Assessing quality in higher education by examining the effects of university experiences on learning outcomes and student development

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ABSTRACT

The thesis is about quality in higher education: what it means, how it is measured, and how it can be improved. It attempts to analyse ways of thinking about higher education and quality, consider their relevance to the measurement of performance of universities, and explore their implications for the selection of criteria, approaches and methods for the assessment of quality in higher education. Forming the basis for the empirical investigation of the thesis is the approach of assessing quality of university education using data collected from individual students about their subjective experiences during the university years and their perceptions of the value of the educational experience. The intention is to investigate the numerous aspects of the student experience in higher education to contribute to the knowledge of quality learning and the necessary conditions in institutions that are required to promote quality learning in students. The setting for the thesis was Lingnan University in Hong Kong, a small, government-funded liberal arts university. Data were collected from two samples of students on two occasions with eight months apart. Data collection was by way of a questionnaire for a wide range of variables about the students' background, university experience and learning outcomes. Findings of the research identified that the change reported by students was related to their educational experience and the effect of different university environments on students' growth and development. Results were reported with implications to provide university administrators, teachers, and students with feedback on how well they have been performing and what conditions are conducive to quality learning and teaching in university. Further, implications were drawn for quality assessment of higher education in Hong Kong by presenting an alternative approach that takes into account the effects of the university experience and students' involvement in it as indicators of university success.

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To all these people I extend my heartfelt thanks.

Declaration

I hereby declare that the work submitted in this thesis is entirely my own, despite the fact that the study for the thesis was supported financially by Lingnan University in Hong Kong as an internal teaching development grant project of which I am the sole investigator and project manager.

The grant has enabled me to acquire some part-time clerical assistance for the administration of the survey questionnaire and the handling of the essential data input into the computer for subsequent analysis and interpretation. Regarding this, I want to express utmost appreciation to my colleagues at the Teaching and Learning Centre, in particular, Ms. Carol Chan and Ms. Lillian Tang, for their assistance in the practical but vital matters of data inputting, and the preparation of the manuscript.

Finally, although I have published part of the Literature Review Chapter as two articles in refereed journals around the topic of Quality Assessment in Higher Education, I declare that the thesis is my original work which has not been submitted for a degree in the University of Durham or any other university.

Chapter 1 Introduction

Organisation of the Thesis

The thesis consists of five chapters. They are: Introduction, Literature Review, Methodology, Results and Findings, Conclusions and Implications. When separate, each of these chapters is devoted to a particular purpose of its own. But when combined, the five chapters are in totality advancing the argument on quality in higher education, its measurement and outcomes.

Chapter One is this introductory chapter which gives the background to the arguments and purpose of the study. It first describes the context from which a concern about quality and purpose of higher education is emerged. Current debate on quality includes why quality matters in higher education, what factors, both internal and external, are driving the efforts of higher education institutions to monitor and improve quality. This helps to set the scene for the conceptual discussions and the subsequent investigation on quality outcomes assessment. This chapter also identifies the contextual factors for Hong Kong higher education to establish a system of quality assurance in view of the rapid and substantial expansion of the university sector and the increasing demands from government for accountability in the expenditure of public funds. Within this larger context of contemporary debate over the improvement of quality in higher education, this chapter provides the rationale for the approach and perspective adopted in the thesis about how quality in higher education should be conceived and measured. It then outlines an investigation that aims to operationalise the conceptual notion with four research questions that guide the structure and purpose of the study.

Chapter Two is a review of the literature which provides a comprehensive synthesis of major thoughts and discussions on quality in higher education, including its conceptions and implications for the measurement, criteria and approaches for the evaluation of university success or excellence. Firstly, it interrogates the various conceptual bearings about both higher education and quality. Different stakeholders in higher education will conceive higher education and quality differently. This part of the thesis analyses the different conceptions of higher education and quality, and examines their philosophical and political underpinnings. Implications are then drawn from these diverse and very often conflicting views of higher education and quality for some theoretical and philosophical perspectives that might be applied to the measurement of institutional performance.

Secondly, the discussion ensues to explore various systems and approaches to measure and assure quality. Each of these systems will be discussed in the light of its contribution to the development of an evaluation framework that will define what performance means, and then measure it. It is inevitable that such choice of performance measurement approaches and methods is influenced by the value systems of those making the choice, and the need to reflect the interests of various stakeholders in higher education. Various models of quality assessment in higher education are discussed and analysed for their purpose, process and even drawbacks. For example, the 'production model' of input and output is examined alongside the 'value added' approach and the 'institutional impact' evaluation to elicit insights into the measurement of quality in higher education.

Thirdly, the issue of college or university impact is raised to discuss the influence of higher education on students' academic, social and personal growth. In order to capture the full range of students' experience in higher education, the challenge is to

find ways of developing and measuring outcomes that adequately reflect the fullness of the experience; and to provide a broader definition of the impact of higher education on student development. In this connection, some major works constituting the body of research on this topic are reviewed and discussed. These include Tinto's theory on the degree to which students felt integrated into the life of the campus and thus sustained a commitment to course completion; Alexander Astin's input-process-output model; Ernest Pascarella's generalised causal model which includes measures of institutional features as well as quality of effort; and finally, Pace's theory that the combined influences of the institutional environment as perceived by the student and the effort expended by the student lead to student growth and development. Discussions are focused on the interactions between the university environment and student's quality of effort or involvement in the university experience that produce desirable educational outcomes. The challenges for university administrators and practitioners are to understand how institutional efforts interact with student responsibility; to formulate effective policy and practice; and to develop instructional environments which promote students' quality experience to result in better learning and development.

Finally, particular reference of the discussion on quality is made to the Hong Kong context to shed light on who controls quality, what processes are involved and how quality assurance is approached to take heed of the different conceptions of quality that inform the preferences of different stakeholders in higher education. However, the details of particular approaches to quality assurance and improvement may be less significant than the societal and institutional circumstances that have given rise to them. Hence, the circumstances that frame the assessment systems and methods used in Hong Kong higher education are analysed for their impact and effectiveness in promoting a quality culture in universities of Hong Kong.

Chapter Three is the Methodology chapter which elaborates the method and approach used to assess quality in higher education in light of the philosophical underpinnings that excellence in higher education can best be measured in terms of the change or growth in students' learning and development. This conception about quality in higher education guides the design and approach of the investigation that aims to understand the students' experience in all aspects during their undergraduate years; and to identify how much of the growth and development can be attributed to the quality university experience that the institution provides for its students. The different exploitations of the university experience by different students to different extents are central to the design of the study in question. Here in this chapter, the overall research objective and the four guiding research questions are reiterated to provide the rationale for the study design and the selection and modification of the instrumentation to collect the relevant data. Methods of analysis will also be introduced to provide the basis for subsequent interpretation and analysis. A particular section of Chapter Three is devoted to the discussion on the limitations of the study by outlining the imperfections and constraints that condition the design and methodology used in the assessment of university impact and its qualitative differences on students' outcomes and development.

Chapter Four gives a detailed report and a comprehensive summary of the major findings. The results of the study will be reported systematically guided by the four research questions. Answers to each of the research questions will take the form of a report on data analyses that address those major concerns raised by the said question. Detailed analyses using tables and figures will be presented for data summary and interpretation. Some specific descriptions of the methods of analysis will be provided and outlined for a summary of the technical details involved.

Chapter Five is the final chapter of the thesis which aims to discuss the findings by drawing comparisons between the conclusions of the study in question and those major conclusions of previous comprehensive syntheses of the impact of higher education on students, with a particular focus on the effect of the university experience on learning outcomes and development. It tries to articulate the extent to which the research evidence presented by the study is supportive of the major theses or models of student outcomes study on the impact of university. Implications will then be drawn and suggestions be made to universities, their administrators, practitioners and even students, on the kinds of conditions, activities, and experiences that university education affects students. As for quality assessment in higher education in Hong Kong, an alternative approach is suggested to encourage institutions to be more oriented towards student learning and the development of a comprehensive database for better institutional planning and decision making. Finally, the chapter suggests important areas for future research and comments on methods of inquiry that may be most useful in increasing the understanding of the impact of university education.

Background to the Study

Nobody would deny that students undergo significant changes during their years of university education. The higher education experience can profoundly affect a student in many ways. Intellectual growth, personal and social development, value and attitude change, and cultural awareness are just a few of the many areas affected by university attendance. The concern with student growth and development in higher education is by no means new. Researchers, practitioners and policy makers have long urged universities to demonstrate their effective performance, and success in meeting their educational goals by scrutinising the quality of their provision at various levels

including the institutional, the programme, as well as individual student levels.

Why quality matters

The recent decades have brought unprecedented public demands for higher quality in colleges and universities in many parts of the world. Higher education institutions today are under increasing pressure to introduce some system for monitoring or assessing quality as a result of both external and internal forces.

Tuttle (1994) suggests that the most acute external pressure facing public colleges and universities is a reduction in the public funds received. There is less taxpayer's support today to fund the higher education system than there used to be in the past. In addition, there has been the rapid and enormous expansion of the university sector. The dramatic increase in the student population has not been matched by appropriate funding increase to safeguard quality. It is generally acknowledged that quality will suffer when resources diminish. Allegations that quality and standards are falling tend to produce the reaction that checks or controls are needed (Pearce, 1995).

Alongside such developments in finance and student participation in higher education, people have become more critical of authority and are no longer willing to place total confidence in the 'ivory tower' image (Craft, 1992) of tertiary institutions, but expect evidence that higher education is providing good quality and value for money. This has been coupled with increasing demands from government for accountability in the expenditure of public funds in an environment where greater accountability and openness on the part of the profession has become the norm (Pearce, 1995).

Another external pressure for quality comes from business and industry (Frazer, 1992). In industry, in commerce, in government circles and now in higher education, the word

'quality' is on everyone's lips: quality control, quality circles, total quality management, quality assurance, and so on. The maintenance and enhancement of quality, and attempts to define and measure quality, remain as widespread and major issues for higher education in many countries.

To deal with these external challenges, the internal structures and environment of higher education need to change accordingly to keep pace with the unprecedented demand for quality. However, it is not uncommon for higher education to find that its management structure and culture make change very difficult. As Tuttle (1994) attests, existing management systems are often outmoded and can no longer ensure success in an increasingly competitive world. This resonates with what Chaffee and Sherr (1992) claim as the fact that the role and importance of higher education in society have changed dramatically over the years, but institutional practices have not.

For example, before the 1950s, higher education achieved a high level of quality through selecting the brightest students and graduating those fittest who survived through the most strenuous examination system. The result has been that institutions could not help but produce high quality graduates. But today, higher education is no longer seen as a privilege but as a right and an economic necessity (Chaffee and Sherr, 1992). The old practice of controlling quality primarily through selecting only high-quality students is no longer acceptable. Colleges and universities now need to pay greater attention to quality, and to transform whenever necessary their organisation values, norms, structures and processes for a higher level of effectiveness and efficiency.

Facing these internal and external demands for quality, the challenge for higher education is to maintain or achieve a high level of standards whilst attempting to meet

the continuing requirement of doing more with less.

Increasing concerns for quality in higher education in Hong Kong

Hong Kong's higher education system has undergone a period of dramatic expansion in the past ten years. In 1989/90, only an equivalent of less than 9% of the relevant age group were able to receive higher education. In 1989, the government decided to expand the tertiary sector substantially. The goal was by 1994/95, the number of first-year first-degree places would have been doubled. This is 18% of the age group, compared with 9% in 1989/90, and only 2% in the 1970s (UGC, 1996). Further, in the Year 2000 Policy Address delivered by the Chief Executive of HKSAR (Hong Kong Special Administrative Region of China), the government has made clear its plan of increasing the participation rate in higher education to even as high as 60% of the relevant age group in ten years' time.

In such times of expansion it has become necessary to address the question of the quality of education and whether it would be sacrificed for quantity. There is a general argument of 'more means worse' which raises concerns about the quality of university graduates, quality of teaching and quality of learning.

In common with many other parts of the world, there has been an increased awareness among higher education institutions in Hong Kong of the importance of quality assurance. Young (1996) attributes this to the massive expansion in the university sector for two reasons:

> **First**, with a much wider range of abilities at intake, effective learning can no longer be taken for granted, as it might have been 20 years ago in an elitist university system. **Second**, the much increased numbers in higher education translate into a correspondingly large public subvention of the sector, and it

> is natural that the community wishes to be re-assured that its money is well and effectively spent.
>
> Young, 1996:1

This raises the issue of accountability being another major reason for greater attention to quality. Hong Kong Government has a responsibility to society to ensure that what she buys from higher education is acceptable and provides value for money. It is therefore the public's expectation that the government will find ways to monitor quality assurance in universities and courses in Hong Kong.

Quality and accountability will certainly continue to be the principal themes in higher education policy debate in future years. As Loder (1990) suggests, issues such as maintaining academic standards and financial accountability to the government will attract much attention as competition between institutions for students become much more severe in future. This is more so when institutions are subject to increasing pressure for greater cost effectiveness, and even cost reductions, while maintaining and improving quality (French, 1997a).

Measurement of quality in higher education

Attempts to measure quality in higher education should be based on some coherent philosophy of what higher education is about, including its purpose and major goals. In particular, the assessment programme should also reflect some conception of what constitutes quality in higher education, which in turn determines the outcomes to be measured and the approach of measuring them.

While different types of institutions assign different priorities to the three basic goals of higher education: research, public or community service, and education of students, all institutions share a common commitment to the educational function. It is the

education of students that should be the primary objective which gives reasons for the existence of universities.

