft fields

A>P mean scores higher for applied fields than pure fields

P>A mean scores higher for pure fields than applied fields

Dashed lines (---) denote non-significant differences between discipline groups

Significant differences were found between disciplines along the following skills. Mean scores (*M*) listed below are based on the following survey scale ratings:

1. Not at all integrated
2. Not integrated
3. Slightly integrated
4. Moderately integrated
5. Strongly integrated
6. Fully integrated

Writing skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 240) = 26.758$, $p<0.05$, such that faculty members from Soft Fields (M=5.105) strongly integrated writing skills into their teaching more so than faculty members from Hard Fields (M=4.292) who integrated it moderately.

Computer skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 240) = 5.416$, $p<0.05$, such that faculty members from Hard Fields (M=3.707) integrated computer skills into their teaching slightly to moderately, compared with faculty members from Soft Fields (M=3.307) who integrated it slightly.

Further, there was a significant main effect for the factor PURE-APPLIED, $F(1, 240) = 6.308$, $p<0.05$, such that faculty members from Applied Fields (M=3.713) integrated computer skills into their teaching slightly to

moderately compared with faculty members from Pure Fields (M=3.172) who only integrated this skill slightly.

Oral communication skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 240) = 4.415$, $p<0.05$, such that faculty members from Soft Fields (M=4.543) integrated oral communication skills into their teaching moderately to strongly, compared with faculty members from Hard Fields (M=4.153) who only integrated it moderately.

Further, there was a significant main effect for the factor PURE-APPLIED, $F(1, 240) = 13.139$, $p<0.05$, such that faculty members from Applied Fields (M=4.554) integrated oral communication skills into their teaching moderately to strongly, compared with faculty members from Pure Fields (M=3.942) who integrated it moderately.

Mathematical skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 240) = 47.830$, $p<0.05$, such that faculty members from Hard Fields (M=4.023) integrated mathematical skills into their teaching moderately compared with faculty members from Soft Fields (M=2.570) who integrated it less than slightly.

Overall, of all ten employability skills, mathematical skills was the least integrated into their teaching by faculty members (M=3.344).

Research skills.

There was a significant main effect for the factor HARD-SOFT , $F(1, 240) = 13.193$, $p<0.05$, such that faculty members from Soft Fields (M=4.921) strongly integrated research skills in their teaching, compared with faculty members from Hard Fields (M=4.200) who only moderately integrated this skill.

Further, there was a significant main effect for the factor PURE-APPLIED, $F(1, 240) = 5.455$, $p<0.05$, such that faculty members from Pure Fields (M=4.827) strongly integrated research skills in their teaching, compared with faculty members from Applied Fields (M=4.375) who only moderately integrated this skill.

Decision-making skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 240) = 11.456$, $p<0.05$, such that faculty members from Applied Fields (M=4.898) reported a strong integration of decision-making skills in their teaching more so than faculty members from Pure Fields (M=4.425) who integrated it moderately.

Critical thinking skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 240) = 23.114$, $p<0.05$, such that faculty members from Soft Fields (M=5.473) integrated critical thinking skills into their teaching either strongly or fully more so than faculty members from Hard Fields (M=4.876) who integrated this skill only strongly.

Overall, of all ten employability skills, faculty members integrated critical thinking into their teaching (M=5.155) the strongest and fullest.

Evaluation skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 240) = 11.228$, $p<0.05$, such that faculty members from Soft Fields (M=5.105) strongly integrated evaluation skills into their teaching more so than faculty members from Hard Fields (M=4.600) who only integrated this skill moderately.

Teamwork skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 240) = 31.859$, $p<0.05$, such that faculty members from Applied Fields (M=4.363) integrated teamwork skills into their teaching moderately, compared with faculty members from Pure Fields (M=3.264) who integrated this skill slightly.

Lifelong learning skills.

There was a significant main effect for the factor HARD-SOFT , $F(1, 240) = 3.851$, $p<0.05$, such that faculty members from Soft Fields (M=4.289) integrated lifelong learning skills into their teaching moderately, compared with faculty members from Hard Fields (M=3.869) who integrated this skill between slightly and moderately.

Further, there was a significant main effect for the factor PURE-APPLIED, $F(1, 240) = 1.926$, $p<0.05$, such that faculty members from Applied Fields (M=4.140) integrated lifelong learning skills into their teaching

moderately, compared with faculty members from Pure Fields (M=3.931) who integrated this skill less than moderately.

Table 23: Effect Size Estimates for Integration of Employability Skills

Variable	Hard-Soft		Pure-Applied	
Writing	0.63	*(S>H)	0.09	
Computer	0.25	*(H>S)	0.34	*(A>P)
Oral Communication	0.28	*(S>H)	0.44	*(A>P)
Mathematics	0.80	*(H>S)	0.13	
Research	0.55	*(S>H)	0.34	*(P>A)
Decision-Making	0.24		0.41	*(A>P)
Critical Thinking	0.63	*(S>H)	0.10	
Evaluation	0.44	*(S>H)	0.15	
Teamwork	0.12		0.70	*(A>P)
Lifelong Learning	0.31	*(S>H)	0.15	*(A>P)

Note. The calculation of effect size estimates was based on Cohen's *d* statistic. This statistic examines the strength of the factor relationship and is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the relationship can be approximated as follows: for $d \approx 0.2$ (small effect), $d \approx 0.5$ (medium effect), $d \approx 0.8$ (large effect).

Significant differences: * $p<0.05$.

Summary: Integration of Employability Skills in Own Teaching

For the Hard-Soft factor, 8 of 10 univariate *F*-tests of between-discipline effects on the integration of general employability skills in their teaching revealed significant differences ($p<0.05$). There were significant differences in perception of faculty members across Hard and Soft Fields for the dependent variables of writing skills, computer skills, oral communication skills, mathematical skills, research skills, critical thinking skills, evaluation skills, and lifelong learning skills. Mean scores were higher for soft fields than hard fields on 6 of 8 skills. Mean scores were higher for hard fields than soft fields on 2 of 8 skills.

Likewise, along the Pure-Applied factor, 6 of 10 univariate *F*-tests of between-discipline effects on the integration of general employability skills in their teaching were deemed significant ($p<0.05$). There were significant differences in perception of faculty members across Pure and Applied Fields for the dependent variables of computer skills, oral communication skills, research skills, decision-making skills, teamwork skills, and lifelong learning skills. Mean scores were higher for applied fields than pure fields on 5 of 6 skills. Mean scores were higher for pure fields than applied fields on 1 of 6 skills.

Furthermore, faculty members had an opportunity to provide an example of how they integrated employability skills into their courses. It is useful to provide a general description of the range of employability skills integrated into their courses in the following table:

Table 24: Examples of Integration of Skills by Faculty Members across Biglan Categories

Biglan Category	Comments from Faculty Member	Skills Integrated
Hard-Pure	Students write critical review papers on a topic, with a chance to revise given my comments. Then they present these concepts and ideas orally in a formal PowerPoint presentation.	Writing Skills Computer Skills Oral Communication Skills Evaluation Skills
Hard-Pure	Students learn a computer software package to perform calculations and plot graphs of scientific results, focusing on examples from the lecture notes.	Computer Skills Evaluation Skills
Soft-Pure	Students develop a research project, conduct the research, and present it to class. Practice interviewing each other in small groups.	Oral Communication Skills Research Skills Teamwork Skills
Soft-Pure	I discuss a standard theory and ask class to identify and discuss the deficiencies of the assumptions	Oral Communication Skills Critical Thinking Skills Evaluation Skills

Biglan Category	Comments from Faculty Member	Skills Integrated
Hard-Applied	Students examine written case reports with analysis included to justify their decision, and applying theory from text to cases discussed in class sessions.	Research Skills Critical Thinking Skills Evaluation Skills
Hard-Applied	Students work in teams in the dental clinic. Students make decisions regarding clinical treatments.	Decision-making Skills Teamwork Skills
Soft-Applied	Students create a portfolio report to summarize and critique in both written and graphic form, the process and outcomes of their work	Writing Skills Evaluation Skills
Soft-Applied	I modify my lecture content to include the latest research findings. I include current health issues from the media in my class for discussion	Oral Communication Skills Research Skills Critical Thinking Skills

Table 25: Means and Standard Deviations of Faculty Members Perceptions about Opportunities for Students to Develop General Employability Skills by Biglan Categories

To what extent do you believe students have opportunities to develop these general employability skills in first, second, and third year courses in a typical undergraduate program?

1. Not at all
2. No opportunities to develop
3. Slight opportunities to develop
4. Moderate opportunities to develop
5. Strong opportunities to develop
6. Full opportunities to develop

First Year Courses

Variable	Mean	Standard Deviation	N
Writing			
Hard	3.188	1.085	122
Soft	4.093	1.170	96
Pure	3.305	1.422	85
Applied	3.766	1.014	133
Total Sample	3.587	1.208	218
Computer			
Hard	3.573	1.239	122
Soft	3.410	1.134	95
Pure	3.023	1.272	85
Applied	3.810	1.034	132
Total Sample	3.502	1.194	217

Variable	Mean	Standard Deviation	N
Oral Communication			
Hard	2.991	1.202	122
Soft	3.333	1.319	96
Pure	2.576	1.178	85
Applied	3.503	1.184	133
Total Sample	3.142	1.263	218
Mathematical			
Hard	3.737	1.334	122
Soft	2.726	1.283	95
Pure	3.105	1.504	85
Applied	3.416	1.325	132
Total Sample	3.294	1.402	217
Research			
Hard	2.688	1.021	122
Soft	3.531	1.178	96
Pure	2.964	1.276	85
Applied	3.120	1.094	133
Total Sample	3.059	1.168	218
Decision-Making			
Hard	3.123	1.095	122
Soft	3.757	1.226	95
Pure	3.282	1.305	85
Applied	3.477	1.115	132
Total Sample	3.400	1.194	217
Critical Thinking			
Hard	3.467	1.099	122
Soft	4.114	1.103	96
Pure	3.847	1.229	85
Applied	3.691	1.088	133
Total Sample	3.752	1.145	218
Evaluating Statements			
Hard	3.303	1.067	122
Soft	3.947	1.075	95
Pure	3.611	1.254	85
Applied	3.568	1.020	132
Total Sample	3.585	1.115	217

Variable	Mean	Standard Deviation	N
Teamwork			
Hard	3.352	1.156	122
Soft	3.489	1.231	96
Pure	3.000	1.165	85
Applied	3.676	1.131	133
Total Sample	3.412	1.189	218
Lifelong Learning			
Hard	3.196	1.175	122
Soft	3.600	1.241	95
Pure	3.352	1.342	85
Applied	3.386	1.136	132
Total Sample	3.373	1.218	217

Second Year Courses

Variable	Mean	Standard Deviation	N
Writing			
Hard	3.791	0.906	120
Soft	4.377	1.069	98
Pure	4.085	1.178	82
Applied	4.036	0.922	136
Total Sample	4.055	1.023	218
Computer			
Hard	3.958	1.140	120
Soft	3.540	1.132	98
Pure	3.451	1.258	82
Applied	3.963	1.042	136
Total Sample	3.770	1.153	218
Oral Communication			
Hard	3.675	1.116	120
Soft	3.949	1.087	98
Pure	3.548	1.208	82
Applied	3.948	1.020	136
Total Sample	3.798	1.109	218
Mathematical			
Hard	4.025	1.337	120
Soft	2.938	1.375	98
Pure	3.439	1.572	82
Applied	3.595	1.384	136
Total Sample	3.536	1.456	218
Research			
Hard	3.483	1.144	120
Soft	4.193	1.042	98
Pure	4.085	1.178	82
Applied	3.632	1.107	136
Total Sample	3.802	1.153	218
Decision-Making			
Hard	3.775	1.064	120
Soft	4.255	1.096	98
Pure	3.975	1.247	82
Applied	4.000	1.011	136
Total Sample	3.990	1.103	218

Variable	Mean	Standard Deviation	N
Critical Thinking			
Hard	3.858	1.079	120
Soft	4.530	1.007	98
Pure	4.280	1.157	82
Applied	4.088	1.057	136
Total Sample	4.160	1.097	218
Evaluating Statements			
Hard	3.800	1.058	120
Soft	4.418	0.962	98
Pure	4.134	1.173	82
Applied	4.044	0.987	136
Total Sample	4.078	1.059	218
Teamwork			
Hard	3.808	1.039	120
Soft	3.949	1.271	98
Pure	3.426	1.237	82
Applied	4.139	1.005	136
Total Sample	3.871	1.148	218
Lifelong Learning			
Hard	3.625	1.123	120
Soft	3.918	1.163	98
Pure	3.695	1.234	82
Applied	3.794	1.096	136
Total Sample	3.756	1.148	218

Third Year Courses

Variable	Mean	Standard Deviation	N
Writing			
Hard	4.363	1.000	121
Soft	4.842	0.926	95
Pure	4.802	0.992	81
Applied	4.437	0.974	135
Total Sample	4.574	0.994	216
Computer			
Hard	4.446	1.110	121
Soft	3.978	1.246	95
Pure	4.086	1.266	81
Applied	4.333	1.139	135
Total Sample	4.240	1.192	216
Oral Communication			
Hard	4.413	0.954	121
Soft	4.600	0.993	95
Pure	4.506	1.038	81
Applied	4.488	0.937	135
Total Sample	4.495	0.974	216
Mathematical			
Hard	4.297	1.400	121
Soft	3.368	1.473	95
Pure	3.827	1.649	81
Applied	3.925	1.412	135
Total Sample	3.888	1.502	216
Research			
Hard	4.198	1.092	121
Soft	4.736	0.947	95
Pure	4.728	1.060	81
Applied	4.259	1.029	135
Total Sample	4.435	1.063	216
Decision-Making			
Hard	4.462	1.000	121
Soft	4.757	0.930	95
Pure	4.567	1.094	81
Applied	4.607	0.906	135
Total Sample	4.592	0.979	216

Variable	Mean	Standard Deviation	N
Critical Thinking			
Hard	4.512	0.975	121
Soft	5.000	0.825	95
Pure	4.814	1.062	81
Applied	4.674	0.862	135
Total Sample	4.726	0.942	216
Evaluating Statements			
Hard	4.388	1.035	121
Soft	4.968	0.892	95
Pure	4.666	1.161	81
Applied	4.629	0.920	135
Total Sample	4.643	1.015	216
Teamwork			
Hard	4.471	0.940	121
Soft	4.431	1.217	95
Pure	4.160	1.156	81
Applied	4.629	0.975	135
Total Sample	4.453	1.068	216
Lifelong Learning			
Hard	4.124	1.166	121
Soft	4.347	1.200	95
Pure	4.135	1.357	81
Applied	4.274	1.068	135
Total Sample	4.222	1.183	216

Table 26: Univariate *F*-Tests of Between-Discipline Effects on Opportunities for Students to Develop Employability Skills across Course Levels

The third ANOVA procedure compared the perceptions of faculty members across academic disciplines on the question of whether students have opportunities to develop employability skills across course levels. These data demonstrate whether students have opportunities to develop employability skills over time as students progress from first to second to third years of their undergraduate program, and whether patterns of opportunity vary across Biglan categories and year level.

First Year Courses

Dependent Variable	Main Effects		Interaction Effect
	HARD-SOFT	PURE-APPLIED	HARD-SOFT x PURE-APPLIED
Writing Skills	S>H	A>P	---
Computer Skills	---	A>P	---
Oral Communication Skills	S>H	A>P	---
Mathematical Skills	H>S	---	---
Research Skills	S>H	---	---
Decision-Making Skills	S>H	---	---
Critical Thinking Skills	S>H	---	---
Evaluation Skills	S>H	---	---
Teamwork Skills	---	A>P	---
Lifelong Learning Skills	S>H	---	---

Note. Significant differences between discipline groups ($p<0.05$):

S>H mean scores higher for soft fields than hard fields

H>S mean scores higher for hard fields than soft fields

A>P mean scores higher for applied fields than pure fields

Dashed lines (---) denote non-significant differences between discipline groups

Significant differences were found between disciplines along the following skills. Mean scores (*M*) listed below are based on the following survey scale ratings:

1. Not at all
2. No opportunities to develop
3. Slight opportunities to develop
4. Moderate opportunities to develop
5. Strong opportunities to develop
6. Full opportunities to develop

Writing skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 49.123$, $p<0.05$, such that faculty members from Soft Fields (M=4.093) perceived moderate opportunities for students to develop writing skills in first year courses, compared with slight opportunities from faculty members of Hard Fields (M=3.188).

Likewise, there was a significant main effect for the factor PURE-APPLIED, $F(1, 214) = 12.514$, $p<0.05$, such that faculty members from Applied Fields (M=3.766) perceived slight to moderate opportunities for students to develop writing skills in first year courses, compared with slight opportunities from faculty members of Pure Fields (M=3.305).