Students are a major part of the concept of higher education in which universities are required to provide quality education by making available the optimal favourable conditions to promote effective learning in students. Hence, for any considerations of quality in higher education the improvement of the student experience should be of central importance.

This conception of quality is premised on the notion that higher education is a 'transformative process' (Harvey and Green, 1993). It is an experience that implies a change in students in all aspects as a result of the higher education they receive. There is other similar terminology to describe the change in students' development caused by higher education. This includes 'value-added', 'growth' and 'impact' (e.g. Astin, 1985, 1993). All these words imply an importance for universities to bring about a positive change in students in both cognitive and non-cognitive dimensions in order to be considered excellent which displays quality in provision. While there is a lot of commonality in these words, they have different connotations about the change measured in students. For example, the word 'value-added' may be interpreted differently with a different meaning. To some 'value-added' simply refers to the progress students made as a result of university education. But there are others who conceive it as the relative progress of students with similar starting points. In other words 'value-added' is equivalent to the residual from regression analysis. It is possible that an individual can make rapid progress, but have zero value added, because that was the kind of progress as predicted. In the context of this thesis, 'value-added' is simply taken as the positive change or gains that students have experienced as a result of their exposure to higher education.

Barnett (1992) suggests that the interest in measuring quality in higher education and the effect of students' university experience must be based on two important considerations: that the central activity of higher education is that of maximising the students' educational development; and that it is the continuing improvement to maximise student learning and development that remains the primary goal of universities and should be the focus of any concern over quality in higher education and its measurement.

Any measurement of quality and evaluation study in higher education that falls short of the centrality of students' experience is inadequate; it fails to provide information about how students have found the experience and how much they are learning and progressing both intellectually and emotionally throughout their university career.

It is in this light of examining the impact of the educational experience within the context of the contemporary debate over the assessment and improvement of quality in higher education that a study was framed to capture the full range of students' experience in higher education. This study intends to find ways of defining and measuring outcomes that adequately reflect the fullness of the experience; and to provide feedback on what programmes or policies facilitate or inhibit students' educational development.

This approach, though not new, is not the current outlook and practice in the assessment of quality in higher education in Hong Kong. One of the aims of the study is therefore to present to Hong Kong higher education an alternative model of quality assessment which takes into account the growth and development of students as a result of their exposure to the university experience.

Purpose of the Study and Research Questions

The study aims to operationalise the notion that institutional excellence or quality can best be measured in terms of the university's influence on students' academic, social and personal growth. It is about the evaluation of the university experience on student outcomes. In more specific terms, the principal objective of the study is to identify in what areas and through what kinds of conditions, activities, and experiences the university affects students.

This objective implies an approach or methodology for quality assessment that should be able to capture the positive influence on the students as they pass through the system of higher education. It is also important for the approach to be able to evaluate the quality of the university experience so that information on what influences learning and growth can be identified to inform policy and practice.

It is on these premises that four research questions were formulated. The research questions are thus:

1. *Do students change or develop during the university years, and if so, how much and in what directions?*

   This is the 'change' question which aims to identify how much students have gained, how much they have added to their knowledge, their intellectual skills, and to other abilities and insights as a result of their experiences in university.

   The fact that students spend several years attending university suggests the great potential of the university experience for producing changes not only in

knowledge and vocational skills but also in values, attitudes, aspirations, beliefs, and behaviour. It is therefore hypothesised that students will grow each year with respect to a broad net of learning outcomes which include gains in general education, vocational and professional preparation, cognitive and intellectual outcomes and gains in personal and social development. The wide array of outcomes to be measured acknowledges the importance of student development outcomes as well as more conventional academic outcomes.

Do different students change differently? How is the change reported by students related to their background characteristics and the environmental factors to which students have been differentially exposed during their undergraduate years? Comparisons of the change for various student sub-groups are therefore needed to identify the different amount and rate of change in them.

2. *What are the students' experiences in university, and how are they related to outcomes, environment, and students' background characteristics?*

This is a question about university experiences. How much time do students spend on academic activities and use the facilities available on campus? To what extent are they really engaged? To what extent is the amount, scope, and quality of their investment related to what they get out of university, related to the university environment (including where they live, what they study, and how long they have been there) and to their satisfaction with the university experience?

Furthermore, how do students perceive the university environment with respect to the emphasis students felt is given to various qualities that make up the ethos or culture of the university (academic, artistic, critical, vocational, practical,

language, IT and good teaching) and the general supportiveness of interpersonal relations on the campus (among students, between students and teaching staff members, and with administrative personnel)?

Generally speaking, this second research question is about students' university experiences, in particular about how much time and effort they spent in engaging themselves in various university activities, and to what extent their effort and experiences are related to the students' self-reported gains, their perceptions of the university environment and their overall satisfaction with the university they attended.

3. *To what extent are student changes or development associated with the university experiences and the various sub-environments within a university?*

The purpose of this research question is to measure the effects of the university experiences on learning outcomes and student development. The question to be answered here is this: given all the data collected about the students — their background characteristics, status in university, satisfaction with university, assessment of the university environment, and their scores on the various university activity scales — what best predicts their achievement with respect to the list of university outcomes and development reported by students?

The overall research concern here is about the 'net effects' of the university experiences on outcomes. In this connection, variables that are considered to be potentially biasing factors or confounding variables will need to be controlled by statistical procedures in order to assess more accurately the effects of university experiences on learning outcomes and student development. The variables that

will be accounted for include those pre-enrollment attributes of students such as prior academic aptitude, sex, parents' education and other environmental factors including place of residence, majors, study hours, part-time work, etc. The attempt here seeks to confirm the effects of students' university experiences on outcomes after controlling for their background characteristics.

4. *Finally, what feedback or implications for policies and practice can be provided for university administrators and practitioners to improve and facilitate better quality experiences of students?*

This is a question about 'feedback' and use of the research findings for improvement. What features of the university environment, for example, lead to changes and development in students? What experiences or university activities make a difference in student outcomes? Underlying these questions is the assumption that university environments can be created and modified to help develop competent, critical, and socially concerned human beings. One primary objective of this study on the quality of university experience is to provide the institution and its stakeholders with not only descriptive information on their students: who they are, what they have learned and what experiences they have had in the university environment; but more importantly, what those factors, programmes, or policies are that have caused a differential effect on student learning and development. With knowledge of the differential effects, university administrators and practitioners are in a better position to evaluate how much and how well students are actually learning, and what facilitates or inhibits students' educational development.

These four guiding research questions present the structure and parameters for the investigation that places an emphasis on quality student experience. The research will be reported in the following chapters of the thesis for discussions and conclusions to be made about student learning and the effect of the university experience on educational outcomes. From time to time, reference will be made to these four research questions to help focus the interrogations and to avoid going off at a tangent from the overall purpose of the study.

Chapter 2 Literature Review

The thesis is about the assessment of quality in higher education by examining the effect of the university experience on learning outcomes and student development. The keywords are thus 'quality', 'higher education', 'assessment', 'university experience', 'effect', 'outcomes and development'. This chapter is a review of the literature that attempts to link all these core ideas and have them intertwined to form a coherent framework and argument for the thesis and a research study that is underpinned by it.

Conceptions of Quality and Higher Education

'What counts as quality is contested' (Barnett, 1994: 68). Quality may mean different things to different people who therefore demand different quality outcomes and methods of assessing quality. Harvey and Green (1993) describe quality as a 'relative concept'. It is relative to the stakeholders in higher education.

> Quality is relative to the user of the term and the circumstances in which it is involved. It means different things to different people, indeed the same person may adopt different conceptualisations at different moments. This raises the issue of whose quality?
>
> Harvey and Green, 1993:10

There are a variety of stakeholders in higher education, including students, employers, teaching and non-teaching staff, government and its funding agencies, accreditors, validators, auditors, and assessors (Burrows and Harvey, 1992). Each of these stakeholders has a different view on quality, influenced by his/her own interest in higher education.

Reynolds (1990) has summarised the several expectations of higher education from different perspectives. For example, to the committed scholar the quality of higher education is its ability to produce a steady flow of people with high intelligence and commitment to learning that will continue the process of transmission and advancement of knowledge. To the government a high quality system is one that produces trained scientists, engineers, architects, doctors and so on in numbers judged to be required by society. To an industrialist a high quality educational institution may be one that turns out graduates with wide-ranging, flexible minds, readily able to acquire skills, and adapt to new methods and needs.

Each of these views represents a valid expectation of higher education and about its quality. The measurements thus required, and the standards to be applied can be different for each of these notions of quality.

This idea is resonant with what Barnett (1994) conceives as a three-fold connection between different conceptions of higher education, different approaches to quality, and the identification of different outcome measures (which Barnett terms as Performance Indicators — PIs). What he suggests is, behind the various notions of what constitutes quality, there lies — whether explicitly formed or held tacitly — a view as to the ends that higher education should serve. In turn, these prior conceptions will generate different methodologies for evaluating quality, and in particular will call for alternative sets of outcome measures (PIs).

Barnett (1994) illustrates this interconnectedness between conceptions, approaches and outcomes in the context of four dominant contemporary conceptions of higher education. When higher education is conceived as the production of highly qualified manpower, the graduates are seen as products whose career earnings and employment will become

bearings on the quality of the education that they have received. When higher education is likened to training for a research career, the PIs then become the research output of staff and students and the input measures of their research ability. The third conception is higher education as the efficient management of teaching provision. On this view, the PIs are those efficiency indicators such as completion rates, unit costs, student-staff ratio, and other financial data. Further, when higher education is conceived as a matter of extending life opportunities, the focus is on the participation rate or percentage growth of students from under-represented backgrounds, including those mature students, part-time students and also disabled students.

These are four different, if overlapping, conceptions of the purposes of higher education. Each of them has their own definition of quality and a distinctive set of PIs that are associated with it. Common in these four conceptions is the view of higher education as a black box. None of them focuses on or indicates an interest in the educational process, or the quality of the learning achieved by the student. They ignore what goes on in the black box and focus chiefly on inputs and outputs.

Barnett (1994) later contrasts these four conceptions with another four conceptions of higher education which focus, this time, on the quality of the student experience. The first conception is about exposing students, or initiating them into the process and experience of pursuing knowledge. The second is related to the process of developing students' autonomy and integrity. The third values the cultivation of general intellectual abilities of students to form perspectives and vision beyond the confines of a single discipline. The final conception of higher education is about the development of critical reasoning.

Those four conceptions, unlike the previous four, are about the educational processes, which are not easily amenable to evaluation by numerical quality measures, such as PIs. The complexity and quality of the educational process and student experience can not be readily captured by any form of objective measures using numbers and scores. Hence, the usefulness of performance indicators by focusing primarily on input and output is subject to question.

In a similar vein, Harvey and Green (1993) conceive quality as a multi-faceted notion which is value-laden in nature. Each stakeholder in higher education sees quality and its outcomes differently resulting in a host of methods and approaches adopted to measure quality in the light that one sees it.

There are widely different conceptualisations of quality in use (Schuller, 1991). But Harvey and Green in their discussion of the relationship between quality and standards in higher education identify five perceptions or notions of quality discernible in higher education: quality as *exceptional* (linked with excellence and elitism), as *perfection* or consistency, as *fitness for purpose*, as *value for money*, and as *transformative* (interpreted as the enhancement and empowerment of students or the development of new knowledge) (Harvey, 1995; see also Harvey, Burrows and Green, 1992). Each of these notions of quality has implications for the methods and approaches used to measure the desirable outcomes emanate from it.

There are problems raised by this pluralistic view of quality and its measurement:

> Who should define the purposes of higher education? Should it be the government, the students, the employers of students, the managers of institutions or the academic professionals?

> How would the conflicting views about higher education and quality be resolved in judging the quality of an institution? Who would determine the priorities?
>
> Green, 1994:15

Barnett (1994) describes the quality debate by different groups of actors in higher education as a power struggle, where each group tries to fight for their voices to be heard and taken into account when assessments of quality are undertaken. Each of the different voices is valid deserving serious attention in its own right, but none can be the only legitimate voice to be heard. It is therefore the challenge for any kind of performance evaluation to be framed so as to permit the equal expression of legitimate voices, though they may conflict or compete in some ways.

In summary, for any indicator or performance evaluation system, it always embodies value judgements about what is meant by quality and the desirable outcomes to be achieved and measured. Putting this in the higher education context, the measurement of its quality therefore depends on how one conceives its purpose and quality, which in turn determines the approach and criteria to be used for its assessment, and the outcomes that are to be measured and presented as evidence of institutional excellence.

To conclude this part of the literature review, quality is a very complex concept. One cannot speak of 'the quality', but to speak about qualities (Vroeijenstijn, 1992). To understand quality, it is necessary to recognise that it has diverse meanings which can lead to different assessment methods, and thus different practical outcomes.

Approaches to Quality Assessment in Higher Education

As a result of the diversity in views about quality and higher education, a variety of systems and approaches have been developed for monitoring quality of different kinds and at different levels, displaying varied emphases and priorities. Some of these monitoring systems are summarised as follows:

Quality control. This is a system to check whether the products produced or services provided have reached the pre-defined standards (Frazer, 1992). Quality is usually inspected at the end of the production and is undertaken by someone external to the workforce. The main problem with this approach to quality measurement in higher education is that it is not included as part of the improvement process ignoring the fact that the overall quality of a university must be the concern of everyone who works there (ibid).

Quality assurance. This is a system based on the premise that everyone in an organisation has a responsibility for maintaining and enhancing the quality of the product or service. When put in the univeristy context, quality assurance requires a whole-institution approach for a complete transformation to quality involving top-level commitment, followed by substantial and comprehensive re-education of all personnel (Chaffee and Sherr, 1992).

When compared to the quality control system, quality assurance represents a more comprehensive approach of assessing and monitoring quality in higher education. Quality assurance requires not just the detection of defects as in quality control but also their prevention. It requires the commitment of everyone in the institution to an organisational culture that prizes quality, relentlessly improving in search of perfection.

However, this is something very difficult to achieve which very often remains as a goal or philosophy that universities would aspire to seek to achieve or get closer to.

Quality audit. Quality audit is a means of checking that relevant systems and structures within an institution support its key teaching mission, and to ensure that provision is at or beyond a satisfactory level of quality (Pearce, 1995). A quality audit can be conducted either internally or externally, which checks that the university system does what it says it is going to do, and has written documented evidence to prove it. The major criticism of audits is that they offer no more than a snapshot of an institution (ibid). Educationists generally find audit distasteful — shallow, undemanding — since either the evidence of conformance to processes and procedures is there or it is not.

Quality assessment. It is a means of assessing the quality of what is actually provided by institutions (Pearce, 1995). Green (1994) adds that quality assessment involves the judgement by assessors of performance against criteria — either internally or externally. This gives rise to a potential source of conflict, precisely because quality criteria for education are so difficult to agree (see Keefe, 1992). Another potential problem with quality assessment is that it is intended to be mission sensitive (Pearce, 1995). It examines the quality of education provision against the expressed aspirations of the individual institution. If the institution has high aspirations, quality is to be measured against this yardstick. That might make it more difficult for a university to succeed than another which sets itself lower aspirations. Pearce (1995) cautions that if taken to absurdity, a university which aspired to produce rubbish, and succeeded, would be of higher quality than a university which claimed intellectual excellence, but narrowly failed.

Indicator systems. This approach of evaluating universities is to compare their performance across a range of indicators (Johnes and Taylor, 1990). There are several characteristics associated with performance indicators (PIs). First, a performance indicator should have a monitoring function. It can be defined as 'an item of information collected at regular intervals to track the performance of a system' (Fitz-Gibbon, 1990:1). Second, an indicator is usually numeric (Cuenin, 1986). Third, performance indicators are objective-related which are 'statements, usually quantified, on resources employed and achievements secured in areas, relevant to the particular objectives of the enterprise' (CVCP/UGC, 1986:5).

Bringing these definitions and interpretations together, it can be summarised that PIs are usually in quantitative form, generated for the purpose of monitoring and assessing performance of institutions against the objectives set for relevant activities on a regular basis.

The development of PIs in higher education can be traced back to the production theory provided by the manufacturing industry (Johnes and Taylor, 1990). Production theory stipulates the way in which inputs are transformed into outputs. When applied to the university context, the theory examines the relationship between the outputs that universities aim to achieve and the inputs they need to produce those outputs.

According to Johnes and Taylor (1990), if universities are to be evaluated, it is therefore necessary to acquire information about:

1. the outputs which universities aim to produce
2. the inputs which universities need to produce these outputs
3. quantitative measurements of each university's inputs and outputs

4. the technical relationship between inputs and outputs.

Such emphasis on the link between inputs and outputs emanates from an intention of comparing institutions to estimate what each university could have produced with the inputs available to it. This purpose was made very explicit in one of the CNAA discussion papers (June, 1990:4) that among the various reasons for the development of PIs, there are the intentions to 'increase accountability' and to 'raise questions about planning intentions and assist in the deployment of resources'.

It is therefore apt for Johnes and Taylor (1990) to conclude that the purpose of attempting to measure the technical relationship between inputs and outputs in the university sector is actually to provide a benchmark against which each university can be compared.

Despite its promises for greater accountability and benchmarking between institutions, this production model of quality assessment does not quite apply to higher education since universities produce more than one output. Moreover, many of the outputs are different and are not directly comparable. As Cave et al (1988) attest, most of them cannot be easily measured in monetary or even in physical units.

In fact many outputs of universities are not amenable to quantitative measurement. Examples of outputs such as 'cultivating talents of students and disseminating cultural values' are some common objectives of universities that are not easily subjected to quantitative representation (Tam, 2001).

This becomes a particular problem when the process variables are to be included in the link between outputs and inputs of higher education. Many process variables such as teaching and curriculum effectiveness are very difficult to measure and may not show a

direct link between inputs and outputs (Tam, 2001).

Some attempts have been made to improve the validity of the input-output association for the measurement of quality in higher education. A good example is provided by Johnes and Taylor's (1990) study of comparing the outputs of universities after taking into account the differences in the inputs used up in producing these outputs. Thus for each measure of output, a set of the main explanatory input variables is identified. Multiple regression analysis is then used to estimate the relationship between each selected output variable and a set of input variables. As a result, a standardised value for each university is produced to serve as the benchmark against which each university's actual output is compared.

Johnes and Taylor (1990) have used this approach on four measures of university output. Their main finding is that once inter-university differences in inputs are taken into account, the remaining 'unexplained' variation between universities is relatively small. In three out of four cases, over 80 per cent of the variation between universities can be explained by a set of plausible input variables, with less than 20 per cent of the variation remaining unexplained after differences in inputs have been taken into account. This raises the question as to whether the unexplained variation is itself a useful indicator of performance of universities. Johnes and Taylor have warned that it would be extremely rash and cavalier to assume that the unexplained variation in degree results could be attributed to teaching quality (Johnes and Taylor, 1987).

The study results are resonant with the main criticism of input-output analysis and its associated PIs that they cannot in themselves provide an adequate means of evaluating the effectiveness of provision, rather they may just provide signposts or guides to aid judgement. Because of their objectivity and stability, PIs help to identify issues requiring

further examination in quality measurement. As Barnett (1994) puts it, PIs definitely have a role to play in quality measurement, even if they cannot give us a direct insight into quality.

Quality assessment using input and output indicators cannot comment fully on the quality of the student experience in higher education. If higher education is seen as a development process of increasing the intellectual maturity and personal growth of students, it is difficult to see how performance indicators and input-output analysis can be of any help.

What can be concluded up to this point is that higher education is a process of causing student learning and development, whose quality or effectiveness cannot be easily measured by any kind of simple input and output analysis. The idea that institutions of higher education are founded on processes of causing growth and development of students in a holistic sense, incorporating not just intellectual growth, but social, emotional and cultural development as well, warrants attention to the measurement of quality as a kind of 'transformation' (Harvey and Green, 1993).

The idea that higher education is about the educational processes and the development of minds and hearts of students is resonant with the transformative view of quality espoused in the following quote:

> The transformative view of quality is rooted in the notion of 'qualitative change', a fundamental change of form... Transformation is not restricted to apparent or physical transformation but also includes cognitive transcendence.
>
> Harvey and Green, 1993: 24

In addition to cognitive transcendence, it is apt for Caul (1993) to add that higher education does not just enhance students' intellectual capacity, but also can 'literally transform self-image, equip the individual with more skills, build on the basis of the knowledge that the individual had before arrival; change attitudes and assumptions' (Caul, 1993:597). In this light, the notion that quality as transformation implies a change in students in all aspects as a result of the higher education they receive.

There is other similar terminology to describe the change in students' development caused by higher education. This includes 'growth' and 'impact' (Astin, 1985). All these words imply an importance for universities to bring about a positive change in students in both cognitive and non-cognitive dimensions in order to be considered excellent which displays quality in provision.

Hence, the performance evaluation of higher education should incorporate a consideration of the impact of the institution on its students. In the words of Alexander Astin:

> Its basic premise is that true excellence lies in the institution's ability to affect its students ... to make a positive difference in their lives. The most excellent institutions are ... those that have the greatest impact ... on the student's knowledge and personal development.
>
> Astin, 1985: 60-61

Such an institutional impact approach to the monitoring and evaluation of performance of universities has, as a result, called upon a number of quality measurement methodologies that aim to capture the positive influence on the students as they pass through the system of higher education (Tam, 2001).

One of these methods is the popular 'value-added' approach of trying to measure the pre- and post-difference in students at different points in time.

> Value-added education examines changes in students' performance over time. Students are assessed for entering competencies and then reassessed following the completion of appropriate courses or experiences.
>
> McMillan, 1988: 564

According to McMillan, the value-added approach to performance evaluation offers a lot of promises, which include:

1. better academic counselling and advice to students based on their entering levels of competence;
2. context-specificity with reference to student characteristics and unique mission of each institution that avoids inappropriate inter-institutional comparisons;
3. longitudinal measurement that assesses the change and its lasting impact;
4. focus is on student learning and development instead of on institutional inputs and outputs;
5. provides useful feedback for the evaluation and improvement of teaching and learning;
6. faculty become more involved in student learning and development;
7. better self understanding on the part of students for continuous improvement;
8. provides data about the assessment of impact of the institution on students.

There is no doubt that the value-added approach to quality measurement is an advancement from the input-output analysis and its associated performance indicators. Compared to the simple input-output measure, the value-added method is more appealing because it tries to correct for differences in quality of student input and measure the

competencies of students at entrance to the university and subtract this from their ability upon emerging at graduation (Tam, 2001).

The idea of measuring the value added to students is related to a shift from the traditional concept of quality as exceptional towards relative and transformative notions (Harvey, 1995). 'The basic argument underlying the value-added approach is that true quality resides in the institution's ability to affect its students favourably, to make a positive difference in their intellectual and personal development' (Astin, 1982: 11). Hence, what counts as quality is the contribution of higher education to change in students.

However, the measurement of positive change or value-added is limited by the unavailability of a standard output measure in higher education, such as a universal public examination before graduation. Even though there is such a test, institutions may teach students to prepare for the test. As a result, value-added measures may no longer measure what they were intended to measure (Cave et al, 1988).

Despite many of its promises for better quality comparisons of institutions by making available the gain scores and impact data, the value-added approach to performance assessment in higher education is difficult to be set up.

Similar to the value-added measure is a related measure of the institutional impact as a quality indicator. The measurement of institutional impact is known as 'college impact' studies in North America with origins dated back to half a century ago resulting in a remarkable stream of scholarship. College impact has been the subject of six major reviews in the literature, including the first of its kind by Feldman and Newcomb (1969), the analyses and research by Astin (1977; 1993) a retrospective review by Lenning et al (1974), a focused review by Pace (1979), and, finally, the very comprehensive work of

Pascarella and Terenzini (1991). On this topic, the literature is vast with studies using an array of methods to try to capture the growth and change in university students, and to identify the factors that are associated with particular aspects of it. But in general, the measurement of college or university impact is fraught with two major problems.

First, the longitudinal or cross-sectional research design that is associated with the measurement of institutional impact generally attributes the change observed in students to the effect of higher education. But the question is 'would these changes have occurred if the students had attended a different college or perhaps had not attended college at all?' (McMillan, 1988:573). Astin (1993) warns about the danger of equating 'impact' with 'change'. The change in students is likely to be a complex combination of various factors, which institutional impact is just part of it.

Second, the difficulty of locating or finding a group of young adults who did not attend university to be the control group for the measurement of institutional impact is another problem. The absence of a control group will make any true study of institutional impact invalid. As a result, most of the studies on institutional impact are conducted within institutions to compare the changes of specific groups of students who do attend university (McMillan, 1988).

Notwithstanding many of the criticisms on both value-added and institutional impact measures, these two approaches to quality measurement are definitely a marked improvement in the evaluation of higher education because they provide more sophisticated data on the difference between output and input, and focus attention on the development of students in higher education. It is this perspective about student development and growth that crystallises the discussions so far on quality in higher education and the approach to be adopted for the measurement of it. University impact in

terms of what students learn at university and to what extent one can relate student outcomes to aspects of the university experience is the subject of the next section in this literature review chapter, and on which the major research concern of the thesis is founded.

Quality as University's Impact on Student Growth and Development

This conceptual view of quality is premised on the idea that institutions of higher education are founded on processes of causing growth and development of students in a holistic sense, incorporating not just intellectual growth, but social, emotional and cultural development as well. Under this view, the assessment of quality in higher education or the performance of universities should therefore be gauged in terms of its impact on students' growth, thus calling for attention to outcomes such as gains in both cognitive and non-cognitive aspects of learning, skills and satisfaction with the university environment, and so forth.

In the literature there already exists a plethora of studies and research, which can be summarised as the 'assessment of student outcomes' or 'college impact' studies. (Here in this literature review, the word 'college' and 'university' are used interchangeably to denote the same construct, although the word 'college' is used more often by researchers in the United States). The large volume of work on college impact was mainly conducted by researchers in North America (such as Astin, Pace, Pascarella, Terenzini, and Knox et al), with similar work being undertaken by researchers in the UK and Australia (notably Harvey, Burrows and Green, and Ramsden). Most of these studies are concerned about the effects of university attendance, using a variety of methods and taking different stances about quality in higher education and its assessment. But a common thread that runs through such vast

and diverse scholarship is the basic argument that true quality resides in the institution's commitment to and interest in the educational and personal development of its students.

The research on university students is abundant as the literature reviews of Feldman and Newcomb (1969), Lenning et al (1974), Bowen (1977), Pace (1979) and others attest. There has certainly been no shortage of studies on university students, the institutions they attend, and what happens to them during and after their attendance. For example, in the most notable summary of the research done prior to the 1960s by Feldman and Newcomb (1969), they identified consistent evidence indicating that students did change and grow during their university years. These changes are mainly non-cognitive which include a movement toward liberalism, autonomy, self-confidence, independence and self-understanding. Similarly, Bowen (1977) concludes that there is a great deal of evidence about students' growth in self-discovery and related changes in values, attitudes, and life choices as a result of their university attendance.