Computer skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 213) = 23.801$, $p<0.05$, such that faculty members from Applied Fields (M=3.810) perceived moderate opportunities for students to develop computer skills in first year courses, compared with slight opportunities from faculty members of Pure Fields (M=3.023).

Oral communication skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 9.324$, $p<0.05$, such that faculty members from Soft Fields (M=3.333) perceived slight opportunities for students to develop oral communication skills in first year courses than faculty members from Hard Fields (M=2.991) who found less than slight opportunities.

Further, there was a significant main effect for the factor PURE-APPLIED, $F(1, 214) = 34.568$, $p<0.05$, such that faculty members from Applied Fields (M=3.503) perceived slight to moderate opportunities for students to develop oral communication skills in first year courses, compared with only little to slight opportunities from faculty members of Pure Fields (M=2.576).

Mathematical skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 213) = 32.590$, $p<0.05$, such that faculty members from Hard Fields (M=3.737) perceived moderate opportunities for students to develop

mathematical skills in first year courses, compared with little to slight opportunities from faculty members of Soft Fields (M=2.726).

Research skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 34.891$, $p<0.05$, such that faculty members from Soft Fields (M=3.531) perceived slight to moderate opportunities for students to develop research skills in first year courses, compared with little to slight opportunities from faculty members of Hard Fields (M=2.688).

Decision-making skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 213) = 17.154$, $p<0.05$, such that faculty members from Soft Fields (M=3.757) perceived moderate opportunities for students to develop decision-making skills in first year courses, compared with slight opportunities from faculty members of Hard Fields (M=3.123).

Critical thinking skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 19.814$, $p<0.05$, such that faculty members from Soft Fields (M=4.114) perceived moderate opportunities for students to develop critical thinking skills in first year courses, compared with slight to moderate opportunities from faculty members of Hard Fields (M=3.467).

Overall, of all ten employability skills, faculty members perceived greatest opportunities for students to develop critical thinking skills in first year courses (M=3.752).

Evaluation skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 213) = 20.234$, $p<0.05$, such that faculty members from Soft Fields (M=3.947) perceived moderate opportunities for students to develop evaluation skills in first year courses, compared with slight opportunities from faculty members of Hard Fields (M=3.303).

Teamwork skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 214) = 18.772$, $p<0.05$, such that faculty members from Applied Fields (M=3.676) perceived slight to moderate opportunities for students to develop teamwork skills in first year courses, compared with slight opportunities from faculty members of Pure Fields (M=3.000).

Lifelong learning skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 213) = 6.354$, $p<0.05$, such that faculty members from Soft Fields (M=3.600) perceived slight to moderate opportunities for students to develop lifelong learning skills in first year courses, compared with slight opportunities from faculty members of Hard Fields (M=3.196).

Table 27: Effect Size Estimates for Opportunities for Students to Develop Employability Skills in First Year Courses

Variable	Hard-Soft		Pure-Applied	
Writing	0.75	*(S>H)	0.38	*(A>P)
Computer	0.14		0.66	*(A>P)
Oral Communication	0.27	*(S>H)	0.73	*(A>P)
Mathematics	0.72	*(H>S)	0.22	
Research	0.72	*(S>H)	0.13	
Decision-Making	0.53	*(S>H)	0.16	
Critical Thinking	0.57	*(S>H)	0.14	
Evaluation	0.58	*(S>H)	0.04	
Teamwork	0.12		0.57	*(A>P)
Lifelong Learning	0.33	*(S>H)	0.03	

Note. The calculation of effect size estimates was based on Cohen's *d* statistic. This statistic examines the strength of the factor relationship and is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the relationship can be approximated as follows: for $d \approx 0.2$ (small effect), $d \approx 0.5$ (medium effect), $d \approx 0.8$ (large effect).

Significant differences: * $p<0.05$.

Summary: Opportunities for Students to Develop Employability Skills in First Year Courses

For the Hard-Soft factor, 8 of 10 univariate *F*-tests of between-discipline effects on opportunities for students to develop employability skills in first year courses were deemed significant ($p<0.05$). There were significant differences in perception by faculty members across Hard and Soft Fields for the dependent variables of writing skills, oral communication skills, mathematical skills, research skills, decision-making skills, critical thinking skills, evaluation skills, and lifelong learning skills. Mean scores were higher for soft fields than hard fields on 7 of 8 skills. Mean scores were higher for hard fields than soft fields on 1 of 8 skills.

Likewise, along the Pure-Applied factor, 4 of 10 univariate *F*-tests of between-discipline effects on opportunities for students to develop employability skills in first year courses were deemed significant ($p<0.05$). There were significant differences in perception by faculty members across Pure and Applied Fields for the dependent variables of writing skills, computer skills, oral communication skills, and teamwork skills. Mean scores were higher for applied fields than pure fields on 4 of 4 skills.

Second Year Courses

Dependent Variable	Main Effects HARD-SOFT	PURE-APPLIED	Interaction Effect HARD-SOFT x PURE-APPLIED
Writing Skills	S>H	---	---
Computer Skills	H>S	A>P	---
Oral Communication Skills	S>H	A>P	*
Mathematical Skills	H>S	---	---
Research Skills	S>H	P>A	---
Decision-Making Skills	S>H	---	---
Critical Thinking Skills	S>H	---	---
Evaluation Skills	S>H	---	---
Teamwork Skills	---	A>P	---
Lifelong Learning Skills	---	---	---

Note. Significant differences between discipline groups ($p<0.05$):

S>H mean scores higher for soft fields than hard fields

H>S mean scores higher for hard fields than soft fields

A>P mean scores higher for applied fields than pure fields

P>A mean scores higher for pure fields than applied fields

Dashed lines (---) denote non-significant differences between discipline groups

Significant differences were found between disciplines along the following skills. Mean scores (*M*) listed below are based on the following survey scale ratings:

1. Not at all
2. No opportunities to develop
3. Slight opportunities to develop
4. Moderate opportunities to develop
5. Strong opportunities to develop
6. Full opportunities to develop

Writing skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 26.076$, $p<0.05$, such that faculty members from Soft Fields (M=4.377) perceived moderate to strong opportunities for students to develop writing skills in second year courses, compared with moderate opportunities from faculty members of Hard Fields (M=3.791).

Computer skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 7.941$, $p<0.05$, such that faculty members from Hard Fields (M=3.958) perceived moderate opportunities for students to develop computer skills in second year courses, compared with slight to moderate opportunities from faculty members of Soft Fields (M=3.540).

Likewise, there was a significant main effect for the factor PURE-APPLIED, $F(1, 214) = 9.849$, $p<0.05$, such that faculty members from Applied

Fields (M=3.963) perceived moderate opportunities for students to develop computing skills in second year courses, compared with slight to moderate opportunities from faculty members of Pure Fields (M=3.451).

Oral communication skills.

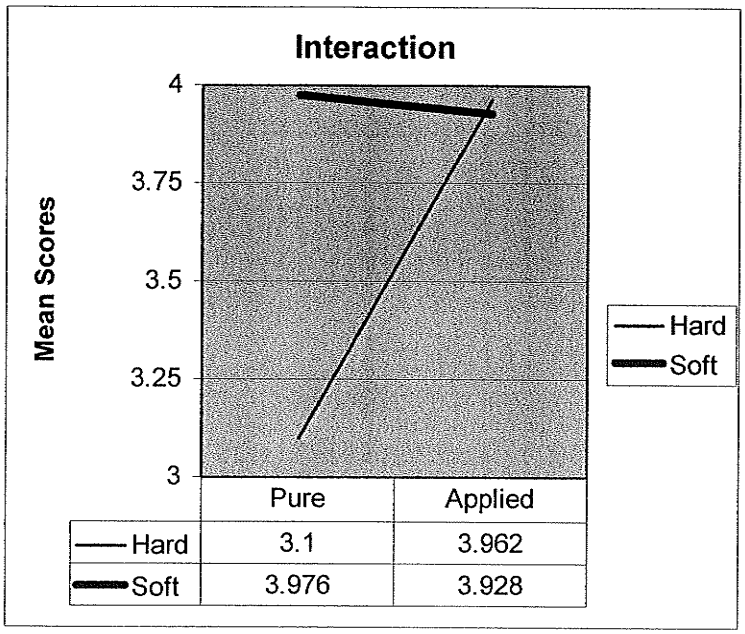
There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 7.886$, $p<0.05$, such that faculty members from Soft Fields (M=3.949) perceived moderate opportunities for students to develop oral communication skills in second year courses, compared with slight to moderate opportunities from faculty members of Hard Fields (M=3.675).

Likewise, there was a significant main effect for the factor PURE-APPLIED, $F(1, 214) = 7.381$, $p<0.05$, such that faculty members from Applied Fields (M=3.948) perceived moderate opportunities for students to develop oral communication skills in second year courses, compared with slight to moderate opportunities from faculty members of Pure Fields (M=3.548).

In addition, there was a significant interaction between both factors of HARD-SOFT and PURE-APPLIED, $F(1, 214) = 9.208$, $p<0.05$, on opportunities for students to develop oral communication skills in 2nd year courses. In particular, faculty members from soft-pure fields reported greater opportunities for students to develop oral communication skills in 2nd year courses than faculty members from hard-pure fields. However, faculty members from both hard-applied and soft-applied fields viewed the opportunity for students to develop oral communication skills roughly the same.

Graphically:

Figure 4: Opportunities to Develop Oral Communication Skills in Second Year



	Pure	Applied
Hard	3.1	3.962
Soft	3.976	3.928

In a Fisher LSD test for simple effects, faculty members from hard fields who are more connected with applied fields (M=3.962) found greater opportunities for students to develop oral communication skills in 2nd year courses than if connected with pure fields (M=3.100), CV_{LSD}=0.40, p<0.05. That is, faculty members from hard-applied fields reported more opportunities for students to develop oral communication skills in 2nd year courses than faculty members from hard-pure fields.

Likewise, faculty members of pure fields who are more attached with soft fields (M=3.976) than hard fields (M=3.100), CV_{LSD}=0.40, p<0.05, found more opportunities for students to develop oral communication skills in 2nd year courses. In essence, faculty members from soft-pure fields found

greater opportunities to develop this skill than faculty members from hard-pure fields.

The simple effects of Pure-Applied factor:

Along Hard Fields:	Applied > Pure	HA > HP
Along Soft Fields:	Applied ≈ Pure	SA ≈ SP

The simple effects of Hard-Soft factor:

Along Pure Fields:	Soft > Hard	SP > HP
Along Applied Fields:	Hard ≈ Soft	HA ≈ SA

Mathematical skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 38.564$, $p<0.05$, such that faculty members from Hard Fields (M=4.025) perceived moderate opportunities for students to develop mathematical skills in second year courses, compared with slight opportunities from faculty members of Soft Fields (M=2.938).

Research skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 19.674$, $p<0.05$, such that faculty members from Soft Fields (M=4.193) perceived moderate opportunities for students to develop research skills in second year courses, compared with slight to moderate opportunities from faculty members of Hard Fields (M=3.483).

Likewise, there was a significant main effect for the factor PURE-APPLIED, $F(1, 214) = 6.369$, $p<0.05$, such that faculty members from Pure Fields (M=4.085) perceived moderate opportunities for students to develop

research skills in second year courses, compared with slight to moderate opportunities from faculty members of Applied Fields (M=3.632).

Decision-making skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 10.227$, $p<0.05$, such that faculty members from Soft Fields (M=4.255) perceived moderate to strong opportunities for students to develop decision-making skills in second year courses, compared with slight to moderate opportunities from faculty members of Hard Fields (M=3.775).

Critical thinking skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 22.172$, $p<0.05$, such that faculty members from Soft Fields (M=4.530) perceived moderate to strong opportunities for students to develop critical thinking skills in second year courses, compared with moderate opportunities from faculty members of Hard Fields (M=3.858).

Overall, of the ten employability skills, faculty members perceived greatest opportunities for students to develop critical thinking skills in second year courses (M=4.160).

Evaluation skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 214) = 19.980$, $p<0.05$, such that faculty members from Soft Fields (M=4.418) perceived moderate to strong opportunities for students to develop evaluation skills in second year courses, compared with slight to moderate opportunities from faculty members of Hard Fields (M=3.800).

Teamwork skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 214) = 22.900$, $p<0.05$, such that faculty members from Applied Fields (M=4.139) perceived moderate opportunities for students to develop teamwork skills in second year courses, compared with slight to moderate opportunities from faculty members of Pure Fields (M=3.426).

Table 28: Effect Size Estimates for Opportunities for Students to Develop Employability Skills in Second Year Courses

Variable	Hard-Soft		Pure-Applied	
Writing	0.57	*(S>H)	0.05	
Computer	0.36	*(H>S)	0.44	*(A>P)
Oral Communication	0.25	*(S>H)	0.36	*(A>P)
Mathematics	0.75	*(H>S)	0.11	
Research	0.62	*(S>H)	0.39	*(P>A)
Decision-Making	0.44	*(S>H)	0.02	
Critical Thinking	0.61	*(S>H)	0.18	
Evaluation	0.58	*(S>H)	0.08	
Teamwork	0.12		0.62	*(A>P)
Lifelong Learning	0.26		0.09	

Note. The calculation of effect size estimates was based on Cohen's *d* statistic. This statistic examines the strength of the factor relationship and is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the relationship can be approximated as follows: for $d \approx 0.2$ (small effect), $d \approx 0.5$ (medium effect), $d \approx 0.8$ (large effect).

Significant differences: * $p<0.05$.

Summary: Opportunities for Students to Develop Employability Skills in Second Year Courses

For the Hard-Soft factor, 8 of 10 univariate *F*-tests of between-discipline effects on opportunities for students to develop employability skills in second year courses were deemed significant ($p<0.05$). There were significant differences in perception by faculty members across Hard and Soft Fields for the dependent variables of writing skills, computer skills, oral communication skills, mathematical skills, research skills, decision-making skills, critical thinking skills, and evaluation skills. Mean scores were higher for soft fields than hard fields on 6 of 8 skills. Mean scores were higher for hard fields than soft fields on 2 of 8 skills.

Likewise, along the Pure-Applied factor, 4 of 10 univariate *F*-tests of between-discipline effects on opportunities for students to develop employability skills in second year courses were deemed significant ($p<0.05$). There were significant differences in perception by faculty members across Pure and Applied Fields for the dependent variables of computer skills, oral communication skills, research skills, and teamwork skills. Mean scores were higher for applied fields than pure fields on 3 of 4 skills. Mean scores were higher for pure fields than applied fields on 1 of 4 skills.

Finally, one significant interaction took place between both factors for the dependent variable related to oral communication skills.

Third Year Courses

Dependent Variable	Main Effects HARD-SOFT	Main Effects PURE-APPLIED	Interaction Effect HARD-SOFT x PURE-APPLIED
Writing Skills	S>H	P>A	---
Computer Skills	H>S	---	---
Oral Communication Skills	---	---	---
Mathematical Skills	H>S	---	---
Research Skills	S>H	P>A	---
Decision-Making Skills	S>H	---	---
Critical Thinking Skills	S>H	---	---
Evaluation Skills	S>H	---	---
Teamwork Skills	---	A>P	---
Lifelong Learning Skills	---	---	---

Note. Significant differences between discipline groups ($p<0.05$):

S>H mean scores higher for soft fields than hard fields

H>S mean scores higher for hard fields than soft fields

A>P mean scores higher for applied fields than pure fields

P>A mean scores higher for pure fields than applied fields

Dashed lines (---) denote non-significant differences between discipline groups

Significant differences were found between disciplines along the following skills. Mean scores (*M*) listed below are based on the following survey scale ratings:

1. Not at all
2. No opportunities to develop
3. Slight opportunities to develop
4. Moderate opportunities to develop
5. Strong opportunities to develop
6. Full opportunities to develop

Writing skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 212) = 12.569$, $p<0.05$, such that faculty members from Soft Fields (M=4.842) perceived strong opportunities for students to develop writing skills in third year courses, compared with moderate to strong opportunities from faculty members of Hard Fields (M=4.363).

Likewise, there was a significant main effect for the factor PURE-APPLIED, $F(1, 212) = 5.566$, $p<0.05$, such that faculty members from Pure Fields (M=4.802) perceived strong opportunities for students to develop writing skills in third year courses, compared with moderate to strong opportunities from faculty members of Applied Fields (M=4.437).

Computer skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 212) = 9.711$, $p<0.05$, such that faculty members from Hard Fields (M=4.446)

perceived moderate to strong opportunities for students to develop computer skills in third year courses, compared with moderate opportunities from faculty members of Soft Fields (M=3.978).

Mathematical skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 212) = 24.972$, $p<0.05$, such that faculty members from Hard Fields (M=4.297) perceived moderate opportunities for students to develop mathematical skills in third year courses, compared with slight to moderate opportunities from faculty members of Soft Fields (M=3.368).

Research skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 212) = 10.884$, $p<0.05$, such that faculty members from Soft Fields (M=4.736) perceived moderate to strong opportunities for students to develop research skills in third year courses, compared with moderate opportunities from faculty members of Hard Fields (M=4.198).