Such voluminous literature on the impact of university on students has accumulated for more than 50 years generating much useful information to shed light on what changes students have developed in their undergraduate years and what possibly might have caused such growth. Notwithstanding the richness, much of the literature remains in an unintegrated form. In general, the university impact literature is characterised by those studies and theories derived from the field of psychology (Terenzini, 1987). These theories can be divided into two major groups: developmental theories and college impact theories (Davis and Murrell, 1993).

The developmental theories emphasise primarily psychological stage theories that address issues of nature, structure, and processes of individual human growth and development. These studies therefore focus on the examination of the developmental and psychological changes within students (see for example, Chickering, 1969; Erikson, 1963, 1968). Their attention is on the nature and outcomes of student development, and on which instrumentation of various kinds to get at these psychological traits have to be developed to measure the different aspects of development in students.

The college impact theories, on the other hand, stress the importance of the interaction between students and the institutional environment and the processes of student college experience, and also emphasise the influences of the environment and experience on student change and development. Examples of notable scholarship adopting this approach include those by Astin, Pascarella, and Pace.

While information about students' individual developmental changes and processes are important, policymakers, institutional administrators and practitioners may find the information difficult to comprehend and not practical enough to shed light on what policies and practices that need changing to result in better learning in students. It is therefore the latter approach embodied by the college impact theories that becomes the conceptual guide for this thesis and the research to examine the interaction between students and their university environment that gives rise to the differential changes and development in them. However, even within the literature on 'college impact', there are also diverse thoughts on quality and impact, which in turn affect the methods to be used to measure it, and the conclusions to be drawn for guiding policy and practice. It is the attempt of this part of the literature review to appraise a few of those major theories or thoughts about college impact, to discuss the various methodologies

used, as well as to synthesise the different conclusions or understandings about college or university impact at large.

Among the many scholars who did research on 'college impact', four theorists are considered to have made significant contributions to the literature which has largely defined inquiry and research into college effects for the last twenty five years. They are Vincent Tinto who has developed the most widely established theory of student departure from college (1975, 1987); Alexander Astin and his national, multi-institutional Cooperative Institutional Research Program (CIRP) and database (1985); Ernest Pascarella who offers a generalised causal model to assess college impact which includes measures of institutional features as well as quality of student effort (1985, 1991); and finally, Robert C. Pace and his well-known College Student Experiences Questionnaire (CSEQ) which examines programmes, services, and other institutional characteristics that are associated with the processes of student college experience (1987, 1990, 1992). Each of these theories about college attendance will be reviewed and compared for conceptualisations about how college affects students and learning, plus the methodology and approach that each of them adopts, and the resultant conclusions or insights derived from these theories and thoughts about college and student learning.

Though not directly related to the study on college impact, Tinto's model about college student attrition has provided some early focus and direction for research on students' integration with the university environment, both academically and socially. Using a model, Tinto tries to review and identify those factors that are possibly associated with student withdrawal from college (1975). Tinto's model is based on Durkheim's assertion that suicide is more likely to occur when individuals are insufficiently integrated into society. For similar reasons, Tinto argues that college students are more likely to drop out if they are insufficiently integrated or if they are not committed to the values and culture

of the institution they are attending. The integration refers to both the academic and social aspects of college attendance. The greater the integration the stronger the students' commitment to the goal of completing college. As a result, it is more likely that students will persist and benefit more from their higher education experience.

In Tinto's model, student characteristics such as family background and pre-enrolment experiences are included in an interactive model of student departure. Tinto contends that initially students' background attributes are associated with commitment. But over time and after experiencing integration with the social and academic aspects of the institution, the commitment of the student is either strengthened or diminished. Further analyses of the different integration patterns show that students who become adequately integrated into the social and academic systems of their institution are found to have participated in extra-curricular activities, and interacted actively with both peers and teachers.

Although the implications from Tinto's model are more applicable to explaining student attrition, they are found useful to also shed light on the effects of college on students. Important insights are gleaned from Tinto's research about the importance of both environmental and sociological factors in promoting student success in college. Hence, Tinto's model is found to be useful for providing a basis for understanding and explaining consequences of college attendance other than attrition.

Looking at other forms of university process other than student attrition, many researchers have then built on Tinto's model to examine the complex processes that take place in a university and to investigate the interactions of students with the environment and experience. Among the numerous studies that have followed Tinto's model is Pascarella's study of college impact on student outcomes (1985). Working extensively with Tinto's model, Pascarella and his colleagues have developed the 'impact model'

which includes institutional characteristics and student effort, two features obviously lacking in Tinto's theorising about college attendance.

> The impact of college is not simply the result of what a college does for or to a student. Rather, the impact is a result of the extent to which an individual student exploits the people, programmes, facilities, opportunities and experiences that the college makes possible.
>
> Pascarella and Terenzini, 1991: 611

Using his 'impact model', Pascarella examines on one hand, the institutional factors on student change, and on the other, the students' involvement in the university experience. After accounting for the potential influence of the student background characteristics on outcomes, Pascarella suggests that the attributes that a student brings to college may exert only an indirect effect on student learning and development. Exerting a more direct influence is the amount of student effort and its interactions with the various environmental factors that subsequently produce differential college effects on students.

In his research work for multi-institutional comparison, Pascarella collects data from a wide range of institutions of a different size, structure, style of teaching, and environment. His analyses, with the help of his impact model, involve five sets of variables that act directly and indirectly to influence student learning and cognitive development. Student background and pre-college characteristics, together with the structural and organisational characteristics of the institution, determine the institutional environment. All three sets of variables influence the nature and frequency of interactions with faculty, peers, and other socialising agents. The socialising agents, the institutional environment, and student background characteristics combine to influence the quality of student effort. Finally, learning and cognitive development are directly affected by quality of effort, socialising agents, and student backgrounds.

By incorporating the quality effort construct and the different environmental factors into his college impact model, Pascarella has helped to bring home the importance of studying the interrelationship between the college environment, what students do while enrolled, and college outcomes. A lot of Pascarella's research and studies on college impact are based on this causal model. Examples include a study on the student-faculty informal contact on college outcomes (Pascarella, 1980); freshman attrition and the residential context (Terenzini and Pascarella, 1984); a multi-institutional path analytic study of student persistence (Pascarella and Chapman, 1983); and a large-scale longitudinal study on academic and social integration on persistence (Stoecker, Pascarella, and Wolfle, 1988).

Another very influential researcher in the field of college impact is Alexander Astin. Concerning quality in higher education or university success, Astin has been unequivocal about its purpose, measurement and outcomes. Institutional excellence, as he sees it, should be the institution's ability to bring about a positive change in students, thereby should be measured in terms of the growth and improvements in students over time. Based on this view, Astin advocates a talent development conception of excellence, in which he considers institutions as excellent, not because of their reputations or resource base, but because they can develop the talents of their institutional members, most importantly, of their students.

To assess the impact on students' development and growth as evidence of institutional success or excellence, Astin uses the I-E-O model, or Input-Environment-Outcomes model. Using data collected as part of the Cooperative Institutional Research Programme (CIRP), Astin completed a large-scale study of college impact (1993). This study analyses the responses of more than 27,000 students at hundreds of colleges across the United States. The I-E-O model presents the conceptual guide for Astin's study on

university student development, with which Astin measures the impact of the environment on outcomes after holding a sufficient number of student input factors constant. Outcomes refer to the change and development in students on a range of cognitive and affective attributes over time. Environment includes those various programmes, policies, faculty, peers, and educational experience to which the student is exposed. Completing the I-E-O model is the input variables that refer to the characteristics of the student at the time of initial entry to the institution. These may include pre-university examination results, reasons for attending university, social economic status, life goals and a variety of demographic variables.

Using the I-E-O model, change or growth in the student during university is determined by comparing outcomes with inputs, plus the assessment of the impact of various university experiences to determine whether students grow or change differently under varying environmental conditions. According to Astin (1993), studying college impact with the I-E-O model can provide institutions, teachers, administrators, policy makers and students with a better basis for knowing how to achieve desired educational outcomes. It also contributes to the knowledge of quality learning and the necessary conditions in institutions that are required to promote better learning in students.

Of his many findings about the various effects of the environment on student outcomes, one very important observation is about student involvement (Astin, 1993). For Astin, involvement means the students' investment of both physical and psychological energy in various campus activities. The more students are involved in college, the greater will be the amount of their learning and development. The implication therefore is for university policies and practices to be considered effective, they should be able to promote greater student involvement and commitment to their learning and the university environment.

Although Astin has not further developed this involvement theory into a more elaborated model that accounts for student background or causally links student involvement to various environmental factors, the theory itself is robust enough to suggest that students should be at the centre for any consideration of institutional quality or excellence, whose involvement is thus critical to the measurement of college impact. If institutional success is to be defined by student involvement, then institutions that develop a climate that supports and nurtures involvement are likely to be successful in causing a positive change in students. Astin's talent development concept and its associated notion of involvement present one plausible conception of what institutional excellence is about, and how that can be measured to provide feedback for all those who are concerned about student growth and development.

Significant contributions to the 'college impact' literature have also been made by Robert Pace. Unlike the other three researchers, Tinto, Pascarella, and Astin, Pace is less ambitious in trying to work as rigorously as possible to explain for college impact. He deliberately called his model one of 'College Impress' (Pace, 1984), because the word 'impress' implies a softer connotation of the effect of college on students than the word 'impact'. Impact implies a powerful and stronger effect, while impress suggests a kind of influence that is more subtle but can be quite penetrating.

The whole idea about Pace's 'College Impress' model is simple. He postulates that college outcomes depend on responsible student behaviour. While student responsibility or involvement is important, it is always the college environment that affects the participation of students, either positively or negatively, to result in the differential outcomes in students. Colleges offer a rich variety of intellectual opportunities. How much one can gain from college depends on one's effort and involvement in college activities to take advantage of the intellectual opportunities

available. Examples of involvement include using the library, interacting with teachers and peers, participating in extra-curricular activities, and so forth.

Pace defines the investment of time and effort in college activities as 'quality of effort' (1982). It requires both frequency and consistency of effort in order to benefit from what the college has to offer. Responsible student behaviour therefore is characterised by the quality and amount of effort expended by a student to make the most of his/her college experience. Pace is explicit about this demand on students when he says:

> Colleges are of course accountable for a lot of things. .... But surely the students are also accountable for the amount, scope, and quality of effort they invest in their own learning and development.
>
> Pace, 1984:6

It transpires from the above quote that success in college should require a partnership between the students and the institution. As students need to invest effort and time in college activities, the institution is also held responsible for providing the optimal favourable conditions to promote active participation of students through programmes and policies that encourage responsible student behaviour. Pace emphasises the very important part played by the college environment in shaping student effort. It is a reciprocal and a two-way interaction that creates the positive relationship which exerts a direct influence on how much students gain from college and in what specific ways.

Pace's recognition of the importance of the interaction between student effort and the collegiate environment found expression in one of his very important developments. It is the CSEQ – College Student Experiences Questionnaire. The CSEQ is a comprehensive instrument that measures student growth and development and the quality of students' experience, specifically in relation to student effort in engaging

themselves with college activities. The underlying philosophy behind the CSEQ is that college experience is a coherent whole that requires a facilitative environment and student effort. The CSEQ therefore tries to measure the quality of the experience in college with reference to a number of very important dimensions of student involvement and responsible behaviour. The various dimensions, when put together, will indicate the amount and quality of effort of students, who are ready to take advantage of what the college environment has provided for them.

The CSEQ collects very few variables on student input characteristics, because Pace believes that it is not important to account for what students bring to college, but rather what they do in college and to what extent they are involved. In Pace's words, his primary research concern, therefore, is 'what students do in college, and what conditions in college influence what they do and what they achieve' (1984:16). In summary, Pace's College Impress model and its associated CSEQ offer a very direct and pragmatic approach of measuring the quality of university experience and student development by way of the combined influences of the college environment and the effort expended by the student.

Despite the different uses of terms, all four theorists, Tinto, Pascarella, Astin, and Pace conceptionalise the purpose of university and its quality with a similar stance. They concur that university education is a matter of causing student growth and development, whose excellence or quality should therefore be measured in terms of its impact on students. They also recognise that in order for universities to make an impact, it requires the contribution of an environment that is conducive to student learning and development, as well as the quality and amount of effort expended by students to engage themselves in campus activities.

The scholarship on college impact derived from the work of these theories represents one of the strongest and most useful accounts of how college affects students and in what areas and through what kinds of conditions, activities, and experiences that college affects students. Although each of the theorists focuses on different outcomes when examining college impact, they all seem to suggest that the student's background plays only an indirect role in shaping college outcomes, usually moderated by the college environment and other related factors. Besides, they all see the very important role of the institutional environment which exerts either a positive or negative influence on outcomes. Most important of all, they all recognise the significant effect of students' effort or involvement in campus activities in order for students to derive maximum benefits from all that the university environment has to offer. For Pace and Pascarella, the college environment should promote quality student effort and interactions between students, teachers and peers in order to be effective. Tinto highlights the importance of both academic and social integration of the students with the college ethos and culture, while Astin reminds of the importance of assessing institutional excellence or quality in terms of the positive influence on students.

This body of research on college impact, student learning and experience provides the conceptual framework for the thesis which stimulates how quality in higher education should be conceived of, and how its performance can be assessed in the light of the impact it makes on the student participants. This college impact approach to gauge the effects of the college on student outcomes is consistent with the view that higher education can literally transform self-image, equip the individual with more skills, build on the basis of the knowledge that the individual had before arrival, change attitudes and assumptions. Higher education, if conceptualised in this perspective, should require a definition of its quality and excellence accordingly, and as a result

demands an approach that should be able to measure the change or development in students as evidence of institutional performance and success.

Quality Assessment in Hong Kong Higher Education

Before outlining a study that aims to operationalise the conceptualisation of institutional excellence or quality on account of student growth and development as a result of university attendance, it is relevant at this juncture to examine the local context of defining and measuring quality in Hong Kong to shed light on who controls quality, what processes are involved and how quality assurance is approached to take heed of the different conceptions of quality that inform the preferences of different stakeholders in Hong Kong's higher education.

In Hong Kong, the primary responsibility for quality assurance rests with the institutions themselves (UGC, 1996), particularly when all of them are self-accrediting universities. While stressing the importance of maintaining the institutions' academic freedom and institutional autonomy, the University Grants Committee of Hong Kong has to balance this with the equally important imperative of public accountability for the increasingly large sums of public money provided by the government (French, 1997a).

The University Grants Committee (UGC) of Hong Kong is a non-statutory advisory body whose members comprise distinguished overseas academics, prominent local professionals and business people, senior locally based academics. It was established in 1965 and has for the past over 35 years discharged its primary responsibility of advising on the academic development and funding of Hong Kong's institutions of higher education. It also played, and continues to play, a vital role in assuring the

quality of provision in the higher education institutions for which it has responsibility (UGC, 1996).

In addition to the UGC, the Hong Kong Council for Academic Accreditation (HKCAA) also has a role to play in quality assurance in higher education in Hong Kong. The HKCAA was set up in 1990, patterned after its counterpart in the Untied Kingdom, the Council for National Academic Awards (CNAA), which no longer exists today. Before the HKCAA came into inception, the CNAA was engaged by the UGC of Hong Kong (the then UPGC) to advise on the academic quality of degree courses proposed or offered by the non-university institutions. The rapid increase in the development of tertiary education in the 1980s made the Hong Kong Government realise that continued reliance on an overseas organisation was no longer appropriate and that it would be desirable to consider the establishment of a Hong Kong system. Eventually, the HKCAA came into being in June 1990 (Hong Kong Government 1987, 1989, 1990).

As Sensicle (1992) sees it, the remit of the HKCAA is to provide authoritative advice to the government on the standards of degree courses in non-university tertiary institutions in Kong Kong. It carries out this task through academic accreditation, that is, by validating and revalidating any courses conducted by institutions and by reviewing the general standards of institutions.

Judging from its remit, the HKCAA operates largely at the programme and institutional levels following a model of 'accreditation'. Accreditation determines whether an institution or a programme meets threshold quality criteria (Massy, 1996). The methodology generally commands a combination of performance indicators, self-study and peer review. As Massy (1996) summarises, performance indicators (PIs)

provide quantitative data on resources and output performance. Self-studies represent an institution's evaluation of its own performance in relation to standards and its own particular aspirations based on both PIs and subjective factors. Peer review relies on the experience of outside experts who visit the campus and form their own opinions about performance in relation to standards.

Accreditation at programme level aims to establish whether a course is equivalent to degree courses elsewhere and to examine it against criteria related to the standards and aims of the course (HKCAA, 1991). Accreditation at institutional level evaluates whether an institution's objectives are appropriate for the degree level in question as well as its implementation of the objectives. Typical implementation questions include whether sufficient resources are available to meet the objectives and whether the resources are used effectively to produce the desired outcomes (Massy, 1996).

Accreditation performs a function of 'certification' too. On this topic, Massy (1996) comments that accreditation helps to assure stakeholders in higher education that minimum standards are being met and allows others who are not familiar with the institution to evaluate the efficacy of credits and degrees against a known baseline. However, it is quite a common phenomenon that once accredited, an institution may sit back and relax, and continue with its usual practice until the next cycle of accreditation. It is therefore dubious for accreditation to achieve an improvement agenda that is assumed to be part of the certification activity.

Through academic accreditation, the HKCAA has helped to assure quality in higher education by assessing and monitoring academic standards at course and at institutional levels. What about the quality of teaching and learning? How can the quality of teaching and learning be assured and improved? Recognising that teaching

is a primary function of all UGC-funded institutions in Hong Kong (UGC, 1996), the UGC has since 1996 embarked on a series of Teaching and Learning Quality Process Reviews (TLQPRs) of all its funded institutions during 1996 and early 1997 following a cycle in every five or six years. The focus of these reviews as Young (1996) puts it, is the institutions' teaching and learning quality assurance processes, and the appropriateness and adequacy of these processes for actually maintaining and improving the quality of teaching and learning.

According to Professor William Massy who played a critical role in the first round of Hong Kong's TLQPRs, quality process reviews are founded on the following principle:

> That good people working with sufficient resources and according to good processes will produce good results, but that faulty processes will prevent even good people and plentiful resources from producing optimal outcomes.
>
> Massy, 1996:5

Before conducting the TLQPRs, the UGC has made it clear that the objective of the TLQPR is not to assess teaching and learning quality per se, nor to assess the quality of the output (the graduates), nor the value added. According to Young (1996), it is not meant to be an assessment exercise. No league table or grading of individual departments or institutions will be produced. The results will not be directly factored into funding, although they will also not be totally ignored.

The UGC recognises that it is difficult, if not impossible, to establish a set of quantitative indicators to measure in any meaningful way the quality of teaching and learning in a higher education setting. The introduction of an element of qualitative

assessment, through inspections, peer review, visits, etc. might make such a process more meaningful (ibid).

Founded on the same belief that good processes will produce quality results, the UGC has very lately introduced another kind of process review, this time, not on teaching and learning, but on the management systems in higher education institutions. To ensure that all the UGC-funded institutions have in place appropriate and effective processes to manage devolved funds and other resources in support of their institutional aims and objectives, the UGC has since early 1998 started its first round of Management Reviews of the institutions (French, 1997b).

According to French (1997b), the Management Reviews look at the institutions' resource allocation, planning and financial processes. The Reviews also consider how these processes are related to the institutions' roles and missions, as well as their academic objectives. They also seek to promote the sharing of experience and best practice. But their principal focus should be how to assist the institutions in enhancing the quality of their management to achieve their objectives.

Working on a totally different platform from the quality process reviews of teaching and learning and management, the assessment of research quality adopts the conventional quantitative assessment model. Since January 1994, the UGC introduced the first Research Assessment Exercise to assess the proportion of academic staff in each institution who could be regarded as being active in research as an indicator to be factored into funding (Young, 1996). It aims to assess the research output performance of the UGC-funded institutions by cost centre and the results will be used as the basis for allocating some of the research portion of the institutional recurrent grant for the following triennium (UGC, 1996).

So far, it has been accounted that the Hong Kong Government, through its UGC, has put in place a range of quality assurance processes, for a variety of purposes and at both course and institutional levels. The mechanisms and processes involved in the monitoring of the quality of academic programmes, of the teaching and learning processes, of the management systems in institution, and of research output and performance should have provided adequate means for all stakeholders to be satisfied that the highest possible standards are being achieved in the Hong Kong higher education sector (Tam, 1999).

Today, quality assurance permeates almost every aspect of higher education in Hong Kong due to the proliferation of quality reviews that take place at various levels and for different educational activities. Academic programmes, institutions themselves, the teaching and learning process, the research performance and even the management systems are put under constant review for quality. With these systems in place, the higher education system in Hong Kong will become answerable to various stakeholders who demand quality of a particular kind and prefer specific ways of how quality should be measured and gauged. It is suspected that the comprehensive quality assurance policies were established to satisfy various competing demands for quality and to resolve the conflict that is inherent in it.

For example, there is considerable tension between the accountability and improvement goals of any quality assurance exercise (Tam, 1999). On the one hand, the funding body needs to monitor quality for accountability to the government for the public expenditure on higher education. Inevitably this will involve imposed systems and mechanisms to be followed by institutions. On the other hand, it is also another very important goal of the quality assurance system to become quality-promoting and development-oriented, instead of focusing on accounting and control.

Further, there is also tension between academic autonomy and accountability in quality assurance (Tam, 1999). Quality monitoring procedures that are externally imposed are more likely to be seen as regulations to be reluctantly complied with and evaded where possible. Williams (1990) reminds that quality is better assured if those who deliver higher education services have a sense of direct ownership of the quality assurance procedures both individually and institutionally.

To ease these tensions and to resolve these contested concerns, the quality assurance arrangements in higher education of Hong Kong are found to have combined critical self-assessment by the faculty or institution with peer review (Tam, 1999). The process is one of self-improvement assisted by peers. As Frazer (1992) suggests, some kind of external input into the evaluation of courses, teaching and research provides a 'mirror' for the institution to see itself with a clear image.

Besides, the quality process reviews of teaching and learning, and of management systems are also found to have considered that decisions with respect to quality dimensions must be made by the institutions themselves, and that variety among and within institutions is necessary for an effective tertiary sector (Massy, 1996). This is echoed by Young (1996) that it is the UGC's intention for the quality process reviews to be seen genuinely as a collegial and supportive effort, rather than as a threatening or confrontational exercise.

Given the contested nature of quality and the different perspectives of looking at it, it has become clear that quality assurance polices in higher education in Hong Kong are very much shaped by the needs to balance the different views of stakeholders, and to ease the tensions that exist between accountability and improvement, and between accountability and institutional autonomy. It is a pragmatic approach with policies

and processes that aim to harness the different quality expectations and approaches to achieve the dual purposes of assuring and improving quality.

The quality monitoring and performance evaluation systems and approaches that have been outlined for higher education in Hong Kong are primarily institutional-based. In other words, all these approaches (teaching and learning process reviews, management reviews, institutional and programme accreditation, research performance reviews) are oriented towards overt institutional performance with an underlying political motive of providing accountability data of how well universities are performing.

None of these approaches have delved deep enough into the quality of the experience of students in higher education, for example, how might they have been changed as a result of receiving higher education, both in terms of intellectual and personal development. Barnett (1992) describes these two approaches, institutional-based and developmental-based, as 'contrasting', but are both justifiable to represent the different conceptions of quality which directly inform the different ways of measuring and assessing quality in higher education.

> It is entirely possible and proper to be concerned with both institutional performance and the character of the individual student's development. They are, though, different interests and can be met on different levels by appropriate forms of action and evaluation. Institutional managers and national bodies have a legitimate interest in institutional performance as such, while course tutors and staff operating in teaching situations should have a continuing interest in the quality of the students' learning.
>
> Barnett, 1992:199

The challenge for the development of any quality assessment system is therefore to combine both accountability with improvement, student learning and institutional performance.

It is founded on this need for an approach which should be able to satisfy the various agendas for quality assessment in higher education that an alternative perspective is suggested. The alternative perspective is premised on the concept of quality as university impact, which on the one hand measures the amount of growth and development in students as they experience university education to satisfy the need for universities to be answerable for the influence they have made on students, and on the other hand, provides improvement data for university administrators and practitioners to shed light on policies and practice that make up the institutional environment.

It is this perspective and the conceptual model it offers that guide the conceptualisation of quality and its assessment in higher education for this thesis. The major research concern is thus what students have learned in university and to what extent that is associated with their university experience and other related factors.

Chapter 3 Methodology

The principal research concern is to assess the relationship between the university experience and student outcomes as a means of determining a university's success in meeting its educational goals. This chapter begins with a reiteration of the four research questions that determine the empirical design, the process, and the selection and adaptation of an appropriate measurement instrument. It then proceeds to interrogate the various methods of analysis to be used and to identify the limitations that are inherent in the overall design, which have implications for subsequent conclusions to be drawn from the findings and data analyses. Finally, validity and reliability for the instrument are examined by assessing the properties and internal consistency of items forming various scales in the instrument, and by validating the use of students as credible reporters of their experiences and development.

The Research Design

The overall design is predicated on the notion that quality in higher education can be best defined as the positive impact of university experiences on student outcomes. The focus is on the effects of different experiences or exposures among individual students or between groups of students. The four research questions that provide the framework for the design are:

- Do students change or develop in various ways during the university years?
- What are their university experiences and how are they related to outcomes, environment, and background characteristics?

- To what extent are student changes or developments attributable to the university experiences and the various sub-environments within a university?

- And finally, what are those institutionally manipulatable influences on student change and development that are amenable to systematic intervention through programmatic and policy decision making?

The four research questions probe into the differential experiences of students during their university years. They mandate an approach to use the student as an observer or informant to tell what kinds of experiences he or she has had.

The unit of analysis is individual students and the investigation is whether differences in individual students' university experiences lead to differences in specified outcomes.

As Astin (1985) suggests, if someone wants to know how higher education affects people, the most direct way is to ask the clients – the students. In higher education it is the student who primarily does the achieving. It is how students think about their university experience that matters. Usually, the gathering of such information can be done by questionnaires on a large sample, which the student completes after being exposed to university education.

To get to the heart of the student experience requires a specially designed instrument of measurement that is capable of reflecting any changes which have taken place in the students across a wide range of dimensions, in both cognitive and affective domains. The measure must be sensitive to change over time and must be nested within a research design that provides comparison across time, students and different educational experiences.

The instrumentation

The plethora of assessment instruments available for the measurement of university experience forms a solid foundation for some very exciting possibilities. But accepting without reflection an instrument from a particular source is inappropriate. After a review of the literature and a number of established instruments and questionnaires against the aims of the study, a suitable instrument was found and identified appropriate for the measurement of student experiences in a broad range of university activities.

The chosen instrument is the 'College Student Experiences Questionnaire (CSEQ)' by Professor C Robert Pace. The questionnaire was first developed in 1979 with revisions made in subsequent years resulting in various current editions available for use by universities and colleges worldwide. It is the 1983 revised second edition that was used for this study to collect students' views on their university experiences. Permission was obtained from the Center for Postsecondary Research and Planning at Indiana University at a fee for a one-time adaptation and modification of items from the CSEQ.