Likewise, there was a significant main effect for the factor PURE-APPLIED, $F(1, 212) = 7.837$, $p<0.05$, such that faculty members from Pure Fields (M=4.728) perceived moderate to strong opportunities for students to develop research skills in third year courses, compared with moderate opportunities from faculty members of Applied Fields (M=4.259).

Decision-making skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 212) = 4.848$, $p<0.05$, such that faculty members from Soft Fields (M=4.757)

perceived moderate to strong opportunities for students to develop decision-making skills in third year courses, compared with moderate opportunities from faculty members of Hard Fields (M=4.462).

Critical thinking skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 212) = 16.510$, $p<0.05$, such that faculty members from Soft Fields (M=5.000) perceived strong opportunities for students to develop critical thinking skills in third year courses, compared with moderate to strong opportunities from faculty members of Hard Fields (M=4.512).

Overall, of the ten employability skills, faculty members perceived greatest opportunities for students to develop critical thinking skills in third year courses (M=4.726).

Evaluation skills.

There was a significant main effect for the factor HARD-SOFT, $F(1, 212) = 20.208$, $p<0.05$, such that faculty members from Soft Fields (M=4.968) perceived strong opportunities for students to develop evaluation skills in third year courses, compared with moderate to strong opportunities from faculty members of Hard Fields (M=4.388).

Teamwork skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 212) = 10.751$, $p<0.05$, such that faculty members from Applied Fields (M=4.629) perceived moderate to strong opportunities for students to develop

teamwork skills in third year courses, compared with moderate opportunities from faculty members of Pure Fields (*M*=4.160).

Table 29: Effect Size Estimates for Opportunities for Students to Develop Employability Skills in Third Year Courses

Variable	Hard-Soft		Pure-Applied	
Writing	0.48	*(S>H)	0.37	*(P>A)
Computer	0.39	*(H>S)	0.21	
Oral Communication	0.19		0.02	
Mathematics	0.62	*(H>S)	0.07	
Research	0.51	*(S>H)	0.44	*(P>A)
Decision-Making	0.30	*(S>H)	0.04	
Critical Thinking	0.52	*(S>H)	0.15	
Evaluation	0.57	*(S>H)	0.04	
Teamwork	0.04		0.44	*(A>P)
Lifelong Learning	0.19		0.12	

Note. The calculation of effect size estimates was based on Cohen's *d* statistic. This statistic examines the strength of the factor relationship and is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the relationship can be approximated as follows: for $d \approx 0.2$ (small effect), $d \approx 0.5$ (medium effect), $d \approx 0.8$ (large effect).

Significant differences: * $p<0.05$.

Summary: Opportunities for Students to Develop Employability Skills in Third Year Courses

For the Hard-Soft factor, 7 of 10 univariate *F*-tests of between-discipline effects on opportunities for students to develop employability skills in third year courses were deemed significant ($p<0.05$). There were significant differences in perception by faculty members across Hard and Soft Fields for the dependent variables of writing skills, computer skills, mathematical skills, research skills, decision-making skills, critical thinking skills, and evaluation skills. Mean scores were higher for soft fields than hard fields on 5 of 7 skills. Mean scores were higher for hard fields than soft fields on 2 of 7 skills.

Likewise, along the Pure-Applied factor, 3 of 10 univariate *F*-tests of between-discipline effects on opportunities for students to develop employability skills in third year courses were deemed significant ($p<0.05$). There were significant differences in perception by faculty members across Pure and Applied Fields for the dependent variables of writing skills, research skills, and teamwork skills. Mean scores were higher on applied fields than pure fields on 1 of 3 skills. Mean scores were higher on pure fields than applied fields on 2 of 3 skills.

Further, findings indicate that there were different patterns of opportunities for students to develop general employability skills across course levels, as perceived by faculty members.

Interestingly, across all three years of a typical undergraduate program, there were a greater number of opportunities to develop general employability skills for students connected with Hard-Soft fields over Pure-Applied fields. Further, within Biglan categories, statistically significant differences in perceptions by faculty members were more often found in soft fields compared to hard fields, and in applied fields compared to pure fields, with respect to the development of employability skills.

Across all three years of a typical undergraduate program, statistically significant differences in perceptions by faculty members from soft fields more so than hard fields were found with respect to the development of 5 of 10 employability skills. Faculty members from soft fields believed students had opportunities to develop the following five skills in each of the three years of a typical undergraduate program: writing skills, research skills, decision-making skills, critical thinking skills, and evaluation skills. Likewise, statistically significant differences in perceptions by faculty members from hard fields were found with respect to the development of 1 of 10 employability skills (namely, mathematical skills) across all three years of a typical undergraduate program. Similarly, statistically significant differences in perceptions on the development of 1 of 10 employability skills (namely, teamwork skills) were more often found by faculty members in applied fields compared to pure fields.

Table 30: Means and Standard Deviations of Faculty Members Perceptions about Possession of General Employability Skills by Biglan Categories

To what extent do you believe graduates of undergraduate programs as a whole possess the following general employability skills?

1. Not at all possessed
2. Not possessed
3. Slightly possessed
4. Moderately possessed
5. Strongly possessed
6. Fully possessed

Variable	Mean	Standard Deviation	N
Writing			
Hard	4.023	0.833	129
Soft	4.118	0.713	110
Pure	3.917	0.743	85
Applied	4.149	0.790	154
Total Sample	4.066	0.780	239
Computer			
Hard	4.503	0.885	129
Soft	4.472	0.915	110
Pure	4.282	0.894	85
Applied	4.603	0.881	154
Total Sample	4.489	0.897	239
Oral Communication			
Hard	4.255	0.937	129
Soft	4.236	0.947	110
Pure	3.752	0.843	85
Applied	4.519	0.879	154
Total Sample	4.246	0.940	239

Variable	Mean	Standard Deviation	N
Mathematical			
Hard	4.031	1.280	129
Soft	3.872	1.158	110
Pure	3.917	1.246	85
Applied	3.980	1.217	154
Total Sample	3.958	1.225	239
Research			
Hard	3.976	1.041	129
Soft	4.209	0.813	110
Pure	4.070	0.935	85
Applied	4.090	0.959	154
Total Sample	4.083	0.949	239
Decision-Making			
Hard	4.248	0.976	129
Soft	4.390	0.878	110
Pure	4.058	0.930	85
Applied	4.454	0.908	154
Total Sample	4.313	0.933	239
Critical Thinking			
Hard	4.263	1.057	129
Soft	4.436	0.807	110
Pure	4.070	0.948	85
Applied	4.493	0.923	154
Total Sample	4.343	0.952	239
Evaluating Statements			
Hard	4.124	1.060	129
Soft	4.300	0.841	110
Pure	3.952	0.911	85
Applied	4.344	0.972	154
Total Sample	4.205	0.967	239
Teamwork			
Hard	4.403	0.972	129
Soft	4.300	1.018	110
Pure	3.823	0.965	85
Applied	4.649	0.882	154
Total Sample	4.355	0.993	239

Variable	Mean	Standard Deviation	N
Lifelong Learning			
Hard	4.131	1.155	129
Soft	4.090	1.062	110
Pure	3.764	1.098	85
Applied	4.305	1.074	154
Total Sample	4.113	1.111	239

Table 31: Univariate *F*-Tests of Between-Discipline Effects on Overall Possession of Employability Skills of Graduates

The fourth ANOVA procedure compared the perceptions of faculty members across Biglan categories on overall possession of employability skills of university graduates.

Dependent Variable	Main Effects		Interaction Effect
	HARD-SOFT	PURE-APPLIED	HARD-SOFT x PURE-APPLIED
Writing Skills	---	A>P	---
Computer Skills	---	A>P	---
Oral Communication Skills	---	A>P	---
Mathematical Skills	---	---	---
Research Skills	---	---	---
Decision-Making Skills	---	A>P	---
Critical Thinking Skills	---	A>P	---
Evaluation Skills	---	A>P	---
Teamwork Skills	---	A>P	*
Lifelong Learning Skills	---	A>P	---

Note. Significant differences between discipline groups ($p<0.05$):

A>P mean scores higher for applied fields than pure fields

Dashed lines (---) denote non-significant differences between discipline groups.

Significant differences were found between disciplines along the following skills. Mean scores (*M*) listed below are based on the following survey scale ratings:

1. Not at all possessed
2. Not possessed
3. Slightly possessed
4. Moderately possessed
5. Strongly possessed
6. Fully possessed

Writing skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 235) = 5.248$, $p<0.05$, such that faculty members from Applied Fields (M=4.149) believed graduates had moderate possession of writing skills more so than faculty members from Pure Fields (M=3.917).

Computer skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 235) = 7.464$, $p<0.05$, such that faculty members from Applied Fields (M=4.603) believed graduates had moderate to strong possession of computer skills, compared with faculty members from Pure Fields (M=4.282) who believed graduates moderately possessed this skill.

Oral communication skills.

There was a significant main effect for the factor PURE-APPLIED,

$F(1, 235) = 43.352$, $p<0.05$, such that faculty members from Applied Fields (M=4.519) believed graduates had moderate to strong possession of oral communication skills, compared with faculty members from Pure Fields (M=3.752) who believed graduates possessed this skill slightly to moderately.

Decision-making skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 235) = 11.172$, $p<0.05$, such that faculty members from Applied Fields (M=4.454) believed graduates had moderate to strong possession of decision-making skills, compared with faculty members from Pure Fields (M=4.058) who believed graduates moderately possessed this skill.

Critical thinking skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 235) = 11.951$, $p<0.05$, such that faculty members from Applied Fields (M=4.493) believed graduates had moderate to strong possession of critical thinking skills, compared with faculty members of Pure Fields (M=4.070) who believed graduates moderately possessed this skill.

Evaluation skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 235) = 9.937$, $p<0.05$, such that faculty members from Applied Fields (M=4.344) believed graduates had moderate to strong possession of evaluation skills, compared with faculty members from Pure Fields (M=3.952) who believed graduates moderately possessed this skill.

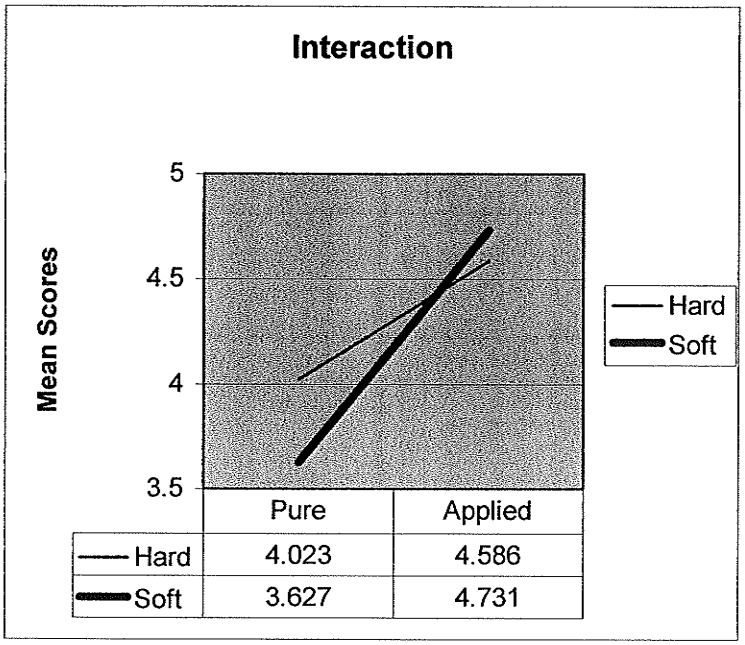
Teamwork skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 235) = 45.912$, $p<0.05$, such that faculty members from Applied Fields (M=4.649) believed graduates had moderate to strong possession of teamwork skills, compared with faculty members from Pure Fields (M=3.823) who believed graduates moderately possessed this skill.

In addition, there was a significant interaction between both factors of HARD-SOFT and PURE-APPLIED, $F(1, 235) = 4.843$, $p<0.05$, on the possession of teamwork skills. In particular, faculty members from hard-pure fields reported greater occurrences of possession of teamwork skills than faculty members from soft-pure fields. Likewise, faculty members from soft-applied fields viewed the possession of teamwork skills greater than faculty members from hard-applied fields.

Graphically:

Figure 5: Possession of Teamwork Skills



	Pure	Applied
Hard	4.023	4.586
Soft	3.627	4.731

Using Fisher's LSD procedure, tests of simple effects were used to decompose the interaction.

Faculty members from hard fields found greater possession of teamwork skills by graduates if they were connected to applied fields (M=4.586) than pure fields (M=4.023), CV_{LSD}=0.32, p<0.05. That is, faculty members from hard-applied fields viewed greater possession of teamwork skills than faculty members from hard-pure fields.

Faculty members from pure fields also found greater possession of teamwork skills by graduates if they were connected to hard fields (M=4.023) than soft fields (M=3.627), CV_{LSD}=0.32, p<0.05. That is, faculty members from hard-pure fields viewed greater possession of teamwork skills than faculty members from soft-pure fields.

Finally, faculty members from soft fields found greater possession of teamwork skills into their courses if they were connected to applied fields (M=4.731) than pure fields (M=3.627), CV_{LSD}=0.32, p<0.05. That is, faculty members from soft-applied fields viewed greater possession of teamwork skills than faculty members from soft-pure fields.

The simple effects of Pure-Applied factor:

Along Hard Fields:	Applied > Pure	HA > HP
Along Soft Fields:	Applied > Pure	SA > SP

The simple effects of Hard-Soft factor:

Along Pure Fields:	Hard > Soft	HP > SP
Along Applied Fields:	Hard ≈ Soft	HA ≈ SA

Lifelong learning skills.

There was a significant main effect for the factor PURE-APPLIED, $F(1, 235) = 13.747$, $p<0.05$, such that faculty members from Applied Fields (M=4.305) believed graduates had moderate to strong possession of lifelong learning skills, compared with faculty members from Pure Fields (M=3.764) who believed graduates possessed this skill slightly to moderately.

Table 32: Effect Size Estimates for Overall Possession of Employability Skills

Variable	Hard-Soft	Pure-Applied
Writing	0.12	0.30 *(A>P)
Computer	0.03	0.36 *(A>P)
Oral Communication	0.02	0.82 *(A>P)
Mathematics	0.13	0.05
Research	0.25	0.02
Decision-Making	0.15	0.42 *(A>P)
Critical Thinking	0.18	0.44 *(A>P)
Evaluation	0.18	0.41 *(A>P)
Teamwork	0.10	0.83 *(A>P)
Lifelong Learning	0.04	0.49 *(A>P)

Note. The calculation of effect size estimates was based on Cohen's *d* statistic. This statistic examines the strength of the factor relationship and is calculated using the mean difference of each factor group divided by the pooled standard deviation in the ANOVA table. The strength of the relationship can be approximated as follows: for $d \approx 0.2$ (small effect), $d \approx 0.5$ (medium effect), $d \approx 0.8$ (large effect).

Significant differences: * $p<0.05$.

Summary: Overall Possession of Employability Skills of University Graduates

For the Pure-Applied factor, 8 of 10 univariate *F*-tests of between-discipline effects on overall possession of employability skills by university graduates were deemed significant ($p<0.05$). There were significant differences in perception by faculty members across Pure and Applied Fields for the dependent variables of writing skills, computer skills, oral communication skills, decision-making skills, critical thinking skills, evaluation skills, teamwork skills, and lifelong learning skills. Mean scores were higher for applied fields than pure fields on 8 of 8 skills.

Further, findings from the faculty survey revealed some interesting observations on general employability skills development. Some faculty members across Biglan categories observed the following two points. First, some employability skills are best taught at the high school level (e.g., basic skills in mathematics and writing) while other employability skills (e.g., research skills, critical thinking skills) were more appropriate for development at the post-secondary levels.

Second, some faculty members from applied programs (e.g., Dentistry, Education, and Law) commented that students from professional programs where a first degree is often required as a prerequisite may have higher skills development and experience than students from typical undergraduate programs (e.g., Arts or Sciences).

Summary of Findings

A brief summary of the general findings from this Chapter can be presented here:

- University graduates have perceived that they have developed and used a variety of employability skills.
- Faculty members have believed that certain employability skills are important to teach.
- Faculty members have integrated a variety of employability skills into their courses.
- Faculty members found that different patterns of opportunities exist for students to develop general employability skills across course levels. In particular, faculty members from soft fields and applied fields tend to provide greater opportunities for students to develop employability skills than faculty members from hard fields and pure fields.
- Statistically significant differences in perceptions with respect to the development of employability skills were more often found in soft fields compared to hard fields, and in applied fields compared to pure fields.

In the next and final Chapter, discussion of the results, together with recommendations, and conclusions will be presented.