The 183-item instrument was built around the theory that university experience is a coherent whole that requires a facilitative campus environment and student effort. The CSEQ measures university experience related to twelve activity scales which include library experience, course learning experience, art, music and theatre, science, students union, athletics and recreations, campus residence, experiences with staff, clubs and organizations, experiences with writing, student acquaintances, and personal experiences. Each scale consists of 10 to 12 items that articulate the specific behaviours that are inherent in each of the twelve dimensions of university experience. To each statement, students respond by checking 'never', 'occasionally', 'often' or 'very often' to indicate their engagement in that particular activity.

In addition to the activity scale, the CSEQ also collects data on outcomes. These include data on grades (self-reported), estimates of gains (on numerous dimensions that encompass intellectual, social, personal, moral and vocational growth), students' perceptions of the university environment, and students' satisfaction in general.

The CSEQ only collects a few student input characteristics. These include age, sex, marital status, major field of study, parents' education, full-time/part-time status, part-time work, financial support, race, and citizenship.

As the CSEQ is an established instrument used widely by institutions of higher education in the world, the instrument has been subjected to extensive review to determine its validity, reliability, and statistical properties. Despite the fact that the questionnaire has been field tested, revised, and administered to samples of university students since its introduction in 1979, there is still the need to test it on the local subjects to establish its relevance and appropriateness to the Hong Kong context.

The adaptation process

The original CSEQ was tested on a group of 30 Lingnan University students prior to adaptation. Students generally found the questionnaire too long which took them some thirty to forty-five minutes to complete. Comments on the relevance of the CSEQ items to the Lingnan context and their experience were also sought to provide the basis for subsequent modification. As a result, a modified and shorter version of the CSEQ was developed. The adaptation process that had been undertaken involved omitting those questionnaire items that were found not relevant to local students in terms of both language and of behaviour. The questionnaire was finally reduced from 183 items to 130 items and the name was changed from CSEQ to *LSEQ – Lingnan Student Experiences Questionnaire* to better reflect the relevance of the instrumentation to the local university

and student contexts. (A copy of the LSEQ is given at Appendix A.)

Language was a concern too during the adaptation process, which consideration was made to the need of translating the LSEQ in Chinese for local administration. However, opinions from students involved in the pilot test indicated that they did not find the language a barrier and they all agreed that the questionnaire was clear and easy to comprehend. As a result, the LSEQ is in English only as it was originally written.

Apart from the minor change of wording in questions, one of the major modifications of the CSEQ to become LSEQ involved the addition of a few more input variables that might have a potential effect on student outcomes. The additional input data include students' academic aptitude (in terms of their A-level and Certificate Examination results), reasons for going to university and the student identification number for subsequent matching with data obtained from the second administration of the LSEQ. To collect further information such as the students' actual end-of-year GPAs, a 'Permission to Access your Student Record' form was included at the end of the questionnaire for students to provide their consent for the research to collect the necessary data from the student records kept by the Registry of the university in question. Students were assured that their information would be used and reported only in group summaries for research purposes, and would not be identified with them individually.

At the same time, those input items that were found not relevant to the study were taken out from the questionnaire. These include variables such as marital status, full-time/part-time status, race and citizenship. All these items do not apply to the local university context as there is a lack of a critical mass of students who are classed as married, part-time and having different racial backgrounds among individuals that make up the student body of Lingnan University.

As for the university activity scales, seven less relevant scales were dropped from the original CSEQ, namely, the 'Art, Music, Theatre', 'Student Union', 'Athletic and Recreational Facilities', 'Experiences in Writing', 'Personal Experiences', 'Student Acquaintances', and 'Science/Technology'. They were omitted because of their irrelevance to the Hong Kong and Lingnan contexts. One additional scale was added instead to find out the students' 'Experiences with Computers'. This scale was taken and modified from a multi-institutional study on the experiences of university students in Hong Kong reported by Armour et al in 1999.

In addition, some changes were made here and there for the rest of the questionnaire to make the instrument more suitable and relevant to the local environment. In particular, a few changes were made in the part about 'Estimate of Gains' to reflect more accurately the educational goals and mission of the university in question, that is, Lingnan University, which is a liberal arts university with emphases less on vocational competence but more on broader educational values, such as independence, cultural awareness and social responsibility.

With these modifications the LSEQ was tested again on another group of Lingnan students for their feedback on the questions and relevance to their experiences at Lingnan University. This time the students found the questionnaire a much more improved edition which they found less repetitious and more relevant to their personal, as well as, institutional contexts.

The variables measured

The revised LSEQ is structured in eight parts which measure variables of the following categories:

1. Demographic and Background Information (14 variables)
   - age (3 groups)
   - sex (dichotomy)
   - AS and Cert level results (5 common subjects ranging from A to F grades for each)
   - year of study (3 groups + other)
   - hostel living (dichotomy)
   - grades up to now (6 categories from A to F)
   - major field [18 dichotomous measures: Chinese (2 streams), English (2 streams), Cultural Studies (3 streams), Translation, Business Administration (6 streams), Social Sciences (4 streams), plus an option for 'other' and 'undecided']
   - priority of major field (dichotomy)
   - parents' university education (4 groups from 'no' to 'yes for both parents')
   - enrol for advanced degree (dichotomy)
   - study hours per week (5 groups from '5 hours or less' to '40 hours a week or more')
   - hours of part-time work per week (5 groups from 'none' to 'more than 20 hours')
   - University expenses paid by family (4 groups from 'none or very little' to 'all or nearly all')
   - reasons for university (11 measures, each scored on a 3-point scale: 'very important', 'somewhat important', and 'not important')

2. University Activities (7 scales)

   For these seven scales of University Experiences, students are asked to indicate the extent or frequency of their involvement in each of the activities by checking 'never', 'occasionally', 'often' or 'very often'.

- *Library Experiences (10 activities)*

  From: routine use of the library catalogue and the library as a study place

  To: more sophisticated use of the library for finding references and development of a reading list

- *Course Learning (10 activities)*

  From: relatively simple cognitive activities — such as taking notes, listening in class

  To: higher level cognitive activities — such as explaining and organising concepts

- *Experiences with Lecturers (10 activities)*

  From: superficial contact

  To: close and more serious interactions — such as discussing careers, inviting criticisms, seeking counsel on personal problems

- *Clubs and Organisations (10 activities)*

  From: awareness and casual attendance of events and activities

  To: working in student organisations, committees and clubs

- *Experiences with Computer (10 activities)*

  From: simple use of the computer for games and entertainment

  To: more sophisticated use of it for a specific purpose related to study — such as for web-based learning, searching information

- *Campus Residence (10 activities)*

  From: casual socialising, minimal participation in hostel activities

  To: active participation in more organised activities, planned group activities

- *Conversations (14 topics)*

  These 14 topics of student conversations can be grouped under four categories:

  i. private conversations — such as about boyfriends, girlfriends, hobbies, and parties

ii. discussions on social and current issues — such as about news, issues like peace, human rights, life styles, ideas and views of other people, the economy and international relations/politics

iii. conversations about job prospects, money, careers

iv. conversations about studies, the university, and courses

In addition to these seven scales of university experiences, six of them taken from Pace's CSEQ, a new scale was created to disaggregate students further for comparison on account of their quality involvement in certain university activities that are considered to be highly desirable or to be sought after by students who want to derive maximum benefit from their university experience. The new scale is entitled the 'Quality Involvement' scale comprising 10 items selected from those 'University Activities' scales excluding the Campus Residence scale which does not apply to all respondents. The items are:

Two from the Library scale:

- Developed a reading list or set of references for an assignment or other course projects
- Looked for references that were cited in your readings

Two from the Course Learning scale:

- Tried to see how different facts and ideas fit together
- Tried to explain the material to another student or friend

Two from the Lecturer scale:

- Discussed ideas for an assignment or other class project with a lecturer
- Asked your lecturer for comments and criticisms about your work

One from the Clubs and Organisations scale:

- Worked in some student organisation or special project (publications, student union, social events, etc.)

One from the Computer scale:

- Used a computer for Web-based learning

Two from the Topics of Conversation scale:

- The ideas and views of other people such as writers, philosophers, historians
- Course learning and subject discipline

An aggregate measure of the Quality Involvement construct is obtained by adding the scores for each of the ten items to give an integrative index of students' quality involvement in university activities.

3. Opinions about University (2 measures)

   - How do you like the University (4 dichotomous measures: 'I am enthusiastic about it', 'I like it', 'I am more or less neutral about it', and 'I don't like it')

   - If you could start over again, would you go to Lingnan University that you are now attending (4 dichotomous measures: 'Yes, definitely', 'Probably yes', 'Probably no', 'No, definitely')

4. The University Environment (8 measures)

   For the eight environment measures, students are to indicate how much they think that each of the following is emphasised in the university environment on a 7-point continuum from strong to weak emphasis:

   - the development of academic, scholarly, and intellectual qualities
   - the development of artistic, expressive, and creative qualities
   - being critical, evaluative, and analytical

- the development of vocational and occupational competence
- the personal relevance and practical values of course
- the development of language abilities
- developing skills in IT and computing
- providing good teaching

5. University People Relationships (3 measures)

   Again, on a seven-point scale, students are to rate the three measures along a continuum from rather negative to very positive relationship.

   - relationship with other students, study groups, and activities
   - relationship with teaching staff members
   - relationship with administrative personnel and offices

6. Satisfaction with University (5 measures)

   Making reference to each of the following five aspects of university education, students are to indicate their degree of satisfaction from 'very satisfied' to 'very dissatisfied'.

   - teaching in general
   - course quality in general
   - course structure and organisation
   - choice of subjects
   - assessment and workload

7. Estimate of Gains (22 measures)

   The twenty-two measures of gains are indices of student growth and change, which students are required to indicate how much they think they have gained or made progress in each of the 22 aspects. These estimated gains or growth aspects can be conceptually grouped under four discrete categories. They are:

- *Vocational gains (5 measures)*

  - acquiring knowledge and skills applicable to a specific job or type of work
  - acquiring background and specialisation for further education in some professional, or scholarly field
  - gaining a broad general education about different fields of knowledge
  - gaining a range of information that may be relevant to a career
  - acquiring familiarity with the use of computers

- *Personal Development Gains (6 measures)*

  - developing independence and self-reliance
  - developing your own values and ethical standards
  - understanding yourself — your abilities, interests, and personality
  - understanding other people and the ability to get along with different kinds of people
  - gaining a strong sense of social responsibility
  - ability to function as a team member

- *General Educational Gains (6 measures)*

  - gaining an international outlook and a cross-cultural perspective
  - writing clearly and effectively
  - becoming aware of different philosophies, cultures, and ways of life
  - ability to adapt to change with flexibility and judgement
  - ability to communicate well in English
  - ability to communicate well in Chinese

- *Intellectual Gains (5 measures)*

  - developing analytical and problem-solving skills
  - ability to think critically

- ability to put ideas together, to see relations, similarities, and differences between ideas
- ability to learn on your own, pursue ideas, and find information you need
- ability to accept diverse views and different opinions of others

8. Predicted Grades (4 measures)

In this final part of the questionnaire, students are asked to predict their end-of-year GPA, as well as grades for three common subjects taken by almost all students in the university. The measures are:

- predicted GPA [6 dichotomous categories from less than 1.00 (F) to 3.67-4.00 (A, A-)]
- average grades (in A-F) for 3 compulsory subjects: General Education, English, Putonghua.

The Sample

Students who took part in this study are from one higher education institution in Hong Kong. It is Lingnan University which is a small liberal arts institution with a student population of only about 2,100. It is the smallest and youngest university in Hong Kong, yet with the longest-established tradition that can be dated back to 1888, when its forerunner, the prestigious Lingnan University in Guangzhou, China was founded (Lingnan University Calendar, 2000-2001).

Lingnan University became a government-funded, degree-conferring institution in 1992 and attained full University title in July 1999. It offers programmes in three main areas, viz, Arts, Business and Social Sciences leading to awards at both undergraduate and postgraduate levels. The University provides education in the liberal arts tradition from both East and West with an emphasis on whole-person development for its students.

Lingnan University has the highest percentage of campus residence for its students among all local institutions in Hong Kong. There are on-campus residential places in student hostels that can accommodate at least 75% of the student population practicing a policy of two years' hostel living for students during their three years of university education. Campus residence is one of the unique features of Lingnan education, which the location of the university in the non-urban Northwestern part of the New Territories has made it possible for most students to be provided with residence on campus.

Because of its small size, Lingnan University is well known for its close teacher-student relationship and a strong sense of community and collegiality between staff and students, and among students themselves.

It is interesting though to testify whether these unique characteristics of Lingnan education are favourable factors that can be attributable to the growth of students, if any, as reported by students as a result of their exposure and experience of the university environment in terms of its programmes, facilities, and people relationships.

Two samples were drawn at different times for the administration of the LSEQ for the purpose of the study. The first sample consists of 706 students from all three years of study, 264 (37.5%) from Year 1, 239 (33.9%) from Year 2, and 201 (28.6%) from Year 3. The response rate is about 33.6% against the entire student population of Lingnan University.

These students were administered the LSEQ at a Student Assembly held on 21st March 2000, which they normally attended as part of their education in Lingnan. About half-an-hour was devoted for students to fill in the questionnaire and return it immediately to the researcher during the Assembly session. As a result, the response rate was high which

almost every student who attended the Assembly session that day had completed and returned the LSEQ for analysis.