Chapter Five: Summary, Discussion, Recommendations, and Conclusion

This Chapter is organized into six sections. The first section summarizes the study. The second section discusses the implications of the findings. The third section identifies some limitations of the study. The fourth and fifth sections deal with some recommendations for further research and for practice. The final section summarizes the conclusion of the study.

Summary of the Study

This study examined the perceptions of both graduates and faculty members at a single university about the development of employability skills in undergraduate programs. The study was designed to seek answers to the following research questions:

1. Do student perceptions of their development and use of general employability skills at a single university differ across academic disciplines reflected in Biglan categories?
2. What kinds of general employability skills do faculty members from different academic disciplines reflected in Biglan categories at a single university judge as important to teach students?
3. Do faculty member perceptions about the development of general employability skills at a single university differ across academic disciplines reflected in Biglan categories?

There were a number of significant differences in perceptions between university graduates and faculty members across Biglan categories with

respect to the development of general employability skills. In particular, statistically significant differences in perceptions with respect to the development of employability skills were more often found in soft fields compared to hard fields, and in applied fields compared to pure fields. Several significant interactions occurred between hard-soft and pure-applied fields along selected employability skills. The next section discusses these findings in a more systematic manner based on the research questions set out in this study.

Discussion of the Findings

The findings of this study illustrated the perceptions of university graduates and faculty members with respect to ten selected general employability skills. This section will discuss these findings with respect to the original research questions and in relation to the review of literature.

Research question one.

Do student perceptions of their development and use of general employability skills at a single university differ across academic disciplines reflected in Biglan categories?

The findings of this study suggested the existence of differences in perceptions among university graduates across Biglan categories on the types of general employability skills developed and used. The findings indicated that university graduates have differing perceptions as to the types of employability skills developed in their program of study and used in their job.

All but one general employability skill developed during students' programs of study were deemed statistically significant across Biglan categories. The fact that graduates perceived to have developed numerous employability skills, however, is in contradiction to recent reports by Evers, Rush, and Berdrow (1998) and Industry Canada (2000) which indicate from employers that, because of the changing labour market and economic conditions, the general employability skills required in today's knowledge-based economy do not appear to be well-developed by university graduates.

Further, not only have university graduates perceived to have developed a wide range of employability skills, but these skills have also spanned a range of categories as suggested by both the Conference Board of Canada (1993, 1998) and SCANS (U.S. Department of Labor, 1991) framework. Overall, university graduates have perceived that their program of study has somewhat developed basic fundamental skills related to writing (M=3.158), computing (M=2.775), and oral communication (M=3.247); advanced skills related to research (M=3.301) and decision-making (M=3.272) more than somewhat; and personal management skills related to teamwork (M=3.401) and lifelong learning (M=3.286) less than a great deal. This finding suggests that making employability skills more explicit to employers would help to minimize the gap in perceptions between various stakeholders on what is appropriate employability skills development.

Graduates of soft fields reported greater development of writing and oral communication skills than graduates of hard fields. Meanwhile,

graduates of applied fields reported a greater development of teamwork skills than graduates of pure fields. The mean score for graduates of applied fields on teamwork skills was 3.502 and the mean score for graduates of pure fields was 3.133. These statements reflect similar findings to Reich (1991) who identified four fundamental skills for the knowledge worker of the new century in areas related to abstraction, systems thinking, experimentation, and collaboration (involving oral communication, written communication, and team-working skills).

Recent research conducted by Li, Long, and Simpson (1999) showed that certain soft disciplines placed greater emphasis on general skills such as critical thinking and oral communication skills than hard disciplines (Li, Long & Simpson, 1999). The findings from this study revealed that there were significant differences in oral communication skills between soft fields (M=3.305) and hard fields (M=3.174), but no significant differences with respect to critical thinking skills, for example. The mean score for graduates of soft fields on critical thinking skills was 3.383 and the mean score for those in hard fields was 3.433. These scores indicate that university graduates perceived the development of critical thinking skills roughly the same.

Another finding consistent with the literature is how the development of teamwork skills can be found in a variety of settings such as the classroom or workplace. According to Chickering and Gamson (1987), working in teams through cooperation among fellow classmates is one good practice of undergraduate education. Effective learning, according to Chickering and

Gamson (1987), ought to be collaborative and social, not competitive and isolated. In fact, graduates from applied fields (*M*=3.502) reported a greater development of teamwork skills in their program of study than graduates from pure fields (*M*=3.133). This finding is quite noteworthy since many of the applied professional programs such as Agriculture, Engineering, Management, and Nursing, for example, often involve extensive project management teams, group work, and collaboration with others.

Further, in terms of use of employability skills in their job, graduates from soft fields over hard fields and applied fields over pure fields reported a greater number of skills that were of statistical significance. Similar to the ratings given to the development of employability skills, the two most used employability skills as reported by graduates were critical thinking (*M*=3.828) and teamwork (*M*=3.772). The use of these skills on the job, and its corresponding development, demonstrates the congruency of these two skills. The fact that these employability skills can also be transferable from one job to the next is reassuring in an era of enhanced employability and lifelong employability.

Given that employability skills development is seen as one form of human capital, individuals will often invest time and energy to become more skilled. Over time, skills tend to depreciate and must be continually used in order to avoid atrophy. Hence, employers typically invest in the human capital development of their employees in hopes of a future return on these investments in terms of worker productivity, for example. The fact that

graduates have identified using these skills two years after graduation provides both employers and educational institutions with confidence in knowing that their program of study was helpful in aiding their development and use of employability skills.

Research question two.

What kinds of general employability skills do faculty members from different academic disciplines reflected in Biglan categories at a single university judge as important to teach students?

The findings indicate that faculty members believed there are several important skills to teach students. The fact that faculty members have identified several important employability skills to teach students is in line with one purpose of a university education. While it is important for students to become acquainted with a body of facts, theories, and ideas of the discipline, it is equally important for faculty members to impart a variety of basic intellectual skills and habits of thought (Bok, 1974; Farr, 2000; Harvey, 2000). These intellectual skills and habits of thought typically refer to the ability to communicate orally and in writing, the ability to speak and read a foreign language, the attitude of lifelong learning, and even an attitude of being an informed citizen about worldly issues. The importance of teaching such employability skills can serve students well in roles such as members of the workforce, public citizens, or as private individuals. In fact, focusing on developing appropriate employability skills within undergraduate education programs can assist students in a better understanding of how the world evolves and operates, for example (Chickering & Gamson, 1987).

In addition, the importance of teaching employability skills to students was supported by the work of Harvey (2000). The main role of faculty members, according to Harvey (2000), is to train and empower students to be lifelong learners and critical thinkers. Employability skills development ought to be viewed as integral to effective learning rather than as in opposition or in addition to learning in a discipline.

More specifically, the findings from this study revealed that mathematical skills were more important to teach by faculty members in hard fields (M=4.628) than in soft fields (M=4.087). Faculty members from hard fields viewed the teaching of mathematical skills as moderate to very important compared with moderately important for those in soft fields.

Teamwork skills were seen as more important to faculty members from applied fields (M=5.119) than pure fields (M=4.275). Likewise, lifelong learning skills were considered important from the perspectives of those in applied fields (M=5.246) compared with pure fields (M=4.804). The two examples of teamwork skills and lifelong learning skills parallel the notion that one purpose of a university education ought to, not only focus on content-specific knowledge, but also on the intellectual skills and habits of thought necessary for success outside of the classroom.

Knowledge of what skills are important to teach students is partly supported by the ongoing work of Astin in his studies on the academic and cognitive development of students (Astin, 1985, 1993). Having faculty members make explicit the types and range of employability skills that can be

developed through various teaching and learning activities and evaluation methods can enhance the cognitive development of student's own learning and meet their expectations of the purpose of a university education.

A comparison of the perspectives of both university graduates and faculty members as to what constitutes appropriate employability skills development is warranted in the next section. Interestingly, findings from this study revealed the existing gap in perceptions by university graduates on the types of employability skills developed from their program of study compared with the perceptions by faculty members on what is important to teach students. Students and faculty members appear to be on different levels of understanding as to what constitutes appropriate employability skills development.

Overall, faculty members believed that critical thinking (M=5.642), writing skills (M=5.443), and evaluation skills (M=5.406) were either very important or extremely important to teach in their academic discipline. Meanwhile, university graduates agreed with faculty members that critical thinking skills (M=3.405) were developed a great deal in their program of studies, but only somewhat for writing skills (M=3.158), and evaluation skills (M=3.207).

Further, another gap in perception between university graduates and faculty members existed. Whereas university graduates perceived that teamwork skills was developed fairly well (M=3.401), faculty members

perceived teamwork skills to be only moderate to very important (*M*=4.821), relative to the other selected employability skills.

As well, two employability skills that were similarly perceived by both university graduates and faculty members were computer skills and mathematical skills. University graduates perceived that computer skills (*M*=2.775) and mathematical skills (*M*=3.049) were the least developed in their program of studies. Faculty members, on the other hand, felt that computer skills (*M*=4.528) and mathematical skills (*M*=4.378) were important to teach only to a moderate extent. This finding suggests that these two skills are either developed by students prior to entering university and as a result are not given priority at university, or that faculty members may assume that students have already developed these two basic employability skills. As a result, faculty members do not spend time to teach these basic skills to students.

Research question three.

Do faculty member perceptions about the development of general employability skills at a single university differ across academic disciplines reflected in Biglan categories?

Despite the charge from several reports that general employability skills are not being well-taught by faculty members, the findings from this study demonstrated strong commitment of faculty members across Biglan categories to integrate employability skills in their courses and teaching practices. Significant differences in perceptions by faculty members from hard and soft fields were found on the integration along 8 of 10 general

employability skills. Faculty members from pure and applied fields reported differences in perceptions along 6 of 10 general employability skills.

Further, the claim that educational institutions, and in particular universities, do not explicitly emphasize general employability skills development in their design of courses and programs nor in the shaping of curricula is rejected by the findings from this study. Faculty members across academic disciplines reported the strong integration of employability skills into their courses and curriculum. In an open-ended question on the faculty survey, respondents were asked to list one example of how they integrated employability skills into their courses. Slightly three-quarters of respondents provided an example. This statistic suggests that faculty members are well-aware of how general employability skills can be integrated into their own teaching.

Specifically, faculty members from soft fields (M=5.105) integrated writing skills in their courses more so than those in hard fields (M=4.292). The mean score between the two categories varied significantly. Faculty members from soft fields believed to have strongly integrated writing skills more so than moderately for faculty members in pure fields. This finding is consistent with earlier studies reported by Lattuca and Stark (1995), which found a greater preference and emphasis by faculty members from soft fields for writing skills and active learning as methods of pedagogy. This is partly attributed to faculty members in soft fields being more likely than those in

hard fields to rely on scholarly-based activities that focus on current journal readings and personal reflection activities as part of their courses.

The findings from this study also suggested that students have many opportunities to develop general employability skills in first, second, and third year courses according to the perceptions of faculty members across Biglan categories. These findings are in line with an earlier study conducted by Atkins (1999) which concluded that universities ought to provide greater adoption of general employability skills into all stages of the university curriculum in order to enhance the employability and marketability of graduates.

The findings also indicated different patterns of opportunities for students to develop general employability skills across course levels. Faculty members from soft fields and applied fields believed greater opportunities for students to develop employability skills than faculty members from hard fields and pure fields. Across all three years of a typical undergraduate program, statistically significant differences in perceptions by faculty members from soft fields more so than hard fields were found with respect to the development of 5 of 10 employability skills. Faculty members from soft fields believed students had opportunities to develop the following five skills in each of the three years of a typical undergraduate program: writing skills, research skills, decision-making skills, critical thinking skills, and evaluation skills. Likewise, statistically significant differences in perceptions by faculty members from hard fields were found with respect to the development of 1 of 10

employability skills (namely, mathematical skills) across all three years of a typical undergraduate program. Similarly, statistically significant differences in perceptions on the development of 1 of 10 employability skills (namely, teamwork skills) were more often found by faculty members in applied fields compared to pure fields.

Finally, the perceptions of faculty members about the overall skill possession of students and graduates were generally viewed positively. The findings revealed that a greater number of faculty members from applied fields felt that students possessed a wider range of employability skills than faculty members from pure fields. In fact, statistically significant differences in perceptions by faculty members from applied fields were found with respect to the development on 8 of 10 employability skills in which the null hypothesis was rejected. However, one of two employability skills displaying no significant differences in perceptions between faculty members was the development of mathematical skills. Many survey respondents felt that mathematical skills, defined to be basic operations related to adding, subtracting, multiplying, and dividing, was best left for the public school system to develop (i.e., in elementary or secondary school), while other advanced forms of employability skills (e.g., research skills, critical thinking skills) were more appropriate for development at the post-secondary levels.

Second, some faculty members from applied programs (e.g., Dentistry, Education, and Law) reported that students from professional programs, where a first degree is often required as a prerequisite, may already have

higher skills development and experience than students from typical undergraduate programs (e.g., Arts or Sciences).

Further, the fact that the majority of faculty members across academic disciplines were generally satisfied with the types of skills that students and graduates possessed bode well for their success in the workplace. The generally positive results suggest that faculty members are confident that students will be leaving university with employability skills that can be transferable from job-to-job. This finding dispels many employer concerns about the lack of skill development and job preparedness of recent graduates and entry-level workers.

Limitations of the Study

Some of the limitations encountered in this study included:

1. The concept of employability skills, developed by the Conference Board of Canada, was derived from lists of skills deemed necessary by senior managers. It is not clear which employability skills are perceived to be most important or desirable by employers.

2. Although a single university was used in this study, the findings and conclusions may not be generalizable beyond the specific population from which the sample was drawn. The findings and conclusions in this study cannot be generalized to educational institutions other than those at the University of Manitoba, which is largely a research-intensive university offering a range of undergraduate programs. It would be beneficial to have included the other two universities in Manitoba as part of this study to provide

a more comprehensive picture of how employability skills are perceived to be developed by university graduates and faculty members across the post-secondary education system.

3. While a 40% response rate was achieved by faculty members across Biglan categories to the faculty survey, those who did not respond to the survey may have yielded other useful results. Further, knowledge and understanding of the employability skills concept may have limited the participation of university graduates or faculty members in this study. Hence, the sample may be biased.

4. Of the 285 faculty members who responded to the survey, 38 faculty members (or 13%) did not state their department, school, or faculty affiliation. As a result, the information they provided on the survey was removed by the researcher from subsequent data analyses. Again, this removal of information may limit the results.

5. Finally, the study dealt with self-perceptions of both university graduates and faculty members on the development of employability skills in undergraduate programs. Given that the study focused on self-perceptions, it is likely that the perceptions of multiple stakeholders (such as graduates, faculty members, and employers) may not be entirely aligned. For example, the perceptions of employers on what constitutes appropriate employability skills needed for the workplace may not match the perceptions of university graduates.

Recommendations for Further Research

Based on the findings of the study and the discussions presented in this Chapter, the following are some recommendations for further research:

1. Further research can be replicated with a focus on graduates and faculty members from the other two major universities in Manitoba to truly provide a comprehensive picture of the nature of general employability skills development across the university system in Manitoba.

2. Further research can be replicated to focus on university students in their final year of their undergraduate degree program as opposed to university graduates. This would enable educators and employers to determine the adequacy of the curriculum in adequately preparing students for entry-level positions.

3. Further research can be done to determine whether university graduates and faculty members of different genders view the development of employability skills differently.

4. Further research can be sought to determine whether junior faculty members (e.g., those with less than five years experience) view the development of general employability skills differently than senior faculty members. Such a study would enable better identification of educational development across the career span.

5. Further research is required to determine what kinds of instructional methods and teaching activities (e.g., lectures, group work, case studies) best foster the development of employability skills across academic disciplines.

Such research has the potential to enhance the teaching experiences of faculty members and the learning experiences of students.

6. Further research can build upon sections of the existing faculty survey by following up with faculty members, through qualitative interviews and focus groups, to examine how they integrate employability skills into their courses and discipline area.

Recommendations for Practice

In addition to ideas for further research, the current study offers a series of recommendations for various stakeholders such as students and graduates, faculty members, and employers.

For students and graduates.

1. Students and graduates should take stock of the variety of general employability skills being developed in their courses and programs by keeping a skills portfolio, for example.

2. Students and graduates should view the development of employability skills as opportunity enhancers for better employment prospects and informed citizenry.

For faculty members.

1. Faculty members should continue integrating a variety of instructional methods and evaluation activities which explicitly enhance the development of employability skills. University teaching and faculty development units on campus should develop workshops for faculty members to address this growing topic area.

2. Faculty members should continue demonstrating leadership in the

classroom by fostering an environment that teaches students a variety of employability skills alongside content of the discipline. Faculty members should make explicit the types and range of employability skills that can be developed through various teaching and learning activities and evaluation methods, for example.

3. Faculty members, when designing new courses or updating existing courses, should explicitly consider the list of general employability skills as a means to identify and create instructional goals and learning objectives into their course outlines and classroom instruction.