All Lingnan University students are required to attend in an academic year a certain number of Assembly sessions, which is one of the requirements for graduation. Most students usually sign up for Assemblies offered on dates that they could attend. Thus, it is a matter of choice of time that principally determines student attendance for a particular Assembly session. The student's choice of not attending the session when the LSEQ was administered was therefore basically at random, which should not have biased the sample on certain student characteristics.

Because of the absence of pre-selection and self-selection of students for taking part in the study, the sample should have close resemblance to a random sample, as there are no set criteria or procedures for the inclusion or exclusion of subjects to be involved in the study. A quick examination of the characteristics of the sample indicated that respondents are representative of the student body of the University with respect to sex, age, study major, parents' education, hostel living and academic aptitude (in terms of their combined AS and Cert results). Further, the relatively large sample size which is more than one-third of its parent population has added to the credibility of the sample.

There was a lapse of eight months between the first and second administration of the LSEQ before it was distributed to another cross-section of students of Lingnan University. This time the questionnaire was not distributed to students on the spot for immediate completion and return. Instead, the questionnaire was sent to all Lingnan students in November 2000 via the electronic mailing system for online submission. The response rate was very satisfactory which a total of 998 students completed the online survey and submitted their responses through the electronic system.

Among these 998 subjects, 344 (35%) of them were first year students, 376 (38.2%) second year students, and 258 (28.6%) final year students. The percentage distribution was very close to the first sample displaying the same phenomenon that final year students were a little bit under-represented in the sample. The under-representation was considered acceptable as the difference between the highest and lowest percentages of representation is within 10% for both samples.

Again, the second sample was found representative of the overall population with respect to a number of background and demographic variables. The high participation rate of students in the second survey, which is as high as 47.5% of the total Lingnan student population, has further contributed to the credibility of the second sample.

The two groups of students who had filled in and returned the LSEQ were not two exactly different groups. Among them there were quite a number of respondents who had completed the LSEQ twice. This arrangement was intentional as part of the research design to gauge the changes in students' perceptions about the university environment, the activities that they have engaged in, and most importantly, the estimated growth and development of students since their first completion of the LSEQ with eight months apart. Students were asked to put down on the LSEQ their student number and consent for the researcher to seek follow-up data and do the matching of the relevant information afterwards. With their consent and identification, it is possible for the research to identify those students who have filled in the LSEQ twice and then compare their responses to the same questions in the LSEQ obtained from both administrations of the questionnaire.

There are altogether 217 subjects in the two samples that have taken part in the survey on both occasions despite the fact that there was a significant number of students who did not

want to fill in the LSEQ twice. Though the number of students re-taking the LSEQ was a bit less than expected, the data obtained from the same subjects twice were useful which could subsequently be matched and assessed for any changes, both negative and positive, between the two times of LSEQ completion. The changes, however, are not real changes per se. They are changes in perceptions of students about their university experiences, about how much they have been involved and what progress or gains they think they have made as a result of their exposure to the university environment and educational opportunities provided.

Methods of Analysis

Analyses for the study are concerned with the comparative effects of the different experiences or university sub-environments on learning outcomes and student development. For this research purpose, data were gathered from two samples of 706 and 998 students of Lingnan University by way of the LSEQ which collected information on a myriad of variables, including the input characteristics of students, their experiences with various university activities, perceptions of the university environment, their expected grades and GPAs, and most importantly, the students' estimates of gains or progress with respect to several dimensions of growth as a result of participation in higher education.

To answer the four research questions that guide the investigation, various methods of analysis are to be employed to generate findings to shed light on issues pertinent to the assessment of quality in higher education as it relates to the impact of university experiences on student outcomes.

Measuring the change in students

The first research question is about student change. The unit of analysis is individual students who reported the estimated amount of change or progress made as a result of university education. The fact that students spend several years attending university suggests the great potential of the university experience for producing changes not only in knowledge and vocational skills but also in values, attitudes, aspirations, beliefs, and behaviour. It is therefore hypothesised that students will grow each year with respect to a broad net of learning outcomes which include gains in general education, vocational and professional preparation, cognitive and intellectual outcomes and gains in personal and social development. The wide array of outcomes to be measured acknowledge the importance of student development outcomes as well as more conventional academic outcomes.

Because the notion of change is so basic to this research question that there is a need to measure the growth of students by the amount of time they spent in the university. As a result, students of different years of study will be compared for the amount of estimated gains they report about their growth as a result of their university experiences. Comparison studies will be conducted to obtain evidence about the change of growth from first-year to final-year progression. Effect sizes will be computed and reported to indicate the magnitude of such change of growth among students of different years of study. Further, ANOVA analyses will be employed to find out if the reported change will differ for different student sub-groups with respect to various demographic or background variables such as gender, age, prior academic aptitude, aspirations, parents' education, and source of finance for university education, and so forth.

The change of growth in students can also be measured by comparing the gains reported

by the same group of students who have completed the LSEQ twice at two different times with some lapse of time in between. Again, ANOVA and effect sizes will be calculated to obtain evidence about the change, if any. In addition, comparisons among different student sub-groups on account of their background characteristics will also be conducted to identify the different amount of change in them.

It is also interesting to determine whether the rate of students' reported progress or development is constant over a 3-year period, to identify what sorts of student change and in what ways. In this connection, comparison of the estimated growth and gains of first year students against those of second year and third year students will yield cross-sectional comparisons as proof of change of growth as students progress in university.

In a nutshell, the first research question is about change where the methods of analysis are to gauge the differences or gains in the knowledge, capacities, skills and attitudes reported by students during their university years as a result of their experience and exploitation of the educational opportunities provided.

Relating experiences with environment and outcomes

The second research question is about student experiences. How much time do they spend on academic activities and use the facilities available on campus? To what extent are they really engaged? To what extent is the amount, scope, and quality of their investment related to what they get out of university, related to the university environment (including where they live, what they study, and how long they have been there) and to their satisfaction with the university experience? Further, how do students perceive the university environment with respect to the emphasis student feel is given to various qualities that make up the ethos or culture of the university (academic, artistic,

critical, vocational, practical, language, IT and good teaching) and the general supportiveness of interpersonal relations on the campus (among students, between students and teaching staff members, and with administrative personnel)?

The statistical or analytical procedures that are applied to answer the above questions will include, first of all, descriptive statistics that aim to capture the frequency and amount of effort students expended in each of the university activities. The seven aspects of university experience measured in the LSEQ (Library, Course Learning, Lecturers, Clubs and Organisations, Computers, Conversations, Campus Residence) will each form an integrative scale ranging from activities requiring little effort to ones requiring much more effort and initiative. An aggregate score derived from each scale forms an index of quality effort or experience related to that particular aspect of university activity.

An overall scale named 'Quality Involvement', which is unique to this research, was created by selecting those most preferred activities or items of quality effort from the seven university activity scales. The new scale provides a composite scale of students' quality involvement in various aspects of their university experience. As a result, a description of the students' involvement or experience with respect to the seven activity scales and the overall quality involvement scale will present a summary of the amount and frequency of students' effort to indicate how much they are engaged in their university experiences.

Descriptive analysis of data becomes more complicated and far more interesting when two or more variables are analysed simultaneously. For example, each of the activity scales can be computed separately for men and women, campus and off-campus residents, students of different study major, different year and whether they have a part-time job or not, and so forth. Descriptive analyses involving more than one variable are of special

interest because they permit the assessment of the degree of relationship or association between the variables.

Correlational analysis is another procedure for describing the relationship between two measures. Correlations basically describe the strength and direction of the association between two variables in terms of a coefficient that can range from -1.0 to +1.0. Using correlational analysis, it will be interesting to know if each of the university activity scales is related to what students get out of university in terms of their self-reported gains or progress, and to what extent the overall quality involvement relates to gains and development reported by students. Furthermore, it is also interesting to measure the relationship between quality involvement or university experience and the students' satisfaction with the university in general. Partial correlations will also be computed as part of multiple regressions among these three sets of variables (university activity, satisfaction, and reported gains) to shed light on their relationships and the extent to which each set of variables is related to one another.

It is also hypothesised that the university environment may affect the amount and frequency of effort by students in various university activities. Hence, it is worth investigating the relationship between students' perceptions of the university environment in terms of its various emphases and people relationships with each of the seven university activity scales and the overall involvement measure. Furthermore, correlation coefficients will also be computed for each of the environment scales with the estimated gains reported by students in each of the development domains, such that learning and development outcomes are assessed in the context of the university environment in which students find themselves.

Generally speaking, the second research question is about students' university experiences, in particular about how much time and effort they spent in engaging themselves in various university activities, and to what extent their effort and experiences are related to the students' self-reported gains, their perceptions of the university environment and their overall satisfaction with the university they attended.

Measuring the effect of university experience

The third research question is to measure the effects, if any, of the university experiences on learning outcomes and development. The question to be answered here is this: given all the elements in the LSEQ — students' background characteristics, their status in university, their satisfaction with university, their assessment of the university environment, and their scores on the various university activity scales — what best predicts their achievement with respect to the list of university outcomes and development reported by students?

Just measuring change is not adequate. One needs to know why there are changes during the undergraduate years. Do different students change differently? What environmental variables affect a particular student outcome? What are the effects of the various university experiences on outcomes and development? To seek answers to these questions, the statistical procedure that is found appropriate is stepwise multiple regression. However, this method of analysis has serious limitations when considering cause and effect and these limitations will be discussed later on pages 76, 79 and 82.

Multiple regression analysis is a procedure that permits the investigator to control a large number of variables at the same time. It measures the relative effect of each predictor variable on the outcome variable. Statistically, these effects can be expressed as

standandised beta weights or changes in R^2 in stepwise multiple regressions. Interpreting standardised betas or R^2 changes allows the assessment of the relative effect or contribution of a predictor compared to other predictors within a given sample. For example, in the context of this research, the association between the university experience and student outcomes can be more accurately measured by way of multiple regression analysis to take into account the influence of other variables on outcomes.

The variables that need to be controlled using multiple regressions include those pre-enrollment attributes of students such as prior academic aptitude, sex, parents' education and other environmental factors including place of residence, majors, study hours, part-time work, etc. In statistical terms, these variables are considered as biasing factors or confounding variables that need to be controlled in order to assess more accurately the effect of educational experiences and impact caused by specific institutional or programme characteristics on learning outcomes and student development.

Three criterion measures or outcome variables are used in separate multiple regression analyses as basis for the assessment of the relative contribution that each predictor (for example, input, environment, experience, effort) made in accounting for the variance in each of the three criterion variables. The three outcome measures used in the analyses include the estimated gains or progress reported by students, their end-of-year GPAs, and the satisfaction scores derived from their opinions about the university they attended. Multiple regressions will be performed for each of the three criterion measures to give an estimate of the relative effect of each predictor variable on the outcome variable.

In order to avoid the problem of over-fitting by including too many variables at one time, the predictors will be entered into the regression analysis in a theoretically consistent manner or sequence selecting only those predictor variables that are considered to be

related to the outcomes measure to some extent according to previous research. While regression analysis appears to be a useful procedure for effect measurement, it has limitations because it remains primarily predictive in nature rather than an explanation of the process by which mediating variables can moderate the effect of entry variables on outcomes (Davis and Murrell, 1993). In other words, it makes interpretation difficult as it shows mainly the relative contribution that each predictor variable has on the outcome measure without suggesting why this is so.

Further, Glymour et al (1997) warns against the use of regression as a method of inferring either the existence or strength of causes from non-experimental data. This is due to the 'correlated error' (p.270) — the error in the regression model that omits variables that influence both the outcome variable and one or more of the regressors, so that the association between the regressors and the outcome may be due, in whole or part, to omitted influences. As a consequence, causal inferences from regression may become fallacious and are fraught with problems of interpretation.

Nonetheless, by performing multiple regression analyses, the attempt was to address the overall concern that 'how much of the reported growth in students is associated with the university experience?' The analyses seek to determine whether students' perceptions of their personal growth are related to their university experiences after controlling for their background characteristics.

Providing feedback for improvement

The fourth research questions that guides further data analysis is about feedback or implications for policy and practice. What features of the university environment, for example, lead to changes and development in students? What experiences or university

activities make a difference in student outcomes? Underlying these questions is the assumption that university environments can be created and modified to help develop competent, critical, and socially concerned human beings.

Drawing upon the analyses resulting from answering the first three research questions, this part of the analysis aims to crystallise the results to provide a rich base of data for institutional managers to assess how well students are performing within their institution. What subcultures exist? What norms do they reinforce? What university experiences are conducive to effective learning? How do they reinforce or diminish institutional influence? Do the university environments encourage interactions among peers and between students and staff? Do the environments support or block student development?

All this information about the university environment and student experiences can be of significant value as a basis for generating critical discussion about the institution among academics, administrators, and students. Ultimately, such discussion should be acted upon to lead to significant changes in policy, practice, attitude, or belief. Otherwise, the data are of little value or significance beyond being interesting. Afterall, effective practitioners in university education need the feedback for assessing the quality or impact of their institutional practices and policies, which gives information on the connection between their efforts and the student outcomes.

Limitations of the Analysis

The problem of maturation and self-selection

The research design and its analyses are limited in several aspects. First, there is the problem of being a single-institution study which limits generalisations about the situation with universities in Hong Kong and students taking part in local higher

education. The lack of a control group which does not go to university poses additional threats from student maturation and selection. The concern is how can it be determined if changes in university students are not the result of maturation and students' aspirations. However, as the research design is not to assess changes per se due to university education or no-university education, but rather changes in relation to particular university environmental factors and student experiences, it makes a lot of sense for the study to be conducted at one institution with the aim to aggregate data for comparisons on smaller sub-groupings based on the student's major field, residence status, participation in various university activities, and the amount and quality of effort they expended in their studies, etc.