4. Faculty members should consider ways to incorporate a variety of employability skills into their teaching practice in order to improve the quality of learning within their undergraduate program.

For employers.

1. Employers should be working more closely with educational institutions to articulate the general employability skills required in today's workplace.

2. Employers should be partnering with departments, schools, and faculties on establishing cooperative or internship programs to enrich the learning experiences of students.

3. Employers should be providing prospective graduates with a guideline of suitable employability skills prior to entering a job.

Conclusion

This study was intended to increase our knowledge and understanding of the pattern of disciplinary differences in the development of general employability skills as perceived by both recent university graduates and faculty members. The findings from this study showed that academic disciplines vary in their emphasis on the types of employability skills developed.

The main implications from this study revolve around the fact that ongoing dialogue between various educational stakeholders about the nature and development of employability skills is key. An understanding of the types of general employability skills that are important for student learning can be helpful in the design of courses and programs, as well as for the effective teaching of these skills. The need for identification and development of general employability skills is a key source of information required to shape and support curriculum development.

The changing nature of work and economy has created greater attention on the transitions made from school-to-work by students and graduates. In order to address this issue, a better understanding of how employability skills are developed within undergraduate programs is a critical issue for future research and practice in university teaching and learning.

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Appendix A: Graduate Survey Questions

- To what extent did your program **develop** the following skills? How about... (READ FIRST ITEM – RANDOMIZE)

  Would you say your program developed this skill... (READ RESPONSES)? How about... (NEXT ITEM)? (REPEAT RESPONSES AS NECESSARY)

- To what extent did you **use** these skills during the reference week (i.e., two years after graduation)?

Items

Writing skills
Computer skills
Communication or speaking skills
Mathematics, or mathematics as they were appropriate for your program
Research skills
Decision-making skills
The ability to think independently
The ability to evaluate or critique a statement
The ability to work with others
(ALWAYS READ LAST): Interest in lifelong learning

Responses

(4) A great deal
(3) Somewhat
(2) Not very much
(1) Not at all
(VOLUNTEERED): Not applicable

Appendix B: Letter of Permission for Release of Graduate Data

December 10, 2003

Ms. Thelma Lussier
Director, Office of Institutional Analysis
201 Allen Building
The University of Manitoba
Winnipeg, MB R3T 2N2

Dear Ms. Lussier,

I am a doctoral candidate in Post-Secondary Studies, Faculty of Education, at the University of Manitoba.

One aspect of my proposed study will be to determine what general employability skills are important to university graduates across academic disciplines and programs in Manitoba. Another purpose is to determine differences in perceptions between university graduates across academic disciplines and programs with respect to the types of general employability skills developed at university.

These two research purposes can be addressed using data from the Manitoba Graduate Follow-Up Survey. As you may recall, this was a large-scale study jointly commissioned by COPSE and the seven participating colleges and universities in Manitoba in 1999. As a result, I would like permission to access the Manitoba Graduate Follow-Up Survey dataset. In particular, **I would like to receive electronic access to data pertaining to all University of Manitoba graduates who graduated in 1997**.

Having been recently approved by the Education/Nursing Research Ethics Board, you can be reassured that the study will adhere to all appropriate ethical principles and guidelines of the University of Manitoba, including anonymity of all participants.

Furthermore, I assure you that the **Protocol for Data use** set out by COPSE and the participating institutions will be adhered to at all time throughout the research (see attached protocol statement). The data will be used for the sole purpose of research.

I am hopeful that your institution will allow me electronic access to the Manitoba Graduate Follow-Up Survey dataset as it pertains to University of Manitoba graduates. Your timely response will allow me to proceed with the data analysis phase of my doctoral research this semester.

If questions remain about this request, please contact me or members of my dissertation committee.

Thank you for your prompt attention to my data request. If permission is granted, please forward an electronic data copy (in SPSS) to my email address below.

Sincerely,

Matthew Kwok
Research Fellow
Division of Post-Secondary Studies
236 St. Paul's College
The University of Manitoba
E-Mail:

Appendix C: Protocol for Data Use Document

PROTOCOL FOR DATA USE

(Source: Manitoba Graduate Follow-Up Survey: Final Report, 1999, p. 15)

The Council on Post-Secondary Education ("The Council") and the seven participating post-secondary institutions ("the institutions") have agreed upon a protocol for data use which applies to the full contents of this report as well as the data file provided to COPSE and the institutions.

The Council and the institutions agreed that the data are owned collectively and will be distributed only by collective agreement.

1. The purpose of the Manitoba Graduates Follow-Up Survey is to produce data that will allow the institutions to assess their programs and services. Ranking of institutions is not a purpose of the survey.

2. The survey data are owned collectively by the Council and the institutions.

3. The report that has been prepared may be reproduced and distributed freely by the Council and on the campuses of the participating institutions. However, use of the data file is restricted to the Council and senior administrators at the participating institutions on a confidential basis.

4. The data file provided to the Council and the institutions includes data for all participating institutions along with institutional identifiers so that appropriate institutional comparisons can be made by the Council and the institutions. This must be done in a way that protects the confidentiality of the institutional identities and respects the absolute right of each institution to decide what portions of its data should be disclosed.

5. For institutional promotion, recruiting or other public dissemination, rankings may not be used. However, the aggregate mean results and an institution's mean results may be used.

6. Access to the aggregate data for research purposes may be granted to interested persons provided that the intended use is legitimate and non-commercial and that the researcher is qualified, agrees to acknowledge the ownership of the data by the Council and the institutions and provides the Council and the institutions with a copy of any report or publication that is produced. Decisions on such requests will be made by the Council with consultation with the participating institutions.

Appendix D: Faculty Survey on Employability Skills

Purpose of Faculty Survey:
The purpose of the Faculty Survey is twofold:

- To determine what kinds of general employability skills faculty members across academic disciplines judge as important to teach undergraduate students

- To determine the perceptions of faculty members regarding the undergraduate student's development of employability skills at particular course levels

Instructions:
Please take 12 to 15 minutes of your time to complete this Faculty Survey.

All responses will be kept confidential. Any comparisons made will not identify the names of individuals. A coded identification number will appear on the survey and return envelope. Only the survey administrator will be able to match code numbers with names. This will allow for targeted follow-up reminders and mailings, and for the distribution of the summary of results to participants upon request.

Please circle the number which best represents your perceptions based on what is asked in each Section. There are no "right" or "wrong" answers.

Once completed, the survey can be returned in the enclosed envelope to:

Faculty Survey Administrator
c/o University Teaching Services
The University of Manitoba
220 Sinnott Building, 70 Dysart Road

Thank you for your participation in this research.

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CODED ID NUMBER: ___

SECTION ONE – IMPORTANCE OF SKILLS

To what extent do you believe it is IMPORTANT to teach the following general employability skills in your academic discipline?

1	2	3	4	5	6
Not at all Important	Not Important	Slightly Important	Moderately Important	Very Important	Extremely Important

Writing Skills communicating thoughts, ideas and information in writing	1	2	3	4	5	6
Computer Skills ability to use keyboard and other computer related applications	1	2	3	4	5	6
Oral Communication Skills ability to speak in oral form	1	2	3	4	5	6
Mathematical Skills ability to perform basic operations such as adding, subtracting, multiplying and dividing whole numbers	1	2	3	4	5	6
Research Skills ability to gather and use ideas and information for research	1	2	3	4	5	6
Decision-Making Skills ability to make choices and decisions from ideas and information	1	2	3	4	5	6
Critical Thinking Skills ability to critically think about ideas and information	1	2	3	4	5	6
Ability to Evaluate or Critique Statements ability to assess and judge ideas and information	1	2	3	4	5	6
Teamwork Skills ability to work in groups of various sizes on tasks	1	2	3	4	5	6
Lifelong Learning Skills desire to continually acquire new knowledge	1	2	3	4	5	6

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SECTION TWO – INTEGRATION OF SKILLS

Thinking of a course you have taught recently, to what extent did you INTEGRATE these general employability skills in your teaching?

1	2	3	4	5	6
Not at all Integrated	Not Integrated	Slightly Integrated	Moderately Integrated	Strongly Integrated	Fully Integrated

Writing Skills communicating thoughts, ideas and information in writing	1	2	3	4	5	6
Computer Skills ability to use keyboard and other computer related applications	1	2	3	4	5	6
Oral Communication Skills ability to speak in oral form	1	2	3	4	5	6
Mathematical Skills ability to perform basic operations such as adding, subtracting, multiplying and dividing whole numbers	1	2	3	4	5	6
Research Skills ability to gather and use ideas and information for research	1	2	3	4	5	6
Decision-Making Skills ability to make choices and decisions from ideas and information	1	2	3	4	5	6
Critical Thinking Skills ability to critically think about ideas and information	1	2	3	4	5	6
Ability to Evaluate or Critique Statements ability to assess and judge ideas and information	1	2	3	4	5	6
Teamwork Skills ability to work in groups of various sizes on tasks	1	2	3	4	5	6
Lifelong Learning Skills desire to continually acquire new knowledge	1	2	3	4	5	6

Please give one (1) example of how you integrate one or more of the above employability skills in your courses.

_____

_____

_____

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CODED ID NUMBER: ___

SECTION THREE – DEVELOPMENT OF SKILLS OVER TIME

Listed below are three course levels in a typical undergraduate program: introductory/first year, intermediate, senior/final year.

To what extent do you believe students have OPPORTUNITIES TO DEVELOP these general employability skills at each particular course level?

COURSE LEVEL: FIRST YEAR COURSE (xxx.1yy)

1	2	3	4	5	6
Not at all	No Opportunities To Develop	Slight Opportunities To Develop	Moderate Opportunities To Develop	Strong Opportunities To Develop	Full Opportunities To Develop

Writing Skills communicating thoughts, ideas and information in writing	1	2	3	4	5	6
Computer Skills ability to use keyboard and other computer related applications	1	2	3	4	5	6
Oral Communication Skills ability to speak in oral form	1	2	3	4	5	6
Mathematical Skills ability to perform basic operations such as adding, subtracting, multiplying and dividing whole numbers	1	2	3	4	5	6
Research Skills ability to gather and use ideas and information for research	1	2	3	4	5	6
Decision-Making Skills ability to make choices and decisions from ideas and information	1	2	3	4	5	6
Critical Thinking Skills ability to critically think about ideas and information	1	2	3	4	5	6
Ability to Evaluate or Critique Statements ability to assess and judge ideas and information	1	2	3	4	5	6
Teamwork Skills ability to work in groups of various sizes on tasks	1	2	3	4	5	6
Lifelong Learning Skills desire to continually acquire new knowledge	1	2	3	4	5	6

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CODED ID NUMBER: ___

COURSE LEVEL: SECOND YEAR COURSE (xxx.2yy)

1	2	3	4	5	6
Not at all	No Opportunities To Develop	Slight Opportunities To Develop	Moderate Opportunities To Develop	Strong Opportunities To Develop	Full Opportunities To Develop

Writing Skills communicating thoughts, ideas and information in writing	1	2	3	4	5	6
Computer Skills ability to use keyboard and other computer related applications	1	2	3	4	5	6
Oral Communication Skills ability to speak in oral form	1	2	3	4	5	6
Mathematical Skills ability to perform basic operations such as adding, subtracting, multiplying and dividing whole numbers	1	2	3	4	5	6
Research Skills ability to gather and use ideas and information for research	1	2	3	4	5	6
Decision-Making Skills ability to make choices and decisions from ideas and information	1	2	3	4	5	6
Critical Thinking Skills ability to critically think about ideas and information	1	2	3	4	5	6
Ability to Evaluate or Critique Statements ability to assess and judge ideas and information	1	2	3	4	5	6
Teamwork Skills ability to work in groups of various sizes on tasks	1	2	3	4	5	6
Lifelong Learning Skills desire to continually acquire new knowledge	1	2	3	4	5	6

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CODED ID NUMBER: ___

COURSE LEVEL: THIRD YEAR COURSE (xxx.3yy)

1	2	3	4	5	6
Not at all	No Opportunities To Develop	Slight Opportunities To Develop	Moderate Opportunities To Develop	Strong Opportunities To Develop	Full Opportunities To Develop

Writing Skills communicating thoughts, ideas and information in writing	1	2	3	4	5	6
Computer Skills ability to use keyboard and other computer related applications	1	2	3	4	5	6
Oral Communication Skills ability to speak in oral form	1	2	3	4	5	6
Mathematical Skills ability to perform basic operations such as adding, subtracting, multiplying and dividing whole numbers	1	2	3	4	5	6
Research Skills ability to gather and use ideas and information for research	1	2	3	4	5	6
Decision-Making Skills ability to make choices and decisions from ideas and information	1	2	3	4	5	6
Critical Thinking Skills ability to critically think about ideas and information	1	2	3	4	5	6
Ability to Evaluate or Critique Statements ability to assess and judge ideas and information	1	2	3	4	5	6
Teamwork Skills ability to work in groups of various sizes on tasks	1	2	3	4	5	6
Lifelong Learning Skills desire to continually acquire new knowledge	1	2	3	4	5	6

© Kwok 2004

CODED ID NUMBER: ___

SECTION FOUR – OVERALL SKILL LEVEL OF GRADUATES

To what extent do you believe graduates of undergraduate programs as a whole POSSESS the following general employability skills?

1	2	3	4	5	6
Not at all Possessed	Not Possessed	Slightly Possessed	Moderately Possessed	Strongly Possessed	Fully Possessed

Writing Skills communicating thoughts, ideas and information in writing	1	2	3	4	5	6
Computer Skills ability to use keyboard and other computer related applications	1	2	3	4	5	6
Oral Communication Skills ability to speak in oral form	1	2	3	4	5	6
Mathematical Skills ability to perform basic operations such as adding, subtracting, multiplying and dividing whole numbers	1	2	3	4	5	6
Research Skills ability to gather and use ideas and information for research	1	2	3	4	5	6
Decision-Making Skills ability to make choices and decisions from ideas and information	1	2	3	4	5	6
Critical Thinking Skills ability to critically think about ideas and information	1	2	3	4	5	6
Ability to Evaluate or Critique Statements ability to assess and judge ideas and information	1	2	3	4	5	6
Teamwork Skills ability to work in groups of various sizes on tasks	1	2	3	4	5	6
Lifelong Learning Skills desire to continually acquire new knowledge	1	2	3	4	5	6

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CODED ID NUMBER: ___

ADDITIONAL COMMENTS: _____

_____

_____

_____

_____

_____

DEMOGRAPHICS

Department: _____

Rank:
___ Lecturer/Instructor
___ Assistant Professor
___ Associate Professor
___ Full Professor
___ Senior Scholar

Gender:
___ Male
___ Female

Year first employed at the U of M: 19 ___ or 20 ___

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CODED ID NUMBER: ___

SUMMARY OF RESULTS

Would you like a copy of the results of this survey?

___ **Yes**
___ **No**

[If "yes", a copy of the survey results will be sent to your campus address by the survey administrator, at the conclusion of this research.]

Respondents who complete and return the Faculty Survey will be eligible to have their name entered for a random draw for one of three $50 gift certificates at the U of M bookstore as a token of appreciation for participation in the study. The draw will take place shortly after the conclusion of the data collection period. Winners of the draw will receive their gift certificates directly from the survey administrator at University Teaching Services.

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Appendix E: Permission Letter and Consent Form to Faculty Dean

December 10, 2003

(Dean OR Associate Dean (Research))
(Faculty of_____)
(Address)

(Dear:

I am a doctoral candidate in Post-Secondary Studies, Faculty of Education, at the University of Manitoba.

As part of my doctoral dissertation requirements, I will be conducting a Faculty Survey at this institution in mid-January 2004. The nature of my doctoral research is to better understand how disciplinary differences impact faculty member perceptions of general employability skills development across academic disciplines at the University of Manitoba.

I have randomly selected your Faculty to participate in the survey. This letter is to request, in writing, your **permission for me to administer the Faculty Survey** to all faculty members within your Faculty.

The Faculty Survey has been developed and tested. The Faculty Survey will ask various statements about faculty members' perceptions of general employability skills development. The faculty survey only takes, on average, 12 to 15 minutes to complete.

Having been recently approved by the Education/Nursing Research Ethics Board, you can be reassured that the study will adhere to all appropriate **ethical principles and guidelines** of the University of Manitoba, including anonymity of all participants. Members of my dissertation committee can be contacted below if questions arise.

I am hopeful that you will allow me to approach faculty members within your faculty to participate in the faculty survey as part of my doctoral study.

Please use the attached **Consent Form** to indicate your response to my request, and return it to me by FAX ( ) or by inter-departmental mail at your earliest convenience.

If questions remain about this request, please contact me below.

Thank you for your cooperation.

Sincerely,

Matthew Kwok
Research Fellow
Division of Post-Secondary Studies
236 St. Paul's College
The University of Manitoba

Email:

DEAN'S CONSENT FORM

(Please check one)

Dear Mr. Kwok:

____ I give permission to Matthew Kwok, Ph.D. Candidate in Post-Secondary Studies, to conduct the Faculty Survey as part of his doctoral dissertation requirements in the Faculty of _____.

____ I do not give permission to Matthew Kwok, Ph.D. Candidate in Post-Secondary Studies, to conduct the Faculty Survey as part of his doctoral dissertation requirements in the Faculty of _____.

Dean's Signature: _____

Dean's Name: _____

Date: _____

RETURN TO:

Matthew Kwok
Research Fellow
236 St. Paul's College
The University of Manitoba

FAX:

Appendix F: Pre-Notice Letter to Faculty Members

January 15, 2004

Dear Faculty Member:

A few days from now, you will receive in your campus mailbox, a request to fill out a **Faculty Survey** for an important study on **the perceptions of faculty members across academic disciplines with respect to the development of general employability skills in undergraduate programs**. The faculty survey, along with the research, constitutes a major part of my Doctor of Philosophy degree requirements in Post-Secondary Studies at the University of Manitoba.

The Education/Nursing Research Ethics Board at the U of M has recently approved this project. As well, the Faculty Dean has given permission for me to seek your voluntary participation in the faculty survey.

Thank you for your time and consideration. It is only with your cooperation in participating in this study that will make this project successful and help me to accomplish my educational goal.

Sincerely,

Matthew Kwok
Research Fellow
Division of Post-Secondary Studies
236 St Paul's College
The University of Manitoba

Email:

Appendix G: Cover Letter to Faculty Members

January 19, 2004

Dear Faculty Member:

As stated in the study's pre-notice letter that was sent to you a few days ago, little research has been conducted to examine how disciplinary differences influence the development of general employability skills in undergraduate university programs.

To better understand the impact of disciplinary differences on learning outcomes, one aspect of my doctoral research study aims to fill a gap in the current literature by understanding the impact of faculty members' perceptions of general employability skills development across academic disciplines at the University of Manitoba.

The task that is requested of you, and which has been granted permission by the faculty dean, is to complete a short Faculty Survey of about 12 to 15 minutes duration. The completion of the attached survey is voluntary. There are no right or wrong answers to any of the questions contained in the faculty survey.

Your participation, by answering all of the questions, is essential for the success of the research study. Higher response rates will enable meaningful data analysis and interpretations of the results. It will also help facilitate generalization of the survey results.

Respondents who complete and return the Faculty Survey will be eligible to have their name entered for a random draw for one of three $50 gift certificates at the U of M bookstore as a token of appreciation for participation in the study. **The draw will take place shortly after the conclusion of the data collection period. Winners of the draw will receive their gift certificates directly from the survey administrator at University Teaching Services (UTS).**

If for some reason you prefer not to respond, please return the blank, or partially filled, faculty survey by inter-departmental mail. There is no penalty if you decide to withdraw from participating. You can either discard the survey, or, return the survey blank or partially filled. Further, you will have the option to withdraw at any stage of the research without penalty.

Your answers to the Faculty Survey will be kept completely confidential. A third party staff member from UTS will handle the tasks of sending replacement questionnaires but will not take part in handling the actual survey data. Neither myself nor members of the doctoral committee will have access to these random codes. To further protect anonymity of your responses, no attempts to identify the participants will be done at any stage of data collection, analysis, and reporting of the responses. The results will be reported in aggregate form and not by individual responses.

The Education/Nursing Research Ethics Board has recently approved this study. A copy of the survey results will be made available to you at the conclusion of the study upon request. This request can be found on the last page of the Faculty Survey (see attached). Dr. Stan Straw is my dissertation supervisor and can be reached at 474-9074. Drs. Lynn Taylor (474-7456) and Wayne Simpson (474-9274) are the other members of my thesis committee. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122.

This copy of the consent form will be left with you for your records and reference and is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The completion and return of the Faculty Survey, not only signals informed consent, but also indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

Thank you for your assistance.

Sincerely,

Matthew Kwok
Research Fellow
Division of Post-Secondary Studies
236 St Paul's College
The University of Manitoba

Email:

Att. (Faculty Survey)

Appendix H: Follow-Up Reminder Notice to Faculty Members

February 20, 2004

Dear Faculty Member,

About three weeks ago a copy of the ***Faculty Survey on Employability Skills*** was sent to you. The purpose of the survey was to determine the perceptions of faculty members across academic disciplines on a number of statements related to the development of general employability skills in undergraduate university programs.

At the time of this mailing, your survey responses have not been received. If you have already returned the faculty survey back to University Teaching Services, please disregard this notice. If you have not completed the faculty survey, please do so as soon as possible.

A final reminder letter (in early March) will not be sent to you if you do one of the following voluntary actions with the **original survey**:

- ►fill out the survey completely
- ►fill out the survey partially
- ►return the survey blank

You may have also noted that the survey was numerically-coded. To ensure confidentiality and integrity throughout the data collection process, only the survey administrator has access to this coded number corresponding to the names of faculty member. This coded number is used for follow-up reminders, tracking of surveys, and entering names for the bookstore draw at the conclusion of the data collection period in mid-March 2004.

If you need a replacement survey, please contact the survey administrator, Ms. Jacqueline Smit, by leaving her a message at facultysurvey@hotmail.com She will gladly send you a replacement copy to your campus address in a few days.

Enjoy the rest of your semester.

Sincerely,

Matthew Kwok
Research Fellow
Division of Post-Secondary Studies
236 St Paul's College
The University of Manitoba

Email:

Appendix I: Final Reminder Notice to Faculty Members

March 15, 2004

Dear Faculty Member,

I am assisting Matthew Kwok, Research Fellow and Ph.D. Candidate in Post-Secondary Studies, in his doctoral study regarding the perceptions of faculty members in developing general employability skills across academic disciplines at the University of Manitoba.

Although a very good return rate has been received so far, we would like to include your survey responses. **As of this writing, I have not received your survey package. Please take 12 to 15 minutes out of your schedule to share your opinions.**

I have enclosed a replacement copy and ask that you do one of the following:

1) Continue to **fill out the original copy of the faculty survey,** if you did not have a chance to complete it during this semester.

   Simply mail back the completed survey by campus mail to my attention.

2) **Fill in this replacement copy of the faculty survey**, if the original is not available.

   Simply mail it back by campus mail to my attention. (Mail back only one survey)

3) **Send back an unanswered copy of the faculty survey**, if you do not wish to be involved in the study. (Mail back only one survey)

To ensure confidentiality and integrity throughout the data collection process, as survey administrator, I only have access to the coded survey number corresponding to the names of faculty member.

Remember, those who complete and return the survey by the end of the data collection period in late March will have their names entered to win one of three $50 gift certificates at the U of M Bookstore.

After mail collection on March 31, 2004, I will draw three names for the gift certificates. Data analysis will begin shortly after that date by Matthew Kwok, the principal researcher. No surveys will be accepted after this date.

Sincerely,

Ms. Jacqueline Smit
Survey Administrator
c/o University Teaching Services
220 Sinnott Building, 70 Dysart Road
The University of Manitoba

Att. (Faculty Survey of Employability Skills)

Appendix J: Statement of Confidentiality

PROJECT NAME:
Disciplinary Differences in the Perceptions of University Graduates and Faculty Members with Respect to the Development of General Employability Skills in Undergraduate Programs

Name of Survey Administrator: Ms. Jacqueline Smit

Location of Employment: University Teaching Services (UTS)
220 Sinnott Building, 70 Dysart Road
The University of Manitoba
(204) 474-7025

I understand that by assisting Matthew Kwok, principal investigator for the above-mentioned doctoral study, I will have access to the matched list of identity codes and names of respondents on the Faculty Survey.

I understand that because this includes personal data and potentially sensitive information, it must remain confidential.

I understand that by signing this **Statement of Confidentiality**, I agree not to disclose or use any information to which I have access while performing my duties in this project as outlined in the study protocol.

Further, the matched list of identity codes and respondent names will be destroyed once the study is completed.

_____ _____
Signature Date
Survey Administrator – J. Smit

_____ _____
Signature Date
Principal Investigator – M. Kwok

Appendix K: Analysis of Variance (ANOVA) Tables from Graduate Survey and Faculty Survey

Perceptions of University Graduates on Development of Employability Skills In Program of Study

Tests of Between-Subjects Effects

Dependent Variable: Q17_1 Writing skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	54.382[a]	3	18.127	30.245	.000
Intercept	7139.248	1	7139.248	11911.857	.000
HARDSOFT	51.989	1	51.989	86.743	.000
PUREAPPL	3.838	1	3.838	6.403	.012
HARDSOFT * PUREAPPL	5.501	1	5.501	9.178	.003
Error	628.108	1048	.599		
Total	11179.000	1052			
Corrected Total	682.490	1051			

a. R Squared = .080 (Adjusted R Squared = .077)

Tests of Between-Subjects Effects

Dependent Variable: Q17_2 Computer skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	92.248[a]	3	30.749	38.470	.000
Intercept	5742.756	1	5742.756	7184.736	.000
HARDSOFT	72.243	1	72.243	90.383	.000
PUREAPPL	.148	1	.148	.185	.668
HARDSOFT * PUREAPPL	.820	1	.820	1.026	.311
Error	811.289	1015	.799		
Total	8752.000	1019			
Corrected Total	903.537	1018			

a. R Squared = .102 (Adjusted R Squared = .099)

Tests of Between-Subjects Effects

Dependent Variable: Q17_3 Communication or speaking skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	62.904[a]	3	20.968	37.445	.000
Intercept	7126.783	1	7126.783	12727.195	.000
HARDSOFT	19.066	1	19.066	34.048	.000
PUREAPPL	57.611	1	57.611	102.883	.000
HARDSOFT * PUREAPPL	9.918	1	9.918	17.712	.000
Error	587.403	1049	.560		
Total	11758.000	1053			
Corrected Total	650.308	1052			

a. R Squared = .097 (Adjusted R Squared = .094)

Tests of Between-Subjects Effects

Dependent Variable: Q17_4 Mathematics, or mathematics as they were appropriate for your program

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	117.272[a]	3	39.091	49.399	.000
Intercept	6233.546	1	6233.546	7877.390	.000
HARDSOFT	94.475	1	94.475	119.388	.000
PUREAPPL	.700	1	.700	.885	.347
HARDSOFT * PUREAPPL	1.919	1	1.919	2.425	.120
Error	726.433	918	.791		
Total	9420.000	922			
Corrected Total	843.705	921			

a. R Squared = .139 (Adjusted R Squared = .136)

Tests of Between-Subjects Effects

Dependent Variable: Q17_5 Research skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8.989[a]	3	2.996	5.992	.000
Intercept	8083.031	1	8083.031	16163.979	.000
HARDSOFT	8.830	1	8.830	17.658	.000
PUREAPPL	.265	1	.265	.529	.467
HARDSOFT * PUREAPPL	2.739	1	2.739	5.478	.019
Error	525.068	1050	.500		
Total	12024.000	1054			
Corrected Total	534.057	1053			

a. R Squared = .017 (Adjusted R Squared = .014)

Tests of Between-Subjects Effects

Dependent Variable: Q17_6 Decision-making skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13.927[a]	3	4.642	9.723	.000
Intercept	7850.723	1	7850.723	16442.885	.000
HARDSOFT	2.062	1	2.062	4.319	.038
PUREAPPL	6.737	1	6.737	14.111	.000
HARDSOFT * PUREAPPL	.994	1	.994	2.083	.149
Error	500.849	1049	.477		
Total	11792.000	1053			
Corrected Total	514.777	1052			

a. R Squared = .027 (Adjusted R Squared = .024)

Tests of Between-Subjects Effects

Dependent Variable: Q17_7 The ability to think independently

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.888[a]	3	.629	1.321	.266
Intercept	8841.793	1	8841.793	18567.688	.000
HARDSOFT	.571	1	.571	1.199	.274
PUREAPPL	1.024	1	1.024	2.150	.143
HARDSOFT * PUREAPPL	2.505E-02	1	2.505E-02	.053	.819
Error	500.478	1051	.476		
Total	12739.000	1055			
Corrected Total	502.366	1054			

a. R Squared = .004 (Adjusted R Squared = .001)

Tests of Between-Subjects Effects

Dependent Variable: Q17_8 The ability to evaluate or critique a statement

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8.918[a]	3	2.973	5.869	.001
Intercept	7526.669	1	7526.669	14859.530	.000
HARDSOFT	7.688	1	7.688	15.178	.000
PUREAPPL	1.638	1	1.638	3.235	.072
HARDSOFT * PUREAPPL	.439	1	.439	.867	.352
Error	529.821	1046	.507		
Total	11342.000	1050			
Corrected Total	538.739	1049			

a. R Squared = .017 (Adjusted R Squared = .014)

Tests of Between-Subjects Effects

Dependent Variable: Q17_9 The ability to work with others

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	28.691[a]	3	9.564	20.512	.000
Intercept	8224.886	1	8224.886	17640.231	.000
HARDSOFT	6.087E-03	1	6.087E-03	.013	.909
PUREAPPL	26.359	1	26.359	56.532	.000
HARDSOFT * PUREAPPL	.302	1	.302	.647	.421
Error	487.705	1046	.466		
Total	12668.000	1050			
Corrected Total	516.396	1049			

a. R Squared = .056 (Adjusted R Squared = .053)

Tests of Between-Subjects Effects

Dependent Variable: Q17_10 Interest in lifelong learning

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.699[a]	3	1.900	3.334	.019
Intercept	8113.927	1	8113.927	14239.284	.000
HARDSOFT	4.451	1	4.451	7.811	.005
PUREAPPL	.204	1	.204	.358	.550
HARDSOFT * PUREAPPL	.442	1	.442	.775	.379
Error	597.179	1048	.570		
Total	11963.000	1052			
Corrected Total	602.877	1051			

a. R Squared = .009 (Adjusted R Squared = .007)

Tests of Between-Subjects Effects

Dependent Variable: Q35_1 Writing skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	40.050[a]	3	13.350	17.571	.000
Intercept	7594.258	1	7594.258	9995.128	.000
HARDSOFT	27.285	1	27.285	35.910	.000
PUREAPPL	3.093	1	3.093	4.070	.044
HARDSOFT * PUREAPPL	.116	1	.116	.153	.696
Error	795.506	1047	.760		
Total	11770.000	1051			
Corrected Total	835.557	1050			

a. R Squared = .048 (Adjusted R Squared = .045)

Tests of Between-Subjects Effects

Dependent Variable: Q35_2 Computer skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	45.891[a]	3	15.297	18.164	.000
Intercept	8420.253	1	8420.253	9998.056	.000
HARDSOFT	28.436	1	28.436	33.765	.000
PUREAPPL	3.766	1	3.766	4.472	.035
HARDSOFT * PUREAPPL	.599	1	.599	.711	.399
Error	880.088	1045	.842		
Total	12312.000	1049			
Corrected Total	925.979	1048			

a. R Squared = .050 (Adjusted R Squared = .047)

Tests of Between-Subjects Effects

Dependent Variable: Q35_3 Communication or speaking skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6.793[a]	3	2.264	8.297	.000
Intercept	10449.379	1	10449.379	38288.363	.000
HARDSOFT	3.927	1	3.927	14.390	.000
PUREAPPL	2.591	1	2.591	9.492	.002
HARDSOFT * PUREAPPL	6.317E-03	1	6.317E-03	.023	.879
Error	285.740	1047	.273		
Total	15168.000	1051			
Corrected Total	292.533	1050			

a. R Squared = .023 (Adjusted R Squared = .020)

Tests of Between-Subjects Effects

Dependent Variable: Q35_4 Mathematics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	41.445[a]	3	13.815	12.964	.000
Intercept	5395.594	1	5395.594	5063.222	.000
HARDSOFT	3.639	1	3.639	3.415	.065
PUREAPPL	18.382	1	18.382	17.250	.000
HARDSOFT * PUREAPPL	7.907	1	7.907	7.420	.007
Error	1104.008	1036	1.066		
Total	9049.000	1040			
Corrected Total	1145.453	1039			

a. R Squared = .036 (Adjusted R Squared = .033)

Tests of Between-Subjects Effects

Dependent Variable: Q35_5 Research skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.935[a]	3	.645	.549	.649
Intercept	5528.429	1	5528.429	4705.377	.000
HARDSOFT	3.130E-02	1	3.130E-02	.027	.870
PUREAPPL	.152	1	.152	.129	.719
HARDSOFT * PUREAPPL	1.274	1	1.274	1.084	.298
Error	1226.614	1044	1.175		
Total	8941.000	1048			
Corrected Total	1228.549	1047			

a. R Squared = .002 (Adjusted R Squared = -.001)

Tests of Between-Subjects Effects

Dependent Variable: Q35_6 Decision-making skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6.445[a]	3	2.148	8.697	.000
Intercept	10486.092	1	10486.092	42453.422	.000
HARDSOFT	2.522	1	2.522	10.210	.001
PUREAPPL	2.154	1	2.154	8.721	.003
HARDSOFT * PUREAPPL	.206	1	.206	.836	.361
Error	258.611	1047	.247		
Total	15133.000	1051			
Corrected Total	265.056	1050			

a. R Squared = .024 (Adjusted R Squared = .022)

Tests of Between-Subjects Effects

Dependent Variable: Q35_7 Ability to think independently

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.100[a]	3	.367	1.879	.131
Intercept	10934.339	1	10934.339	56053.398	.000
HARDSOFT	2.833E-02	1	2.833E-02	.145	.703
PUREAPPL	.859	1	.859	4.405	.036
HARDSOFT * PUREAPPL	3.478E-02	1	3.478E-02	.178	.673
Error	204.043	1046	.195		
Total	15596.000	1050			
Corrected Total	205.143	1049			

a. R Squared = .005 (Adjusted R Squared = .003)

Tests of Between-Subjects Effects

Dependent Variable: Q35_8 Ability to evaluate or critique a statement

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	14.432[a]	3	4.811	6.370	.000
Intercept	7977.638	1	7977.638	10564.180	.000
HARDSOFT	7.567	1	7.567	10.020	.002
PUREAPPL	.803	1	.803	1.063	.303
HARDSOFT * PUREAPPL	.638	1	.638	.845	.358
Error	786.876	1042	.755		
Total	12154.000	1046			
Corrected Total	801.308	1045			

a. R Squared = .018 (Adjusted R Squared = .015)

Tests of Between-Subjects Effects

Dependent Variable: Q35_9 Ability to work with others

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.349[a]	3	.450	1.465	.223
Intercept	10561.773	1	10561.773	34393.180	.000
HARDSOFT	.544	1	.544	1.772	.183
PUREAPPL	1.038	1	1.038	3.381	.066
HARDSOFT * PUREAPPL	.557	1	.557	1.815	.178
Error	320.601	1044	.307		
Total	15240.000	1048			
Corrected Total	321.950	1047			

a. R Squared = .004 (Adjusted R Squared = .001)

Tests of Between-Subjects Effects

Dependent Variable: Q35_10 Interest in lifelong learning

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	30.613[a]	3	10.204	12.260	.000
Intercept	6956.950	1	6956.950	8358.399	.000
HARDSOFT	13.184	1	13.184	15.839	.000
PUREAPPL	.995	1	.995	1.196	.274
HARDSOFT * PUREAPPL	2.904	1	2.904	3.489	.062
Error	868.121	1043	.832		
Total	10814.000	1047			
Corrected Total	898.734	1046			

a. R Squared = .034 (Adjusted R Squared = .031)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Writing Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.745[a]	3	1.915	3.242	.023
Intercept	6728.214	1	6728.214	11389.540	.000
HARDSOFT	1.078	1	1.078	1.824	.178
PUREAPPL	3.806	1	3.806	6.443	.012
HARDSOFT * PUREAPPL	.107	1	.107	.180	.671
Error	142.958	242	.591		
Total	7437.000	246			
Corrected Total	148.703	245			

a. R Squared = .039 (Adjusted R Squared = .027)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Computer Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22.687[a]	3	7.562	5.250	.002
Intercept	4482.092	1	4482.092	3111.373	.000
HARDSOFT	10.457	1	10.457	7.259	.008
PUREAPPL	7.082	1	7.082	4.916	.028
HARDSOFT * PUREAPPL	8.609	1	8.609	5.976	.015
Error	348.613	242	1.441		
Total	5416.000	246			
Corrected Total	371.301	245			

a. R Squared = .061 (Adjusted R Squared = .049)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Oral Communication Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6.108[a]	3	2.036	3.106	.027
Intercept	6183.823	1	6183.823	9432.954	.000
HARDSOFT	.966	1	.966	1.473	.226
PUREAPPL	1.729	1	1.729	2.637	.106
HARDSOFT * PUREAPPL	2.520	1	2.520	3.845	.051
Error	158.644	242	.656		
Total	7003.000	246			
Corrected Total	164.752	245			

a. R Squared = .037 (Adjusted R Squared = .025)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Mathematical Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	43.336[a]	3	14.445	6.085	.001
Intercept	4201.784	1	4201.784	1769.924	.000
HARDSOFT	26.741	1	26.741	11.264	.001
PUREAPPL	5.296	1	5.296	2.231	.137
HARDSOFT * PUREAPPL	20.639	1	20.639	8.694	.004
Error	574.506	242	2.374		
Total	5333.000	246			
Corrected Total	617.841	245			

a. R Squared = .070 (Adjusted R Squared = .059)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Research Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13.756[a]	3	4.585	5.094	.002
Intercept	5838.051	1	5838.051	6485.602	.000
HARDSOFT	1.036	1	1.036	1.151	.284
PUREAPPL	8.805	1	8.805	9.782	.002
HARDSOFT * PUREAPPL	1.823	1	1.823	2.025	.156
Error	217.838	242	.900		
Total	6482.000	246			
Corrected Total	231.593	245			

a. R Squared = .059 (Adjusted R Squared = .048)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Decision-Making Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	15.171[a]	3	5.057	6.916	.000
Intercept	6179.201	1	6179.201	8450.181	.000
HARDSOFT	4.747E-02	1	4.747E-02	.065	.799
PUREAPPL	9.758	1	9.758	13.345	.000
HARDSOFT * PUREAPPL	5.315	1	5.315	7.268	.008
Error	176.963	242	.731		
Total	7115.000	246			
Corrected Total	192.134	245			

a. R Squared = .079 (Adjusted R Squared = .068)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Critical Thinking Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.087[a]	3	1.029	2.784	.042
Intercept	7121.267	1	7121.267	19269.638	.000
HARDSOFT	1.106	1	1.106	2.992	.085
PUREAPPL	.150	1	.150	.406	.525
HARDSOFT * PUREAPPL	1.056	1	1.056	2.858	.092
Error	89.433	242	.370		
Total	7924.000	246			
Corrected Total	92.520	245			

a. R Squared = .033 (Adjusted R Squared = .021)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Evaluating Statements

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.244[a]	3	1.081	2.075	.104
Intercept	6558.906	1	6558.906	12586.703	.000
HARDSOFT	2.678	1	2.678	5.138	.024
PUREAPPL	.273	1	.273	.524	.470
HARDSOFT * PUREAPPL	.771	1	.771	1.480	.225
Error	126.106	242	.521		
Total	7320.000	246			
Corrected Total	129.350	245			

a. R Squared = .025 (Adjusted R Squared = .013)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Teamwork Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	52.373[a]	3	17.458	16.781	.000
Intercept	4966.514	1	4966.514	4774.035	.000
HARDSOFT	.208	1	.208	.200	.655
PUREAPPL	41.415	1	41.415	39.810	.000
HARDSOFT * PUREAPPL	12.042	1	12.042	11.575	.001
Error	251.757	242	1.040		
Total	6022.000	246			
Corrected Total	304.130	245			

a. R Squared = .172 (Adjusted R Squared = .162)

Tests of Between-Subjects Effects

Dependent Variable: Importance of Lifelong Learning Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	15.035[a]	3	5.012	5.184	.002
Intercept	5650.995	1	5650.995	5845.280	.000
HARDSOFT	.128	1	.128	.132	.716
PUREAPPL	11.732	1	11.732	12.135	.001
HARDSOFT * PUREAPPL	3.250	1	3.250	3.361	.068
Error	232.990	241	.967		
Total	6595.000	245			
Corrected Total	248.024	244			

a. R Squared = .061 (Adjusted R Squared = .049)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Writing Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	41.341[a]	3	13.780	9.227	.000
Intercept	4920.443	1	4920.443	3294.666	.000
HARDSOFT	39.962	1	39.962	26.758	.000
PUREAPPL	.178	1	.178	.119	.730
HARDSOFT * PUREAPPL	1.039	1	1.039	.696	.405
Error	358.430	240	1.493		
Total	5726.000	244			
Corrected Total	399.770	243			

a. R Squared = .103 (Adjusted R Squared = .092)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Computer Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	34.481[a]	3	11.494	4.785	.003
Intercept	2647.575	1	2647.575	1102.358	.000
HARDSOFT	13.008	1	13.008	5.416	.021
PUREAPPL	15.150	1	15.150	6.308	.013
HARDSOFT * PUREAPPL	10.099	1	10.099	4.205	.041
Error	576.417	240	2.402		
Total	3635.000	244			
Corrected Total	610.898	243			

a. R Squared = .056 (Adjusted R Squared = .045)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Oral Communication Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	34.931[a]	3	11.644	6.506	.000
Intercept	4048.030	1	4048.030	2261.936	.000
HARDSOFT	7.902	1	7.902	4.415	.037
PUREAPPL	23.514	1	23.514	13.139	.000
HARDSOFT * PUREAPPL	2.495	1	2.495	1.394	.239
Error	429.511	240	1.790		
Total	5052.000	244			
Corrected Total	464.443	243			

a. R Squared = .075 (Adjusted R Squared = .064)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Mathematical Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	136.800[a]	3	45.600	16.327	.000
Intercept	2412.190	1	2412.190	863.705	.000
HARDSOFT	133.583	1	133.583	47.830	.000
PUREAPPL	.899	1	.899	.322	.571
HARDSOFT * PUREAPPL	7.798	1	7.798	2.792	.096
Error	670.282	240	2.793		
Total	3536.000	244			
Corrected Total	807.082	243			

a. R Squared = .169 (Adjusted R Squared = .159)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Research Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	45.330[a]	3	15.110	9.662	.000
Intercept	4763.842	1	4763.842	3046.112	.000
HARDSOFT	20.633	1	20.633	13.193	.000
PUREAPPL	8.531	1	8.531	5.455	.020
HARDSOFT * PUREAPPL	4.936	1	4.936	3.156	.077
Error	375.338	240	1.564		
Total	5443.000	244			
Corrected Total	420.668	243			

a. R Squared = .108 (Adjusted R Squared = .097)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Decision-Making Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22.949[a]	3	7.650	6.219	.000
Intercept	4870.213	1	4870.213	3959.541	.000
HARDSOFT	3.015	1	3.015	2.451	.119
PUREAPPL	14.091	1	14.091	11.456	.001
HARDSOFT * PUREAPPL	4.525	1	4.525	3.679	.056
Error	295.199	240	1.230		
Total	5776.000	244			
Corrected Total	318.148	243			

a. R Squared = .072 (Adjusted R Squared = .061)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Critical Thinking Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23.213[a]	3	7.738	9.433	.000
Intercept	5920.043	1	5920.043	7217.020	.000
HARDSOFT	18.960	1	18.960	23.114	.000
PUREAPPL	1.221	1	1.221	1.489	.224
HARDSOFT * PUREAPPL	.390	1	.390	.476	.491
Error	196.869	240	.820		
Total	6706.000	244			
Corrected Total	220.082	243			

a. R Squared = .105 (Adjusted R Squared = .094)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Evaluating Statements

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	18.324[a]	3	6.108	4.901	.003
Intercept	5180.691	1	5180.691	4156.765	.000
HARDSOFT	13.994	1	13.994	11.228	.001
PUREAPPL	2.593	1	2.593	2.081	.150
HARDSOFT * PUREAPPL	.259	1	.259	.207	.649
Error	299.119	240	1.246		
Total	6024.000	244			
Corrected Total	317.443	243			

a. R Squared = .058 (Adjusted R Squared = .046)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Teamwork Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	71.848[a]	3	23.949	10.949	.000
Intercept	3246.226	1	3246.226	1484.127	.000
HARDSOFT	4.029	1	4.029	1.842	.176
PUREAPPL	69.685	1	69.685	31.859	.000
HARDSOFT * PUREAPPL	7.817E-03	1	7.817E-03	.004	.952
Error	524.951	240	2.187		
Total	4445.000	244			
Corrected Total	596.799	243			

a. R Squared = .120 (Adjusted R Squared = .109)

Tests of Between-Subjects Effects

Dependent Variable: Integration of Lifelong Learning Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	19.095[a]	3	6.365	3.537	.015
Intercept	3659.618	1	3659.618	2033.799	.000
HARDSOFT	6.929	1	6.929	3.851	.051
PUREAPPL	3.467	1	3.467	1.926	.166
HARDSOFT * PUREAPPL	5.078	1	5.078	2.822	.094
Error	431.856	240	1.799		
Total	4484.000	244			
Corrected Total	450.951	243			

a. R Squared = .042 (Adjusted R Squared = .030)

Tests of Between-Subjects Effects

Dependent Variable: Development of Writing Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	70.507[a]	3	23.502	20.417	.000
Intercept	2589.423	1	2589.423	2249.504	.000
HARDSOFT	56.546	1	56.546	49.123	.000
PUREAPPL	14.405	1	14.405	12.514	.000
HARDSOFT * PUREAPPL	10.140	1	10.140	8.809	.003
Error	246.337	214	1.151		
Total	3122.000	218			
Corrected Total	316.844	217			

a. R Squared = .223 (Adjusted R Squared = .212)

Tests of Between-Subjects Effects

Dependent Variable: Development of Computing Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	32.368[a]	3	10.789	8.330	.000
Intercept	2366.315	1	2366.315	1826.967	.000
HARDSOFT	.337	1	.337	.260	.611
PUREAPPL	30.828	1	30.828	23.801	.000
HARDSOFT * PUREAPPL	8.855E-03	1	8.855E-03	.007	.934
Error	275.881	213	1.295		
Total	2970.000	217			
Corrected Total	308.249	216			

a. R Squared = .105 (Adjusted R Squared = .092)

Tests of Between-Subjects Effects

Dependent Variable: Development of Oral Communication Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	58.632[a]	3	19.544	14.524	.000
Intercept	1897.034	1	1897.034	1409.801	.000
HARDSOFT	12.547	1	12.547	9.324	.003
PUREAPPL	46.514	1	46.514	34.568	.000
HARDSOFT * PUREAPPL	3.636	1	3.636	2.702	.102
Error	287.959	214	1.346		
Total	2499.000	218			
Corrected Total	346.592	217			

a. R Squared = .169 (Adjusted R Squared = .158)

Tests of Between-Subjects Effects

Dependent Variable: Development of Mathematical Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	61.138[a]	3	20.379	11.926	.000
Intercept	2112.435	1	2112.435	1236.168	.000
HARDSOFT	55.691	1	55.691	32.590	.000
PUREAPPL	2.530	1	2.530	1.480	.225
HARDSOFT * PUREAPPL	4.461	1	4.461	2.611	.108
Error	363.987	213	1.709		
Total	2781.000	217			
Corrected Total	425.124	216			

a. R Squared = .144 (Adjusted R Squared = .132)

Tests of Between-Subjects Effects

Dependent Variable: Development of Research Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	42.626[a]	3	14.209	11.990	.000
Intercept	1931.405	1	1931.405	1629.821	.000
HARDSOFT	41.347	1	41.347	34.891	.000
PUREAPPL	2.866	1	2.866	2.418	.121
HARDSOFT * PUREAPPL	1.295	1	1.295	1.093	.297
Error	253.599	214	1.185		
Total	2337.000	218			
Corrected Total	296.225	217			

a. R Squared = .144 (Adjusted R Squared = .132)

Tests of Between-Subjects Effects

Dependent Variable: Development of Decision-Making Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	25.280[a]	3	8.427	6.346	.000
Intercept	2363.529	1	2363.529	1779.917	.000
HARDSOFT	22.778	1	22.778	17.154	.000
PUREAPPL	3.618	1	3.618	2.724	.100
HARDSOFT * PUREAPPL	4.410E-02	1	4.410E-02	.033	.856
Error	282.840	213	1.328		
Total	2818.000	217			
Corrected Total	308.120	216			

a. R Squared = .082 (Adjusted R Squared = .069)

Tests of Between-Subjects Effects

Dependent Variable: Development of Critical Thinking Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	25.737[a]	3	8.579	7.092	.000
Intercept	2929.449	1	2929.449	2421.532	.000
HARDSOFT	23.970	1	23.970	19.814	.000
PUREAPPL	.554	1	.554	.458	.499
HARDSOFT * PUREAPPL	2.836	1	2.836	2.344	.127
Error	258.887	214	1.210		
Total	3354.000	218			
Corrected Total	284.624	217			

a. R Squared = .090 (Adjusted R Squared = .078)

Tests of Between-Subjects Effects

Dependent Variable: Development of Evaluation Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23.425[a]	3	7.808	6.782	.000
Intercept	2653.889	1	2653.889	2304.924	.000
HARDSOFT	23.297	1	23.297	20.234	.000
PUREAPPL	1.414E-02	1	1.414E-02	.012	.912
HARDSOFT * PUREAPPL	1.225	1	1.225	1.064	.304
Error	245.248	213	1.151		
Total	3058.000	217			
Corrected Total	268.673	216			

a. R Squared = .087 (Adjusted R Squared = .074)

Tests of Between-Subjects Effects

Dependent Variable: Development of Teamwork Skills in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	26.268[a]	3	8.756	6.678	.000
Intercept	2283.449	1	2283.449	1741.623	.000
HARDSOFT	2.508	1	2.508	1.913	.168
PUREAPPL	24.613	1	24.613	18.772	.000
HARDSOFT * PUREAPPL	.188	1	.188	.143	.706
Error	280.576	214	1.311		
Total	2846.000	218			
Corrected Total	306.844	217			

a. R Squared = .086 (Adjusted R Squared = .073)

Tests of Between-Subjects Effects

Dependent Variable: Development of Lifelong Learning in 1st Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	9.348[a]	3	3.116	2.131	.097
Intercept	2328.735	1	2328.735	1592.784	.000
HARDSOFT	9.290	1	9.290	6.354	.012
PUREAPPL	.272	1	.272	.186	.667
HARDSOFT * PUREAPPL	.338	1	.338	.231	.631
Error	311.417	213	1.462		
Total	2790.000	217			
Corrected Total	320.765	216			

a. R Squared = .029 (Adjusted R Squared = .015)

Tests of Between-Subjects Effects

Dependent Variable: Development of Writing Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	28.795[a]	3	9.598	10.345	.000
Intercept	3339.193	1	3339.193	3599.126	.000
HARDSOFT	24.193	1	24.193	26.076	.000
PUREAPPL	9.063E-03	1	9.063E-03	.010	.921
HARDSOFT * PUREAPPL	10.272	1	10.272	11.072	.001
Error	198.545	214	.928		
Total	3812.000	218			
Corrected Total	227.339	217			

a. R Squared = .127 (Adjusted R Squared = .114)

Tests of Between-Subjects Effects

Dependent Variable: Development of Computing Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	25.063[a]	3	8.354	6.786	.000
Intercept	2774.393	1	2774.393	2253.472	.000
HARDSOFT	9.777	1	9.777	7.941	.005
PUREAPPL	12.125	1	12.125	9.849	.002
HARDSOFT * PUREAPPL	4.246	1	4.246	3.449	.065
Error	263.469	214	1.231		
Total	3388.000	218			
Corrected Total	288.532	217			

a. R Squared = .087 (Adjusted R Squared = .074)

Tests of Between-Subjects Effects

Dependent Variable: Development of Oral Communication Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23.941[a]	3	7.980	7.023	.000
Intercept	2829.713	1	2829.713	2490.187	.000
HARDSOFT	8.961	1	8.961	7.886	.005
PUREAPPL	8.388	1	8.388	7.381	.007
HARDSOFT * PUREAPPL	10.463	1	10.463	9.208	.003
Error	243.178	214	1.136		
Total	3412.000	218			
Corrected Total	267.119	217			

a. R Squared = .090 (Adjusted R Squared = .077)

Tests of Between-Subjects Effects

Dependent Variable: Development of Mathematical Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	72.128[a]	3	24.043	13.258	.000
Intercept	2465.905	1	2465.905	1359.788	.000
HARDSOFT	69.935	1	69.935	38.564	.000
PUREAPPL	.243	1	.243	.134	.715
HARDSOFT * PUREAPPL	8.363	1	8.363	4.612	.033
Error	388.078	214	1.813		
Total	3187.000	218			
Corrected Total	460.206	217			

a. R Squared = .157 (Adjusted R Squared = .145)

Tests of Between-Subjects Effects

Dependent Variable: Development of Research Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	34.788[a]	3	11.596	9.780	.000
Intercept	3048.037	1	3048.037	2570.760	.000
HARDSOFT	23.327	1	23.327	19.674	.000
PUREAPPL	7.552	1	7.552	6.369	.012
HARDSOFT * PUREAPPL	2.936E-02	1	2.936E-02	.025	.875
Error	253.730	214	1.186		
Total	3441.000	218			
Corrected Total	288.518	217			

a. R Squared = .121 (Adjusted R Squared = .108)

Tests of Between-Subjects Effects

Dependent Variable: Development of Decision-Making Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12.707[a]	3	4.236	3.607	.014
Intercept	3243.797	1	3243.797	2762.601	.000
HARDSOFT	12.008	1	12.008	10.227	.002
PUREAPPL	.271	1	.271	.231	.632
HARDSOFT * PUREAPPL	1.611E-04	1	1.611E-04	.000	.991
Error	251.275	214	1.174		
Total	3736.000	218			
Corrected Total	263.982	217			

a. R Squared = .048 (Adjusted R Squared = .035)

Tests of Between-Subjects Effects

Dependent Variable: Development of Critical Thinking Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	26.263[a]	3	8.754	7.968	.000
Intercept	3570.950	1	3570.950	3250.222	.000
HARDSOFT	24.360	1	24.360	22.172	.000
PUREAPPL	.902	1	.902	.821	.366
HARDSOFT * PUREAPPL	1.079	1	1.079	.982	.323
Error	235.117	214	1.099		
Total	4035.000	218			
Corrected Total	261.381	217			

a. R Squared = .100 (Adjusted R Squared = .088)

Tests of Between-Subjects Effects

Dependent Variable: Development of Evaluation Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	21.267[a]	3	7.089	6.821	.000
Intercept	3410.720	1	3410.720	3281.792	.000
HARDSOFT	20.765	1	20.765	19.980	.000
PUREAPPL	5.816E-02	1	5.816E-02	.056	.813
HARDSOFT * PUREAPPL	.600	1	.600	.577	.448
Error	222.407	214	1.039		
Total	3869.000	218			
Corrected Total	243.674	217			

a. R Squared = .087 (Adjusted R Squared = .074)

Tests of Between-Subjects Effects

Dependent Variable: Development of Teamwork Skills in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	28.763[a]	3	9.588	7.964	.000
Intercept	2910.634	1	2910.634	2417.616	.000
HARDSOFT	1.822	1	1.822	1.513	.220
PUREAPPL	27.570	1	27.570	22.900	.000
HARDSOFT * PUREAPPL	.397	1	.397	.330	.566
Error	257.640	214	1.204		
Total	3554.000	218			
Corrected Total	286.404	217			

a. R Squared = .100 (Adjusted R Squared = .088)

Tests of Between-Subjects Effects

Dependent Variable: Development of Lifelong Learning in 2nd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.683[a]	3	1.894	1.446	.231
Intercept	2847.747	1	2847.747	2173.143	.000
HARDSOFT	5.172	1	5.172	3.947	.048
PUREAPPL	.808	1	.808	.617	.433
HARDSOFT * PUREAPPL	.188	1	.188	.144	.705
Error	280.432	214	1.310		
Total	3363.000	218			
Corrected Total	286.115	217			

a. R Squared = .020 (Adjusted R Squared = .006)

Perceptions of Faculty Members on Opportunities for Students to Develop Employability Skills in Third Year Courses

Tests of Between-Subjects Effects

Dependent Variable: Development of Writing Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	18.509[a]	3	6.170	6.731	.000
Intercept	4260.169	1	4260.169	4648.111	.000
HARDSOFT	11.520	1	11.520	12.569	.000
PUREAPPL	5.101	1	5.101	5.566	.019
HARDSOFT * PUREAPPL	1.538	1	1.538	1.678	.197
Error	194.306	212	.917		
Total	4732.000	216			
Corrected Total	212.815	215			

a. R Squared = .087 (Adjusted R Squared = .074)

Tests of Between-Subjects Effects

Dependent Variable: Development of Computing Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	18.142[a]	3	6.047	4.462	.005
Intercept	3516.135	1	3516.135	2594.219	.000
HARDSOFT	13.162	1	13.162	9.711	.002
PUREAPPL	2.179	1	2.179	1.608	.206
HARDSOFT * PUREAPPL	4.702	1	4.702	3.469	.064
Error	287.339	212	1.355		
Total	4190.000	216			
Corrected Total	305.481	215			

a. R Squared = .059 (Adjusted R Squared = .046)

Tests of Between-Subjects Effects

Dependent Variable: Development of Oral Communication Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.859[a]	3	.620	.650	.584
Intercept	4034.860	1	4034.860	4231.743	.000
HARDSOFT	1.738	1	1.738	1.823	.178
PUREAPPL	2.071E-03	1	2.071E-03	.002	.963
HARDSOFT * PUREAPPL	2.147E-04	1	2.147E-04	.000	.988
Error	202.137	212	.953		
Total	4569.000	216			
Corrected Total	203.995	215			

a. R Squared = .009 (Adjusted R Squared = -.005)

Tests of Between-Subjects Effects

Dependent Variable: Development of Mathematical Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	52.344[a]	3	17.448	8.543	.000
Intercept	2951.850	1	2951.850	1445.283	.000
HARDSOFT	51.002	1	51.002	24.972	.000
PUREAPPL	4.622E-04	1	4.622E-04	.000	.988
HARDSOFT * PUREAPPL	6.388	1	6.388	3.128	.078
Error	432.989	212	2.042		
Total	3752.000	216			
Corrected Total	485.333	215			

a. R Squared = .108 (Adjusted R Squared = .095)

Tests of Between-Subjects Effects

Dependent Variable: Development of Research Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23.890[a]	3	7.963	7.702	.000
Intercept	4057.805	1	4057.805	3924.481	.000
HARDSOFT	11.254	1	11.254	10.884	.001
PUREAPPL	8.103	1	8.103	7.837	.006
HARDSOFT * PUREAPPL	.180	1	.180	.174	.677
Error	219.202	212	1.034		
Total	4492.000	216			
Corrected Total	243.093	215			

a. R Squared = .098 (Adjusted R Squared = .086)

Tests of Between-Subjects Effects

Dependent Variable: Development of Decision-Making Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.936[a]	3	1.645	1.734	.161
Intercept	4207.198	1	4207.198	4432.765	.000
HARDSOFT	4.602	1	4.602	4.848	.029
PUREAPPL	.301	1	.301	.317	.574
HARDSOFT * PUREAPPL	4.754E-06	1	4.754E-06	.000	.998
Error	201.212	212	.949		
Total	4762.000	216			
Corrected Total	206.148	215			

a. R Squared = .024 (Adjusted R Squared = .010)

Tests of Between-Subjects Effects

Dependent Variable: Development of Critical Thinking Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	15.081[a]	3	5.027	6.062	.001
Intercept	4492.814	1	4492.814	5417.850	.000
HARDSOFT	13.691	1	13.691	16.510	.000
PUREAPPL	.429	1	.429	.517	.473
HARDSOFT * PUREAPPL	2.104	1	2.104	2.538	.113
Error	175.803	212	.829		
Total	5017.000	216			
Corrected Total	190.884	215			

a. R Squared = .079 (Adjusted R Squared = .066)

Tests of Between-Subjects Effects

Dependent Variable: Development of Evaluation Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	19.377[a]	3	6.459	6.773	.000
Intercept	4325.102	1	4325.102	4535.313	.000
HARDSOFT	19.272	1	19.272	20.208	.000
PUREAPPL	3.469E-02	1	3.469E-02	.036	.849
HARDSOFT * PUREAPPL	1.409	1	1.409	1.477	.226
Error	202.174	212	.954		
Total	4879.000	216			
Corrected Total	221.551	215			

a. R Squared = .087 (Adjusted R Squared = .075)

Tests of Between-Subjects Effects

Dependent Variable: Development of Teamwork Skills in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	14.137[a]	3	4.712	4.317	.006
Intercept	3862.617	1	3862.617	3538.784	.000
HARDSOFT	7.546E-02	1	7.546E-02	.069	.793
PUREAPPL	11.734	1	11.734	10.751	.001
HARDSOFT * PUREAPPL	2.980	1	2.980	2.730	.100
Error	231.400	212	1.092		
Total	4530.000	216			
Corrected Total	245.537	215			

a. R Squared = .058 (Adjusted R Squared = .044)

Tests of Between-Subjects Effects

Dependent Variable: Development of Lifelong Learning in 3rd Year Course

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.293[a]	3	1.431	1.021	.384
Intercept	3537.675	1	3537.675	2524.869	.000
HARDSOFT	2.597	1	2.597	1.854	.175
PUREAPPL	1.485	1	1.485	1.060	.304
HARDSOFT * PUREAPPL	.214	1	.214	.153	.696
Error	297.040	212	1.401		
Total	4152.000	216			
Corrected Total	301.333	215			

a. R Squared = .014 (Adjusted R Squared = .000)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Writing Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.711[a]	3	1.237	2.058	.106
Intercept	3549.453	1	3549.453	5906.626	.000
HARDSOFT	.569	1	.569	.947	.332
PUREAPPL	3.154	1	3.154	5.248	.023
HARDSOFT * PUREAPPL	4.800E-02	1	4.800E-02	.080	.778
Error	141.218	235	.601		
Total	4098.000	239			
Corrected Total	144.929	238			

a. R Squared = .026 (Adjusted R Squared = .013)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Computer Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7.451[a]	3	2.484	3.167	.025
Intercept	4307.232	1	4307.232	5492.938	.000
HARDSOFT	.203	1	.203	.259	.612
PUREAPPL	5.853	1	5.853	7.464	.007
HARDSOFT * PUREAPPL	1.782	1	1.782	2.273	.133
Error	184.273	235	.784		
Total	5009.000	239			
Corrected Total	191.724	238			

a. R Squared = .039 (Adjusted R Squared = .027)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Oral Communication Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	33.431[a]	3	11.144	14.795	.000
Intercept	3733.878	1	3733.878	4957.302	.000
HARDSOFT	6.390E-03	1	6.390E-03	.008	.927
PUREAPPL	32.653	1	32.653	43.352	.000
HARDSOFT * PUREAPPL	1.194	1	1.194	1.585	.209
Error	177.004	235	.753		
Total	4521.000	239			
Corrected Total	210.435	238			

a. R Squared = .159 (Adjusted R Squared = .148)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Mathematical Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.410[a]	3	1.803	1.203	.309
Intercept	3399.997	1	3399.997	2268.778	.000
HARDSOFT	2.852	1	2.852	1.903	.169
PUREAPPL	.211	1	.211	.141	.708
HARDSOFT * PUREAPPL	3.776	1	3.776	2.519	.114
Error	352.172	235	1.499		
Total	4102.000	239			
Corrected Total	357.582	238			

a. R Squared = .015 (Adjusted R Squared = .003)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Research Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.946[a]	3	1.982	2.235	.085
Intercept	3648.795	1	3648.795	4114.905	.000
HARDSOFT	1.621	1	1.621	1.828	.178
PUREAPPL	.113	1	.113	.128	.721
HARDSOFT * PUREAPPL	2.666	1	2.666	3.007	.084
Error	208.381	235	.887		
Total	4200.000	239			
Corrected Total	214.326	238			

a. R Squared = .028 (Adjusted R Squared = .015)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Decision-Making Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	11.528[a]	3	3.843	4.609	.004
Intercept	3962.079	1	3962.079	4751.993	.000
HARDSOFT	.876	1	.876	1.050	.306
PUREAPPL	9.315	1	9.315	11.172	.001
HARDSOFT * PUREAPPL	1.254	1	1.254	1.504	.221
Error	195.936	235	.834		
Total	4655.000	239			
Corrected Total	207.464	238			

a. R Squared = .056 (Adjusted R Squared = .044)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Critical Thinking Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12.227[a]	3	4.076	4.703	.003
Intercept	4002.129	1	4002.129	4618.463	.000
HARDSOFT	2.365	1	2.365	2.729	.100
PUREAPPL	10.357	1	10.357	11.951	.001
HARDSOFT * PUREAPPL	3.463E-02	1	3.463E-02	.040	.842
Error	203.639	235	.867		
Total	4724.000	239			
Corrected Total	215.866	238			

a. R Squared = .057 (Adjusted R Squared = .045)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Evaluating Statements

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10.811[a]	3	3.604	3.992	.008
Intercept	3758.569	1	3758.569	4163.523	.000
HARDSOFT	2.168	1	2.168	2.402	.123
PUREAPPL	8.970	1	8.970	9.937	.002
HARDSOFT * PUREAPPL	5.688E-03	1	5.688E-03	.006	.937
Error	212.143	235	.903		
Total	4449.000	239			
Corrected Total	222.954	238			

a. R Squared = .048 (Adjusted R Squared = .036)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Teamwork Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	41.480[a]	3	13.827	16.810	.000
Intercept	3918.571	1	3918.571	4764.150	.000
HARDSOFT	.856	1	.856	1.040	.309
PUREAPPL	37.763	1	37.763	45.912	.000
HARDSOFT * PUREAPPL	3.983	1	3.983	4.843	.029
Error	193.290	235	.823		
Total	4769.000	239			
Corrected Total	234.770	238			

a. R Squared = .177 (Adjusted R Squared = .166)

Tests of Between-Subjects Effects

Dependent Variable: Possession of Lifelong Learning Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	17.043[a]	3	5.681	4.821	.003
Intercept	3551.151	1	3551.151	3013.718	.000
HARDSOFT	.108	1	.108	.091	.763
PUREAPPL	16.198	1	16.198	13.747	.000
HARDSOFT * PUREAPPL	1.041	1	1.041	.883	.348
Error	276.907	235	1.178		
Total	4337.000	239			
Corrected Total	293.950	238			

a. R Squared = .058 (Adjusted R Squared = .046)