The study is premised on an interest in the within-institution environment and student experiences as they relate to the differential outcomes in students. Hence, the design is directed to capture the effects of those salient sub-environments in a university with which students interact to produce an influence on their personal development and academic attainment.

Given such a research focus, the study is confronted with another problem of separating the influence due to the university experiences alone from that due to other factors or competing influences, such as the particular characteristics of the individuals participating in those experiences. Similarly, students self-select and are differently recruited to different kinds of programmes, activities, and university experiences. So, how can it be sure that university outcomes might not result from types of students served or the self-selection by students rather than university policies or environment?

The ideal solution to this research problem is through experiments where students are assigned at random to the various educational environments. However, randomisation is

not always possible when universities are applied settings and students are free to choose and form their own educational experiences. As a result, there are always confounding variables that pose threat to research of this kind. These include students' background characteristics and other self-produced environmental factors which become easily entangled with university experience and student outcome.

Notwithstanding the fact that multiple regression analysis is not an adequate substitute for randomisation and the setting up of experimental and control groups of subjects for the research, the statistical procedures involved in regression analysis can, to some extent, attempt to separate that part of student change that is caused by the particular educational experience under investigation from the part that is due to other influences, such as student background abilities or normal maturation over time.

By performing these statistical procedures, the intention is to evaluate with as much precision as possible the impact of university experiences and get a less biased estimate of the comparative effects of different environments on outputs. However, it is worth mentioning at this juncture that multiple regression analyses can be further limited to only those variables for which data are available. Hence, it is a fallacy to claim that all possible confounding or biased variables could have been controlled by multiple regressions in research of this kind.

Longitudinal versus cross-sectional design

One typical design for the research on university outcomes and student development is the pretest-posttest longitudinal design, such that the students are essentially their own control group and the difference in outcomes is measured by following progress from entry to graduation. However, the change scores are subject not just to the influence of the university experience but also those confounding non-institutional influences such as

the history effect with the passage of time between the two points of measurement, the practice effect of students taking the tests twice, and even regression-to-the-mean if the group is extremely high or low on the first testing. Nevertheless, in most cases, this simple longitudinal design is considered weak as it fails to account for the effect of age or maturation.

An alternative design is the cross-sectional design to compare the different year cohorts on the same measure, thereby minimising the confounding effect caused by being assessed twice on the same test. But the age problem still remains which needs to be adjusted statistically to account for the effects of age variance among students of different years. There are other weaknesses with the cross-sectional design, though. Pascarella and Terrenzini (1991) have warned about the problem of attrition where the students in senior years may represent a more selective population in terms of ability and aspirations. Further, there is also the problem of the differential recruitment or admission criteria for different cohorts of students at different times. With these two possible pitfalls in the cross-sectional design, it is necessary that statistical adjustments are to be performed to take into account student aptitude or prior achievement as well as age in the research analyses.

Realising the problems inherent in both the longitudinal and cross-sectional designs, the research conducted on Lingnan University students in Hong Kong used a combination of both designs, such that data obtained from the same and different groups of students could be used to validate the findings and the conclusions to be made about student learning and university outcome.

The design was basically cross-sectional when data were collected from two samples of students of any year of study at two points in time. As the measuring instrument was

administered twice, the result was that there was some overlapping of subjects in the two samples, resulting in a longitudinal effect for the research to track the progress or development of some students since the first administration of the measure. Both the longitudinal and cross-sectional data obtained will be used to validate each other and compared for any discrepancies between samples.

Problems with students' self-reports

In the research design, the assessment of student change and growth takes the form of their self-reports of gains on several dimensions of student development. This presents the validity problem with self-reported gains as adequate measures of change in students. Students' self-reported perceptions of their personal development may not correspond to more objective developmental measures. But the tremendous cost involved in the development and administration of tests such as critical thinking and problem solving renders the data collection impractical.

Although this alternative way of assessing the change in students is far from perfect, research generally supports that self-report of gains do have some modest validity when compared against actual pretest-posttest changes in students' ability (see for example, Anaya, 1992; Baird, 1976; Berdie, 1971; Dumont and Troelstrup, 1980; Pohlmann and Beggs, 1974).

An examination of the credibility of students' self-reports of gains and progress will be undertaken in this study by relating the perceptions of their growth with the residual difference between their grades attained so far and the students' predicted end-of-year cumulative GPAs (see Table 3 on page 87). Even when the relationship between the two sets of measures cannot be validated, the assumptive validity of students' self-reports is critical to the research design and purpose of the study when it is the reported benefits of

university education that form the major criterion measure for the evaluation and assessment of the impact of the undergraduate experience on students.

The problem of causal ambiguity

As pointed out earlier, correlational investigations of this nature suffer from the inherent problem of ambiguity in causal direction. Explanation of research results is made difficult by the ambiguous causal linkages and directionality of influence, which demands caution in making causal inferences. For example, the student's perception of the university environment can be affected both by what the environment is really like and by how the student has been influenced by that environment. In other words, the student's subjective view of his university experience has been influenced by outcomes or how much the student thinks he has gained from the experience. Hence, it cannot be sure that the interaction between the environment and outcome really explains the change simply because the direction of causation might well be reversed. This presents the chicken-and-egg problem which makes it difficult to separate cause and effect when both are intermingled in the student's experience and his perceptions about outcomes.

There are problems in drawing conclusions from the research findings because of the ambiguities in the direction of causal influence. One cannot tell whether it is the teacher-student interaction that has caused better learning outcome or it is the better outcome in learning that leads to closer relationships and more frequent interactions with the teacher. It appears that the causal linkages are circular or reciprocal which the cause influences the effect, and vice versa. Despite this ambiguity, the proven relationships between variables do suggest the existence and different magnitude of the effect of certain factors on outcomes to result in a better understanding of what predicts university success in terms of student learning and development.

While it is difficult to analyse the cause and effect between variables and the results are bound to be inherently ambiguous, it is important that caution is exercised and interpretations are done with a full awareness and recognition of the inherent ambiguities.

Establishing Reliability and Validity

Internal consistency of the scales

Data collection for the research was done through a questionnaire with items forming various sets of measures or scales which require reliability and validity checks for their properties as tests rather than some assortment of student behaviour or experience. The original CSEQ, on which the LSEQ was based, had been subjected to careful psychometric analysis and several revisions resulting in a highly credible instrument for the measurement of university experiences and outcomes. However, as a lot of changes have been made to the CSEQ to become the LSEQ, it is necessary that validity and reliability of the instrument be established for greater confidence in the findings to be resulted.

First of all, validity checks for internal consistency of items forming each of the scales was performed by computing alpha coefficients on the first sample of the 706 respondents to the LSEQ (see Table 1). A high alpha coefficient (between 0.7 and 0.9) generally implies a high internal consistency among items in each of the scales suggesting that items within the scale are generally homogeneous, which purport to measure one underlying construct. The various scales in the LSEQ to be assessed for internal consistency include the seven University Activity scales, the overall Quality Involvement scale, the University Environment scale, the Satisfaction scale and the various scales of students' self-reported gains or progress as a result of university education.

Table 1 – Internal consistency reliability of various scales in the LSEQ			
Scale	Alpha	No. of items	No. of cases (1st sample)
• University Activities:			
– Library Experiences	.83	10	700
– Course Learning	.82	10	701
– Experiences with Lecturers	.89	10	699
– Clubs and Organisations	.90	10	697
– Experiences with Computer	.81	10	694
– Campus Residence	.86	10	596
– Conversations	.86	14	686
• Quality Involvement	.70	10	688
• University Environment	.87	8	697
• Satisfaction with University	.82	5	703
• Estimate of Gains:			
– Vocational	.74	5	702
– Personal Development	.81	6	691
– General Educational	.78	6	693
– Intellectual	.83	5	692

A calculation of the internal consistency reliability among items in each of the scales shows that the alpha coefficients for all the scales are rather high ranging from the lowest .70 (for the Quality Involvement scale) to the highest .90 (for the Clubs and Organisations scale). The rather high alpha coefficient for the Quality Involvement scale suggests that it has overlapping variance with the other scales of university activities.

As additional indicators of internal consistency, the mean item-total correlations (i.e. the average correlations between an item and the summed responses from all the other items in the same scale) were computed for each scale. The mean coefficients range from .20 (for the Quality Involvement scale) to .49 (for the Intellectual Gains scale). These correlation coefficients suggest that items in each of the scales are related to one another to contribute to the measure of the same construct.

Test and re-test reliability for each of the University Activity scales was established by examining the consistency in the responses made by the 217 students who had answered the same questions twice. As an illustration of the consistency, Table 2 presents the pairs of means to the same questions in two of the University Activity scales — Library and Course Learning. The comparison of the first response alongside the second response showed that there was a tendency for students to give a similar score to the same questions. Despite the slight variation that was expected between the two sets of responses, consistency was established by the questions yielding similar results. Further, the correlation coefficients computed for the two sets of responses were found also significant which suggest that the responses to each of the items are consistent despite the lapse of time between the two occasions of LSEQ administration.

Table 2 – Consistency of responses to the same questions in the University Activity Scales by students who have taken part in the survey twice N = 217			
	1st response	2nd response	
University Activities:	(mean)	(mean)	*r*
● Library Experiences			
– used the library as a quiet place to study	2.47	2.45	.38 **
– used the card or on-line catalogue	2.71	2.77	.28 **
– asked the librarian for help	1.96	2.00	.23 **
– used reserve/reference reading room	1.91	2.03	.21**
– used indexes or CD roms	1.68	1.66	.20**
– developed reference list	2.06	2.08	.28**
– looked through the shelves	2.18	2.19	.33**
– looked for reference cited in readings	2.24	2.31	.25**
– read reference that authors refer to	1.94	2.06	.23**
– borrowed non-print materials	1.63	1.78	.24**
● Course Learning			
– took detailed notes in class	2.68	2.89	.37**
– listened attentively in class	2.82	3.06	.28**
– participated in class discussion	2.61	2.74	.37**
– underlined major points in readings	3.01	3.13	.42**
– saw how different facts/ideas fit together	2.49	2.61	.37**
– practical application of material	2.35	2.59	.29**
– integrated ideas from various sources	2.39	2.62	.22**
– summarised points/information in readings	2.57	2.75	.22**
– explained materials to others	2.40	2.51	.18*
– additional readings	2.11	2.20	.18*

** *Correlation is significant at the 0.01 level (2-tailed)*

* *Correlation is significant at the 0.05 level (2-tailed)*

Credibility of self-reports

Core to the design of the LSEQ is a set of items under the Estimate of Gains section of the questionnaire where students were asked to consider how much gain or progress they believed they have made in 'university up to now'. Credibility in this crucial part of the questionnaire is to be established by matching their self-reported gains with the difference between the students' reported grades so far and their predicted end-of-year cumulative GPAs. A correlational analysis was performed for the various aspects of the reported gains with other variables of student achievement (see Table 3).

Table 3 – Correlations between self-reported gains with grades so far, predicted GPA and the residual for earlier and later achievement (N = 998)				
	Students' self-report of			
	Vocational gains	Intellectual gains	Personal development	General educational
Grades attained so far *(earlier measure of achievement)*	.07 ($p = .05$)	.14** ($p = .00$)	.12** ($p = .00$)	.12** ($p = .00$)
Predicted end-of-year cumulative GPAs *(later measure of achievement)*	.09** ($p = .01$)	.10** ($p = .01$)	.07* ($p = .03$)	.08* ($p = .02$)
Residual *(for earlier and later achievement)*	.06 ($p = .07$)	.04 ($p = .24$)	.02 ($p = .56$)	.03 ($p = .40$)

** *Correlation is significant at the 0.01 level (2-tailed)*

* *Correlation is significant at the 0.05 level (2-tailed)*

A lack of meaning between the residuals and the various scales of self-reported gains suggests that the growth and development in students cannot be adequately captured by a change in academic performance only. However, the grades attained so far and the students' predicted end-of-year cumulative GPAs are to some extent correlated with the self-reports of gains. This indicates that grades and GPAs are but one aspect of the multiple dimensions of students' performance in higher education.

There are always criticisms about the use of the grade-point average (GPA) as a primary measure of student progress (see for example, Astin, 1985; and Pascarella and Terenzini, 1991). When compared to the list of university outcomes and student development, it is apparent that the single measure by way of GPAs does not adequately reflect the multidimensionality of student outcomes.

Although the validity test just reported cannot help to establish the worth and strength of students as credible reporters of their experiences and development, their self-reports do provide a comprehensive indicator of students' growth and perceptions of the university

environment. Despite the difficulty to fix with any certainty the closeness of the correspondence between other measures of cognitive outcomes and students' self-reports, there is considerable support from earlier research evidence in the literature that students are credible reporters. (See for example, Anaya, 1992; Baird, 1976; Berdie, 1971; Dumont and Troelstrup, 1980; Pohlmann and Beggs, 1974.) The assumption that students are credible reporters is important as the findings to be reported in the next chapter are predicated on what students talked about their university experiences and how much they thought have been added to their knowledge, their intellectual skills, and to other abilities and insights as a result of their experiences in university.

Chapter 4 Results and Findings

The preceding chapter has described the process of how data were collected and discussed the various methods of analysis to examine relationships among variables. This chapter is a summary of the findings to synthesise evidence pertaining to the impact of university on a range of outcomes associated with university attendance. The report of the findings in this chapter will employ an organisational framework presented by the four research questions that guide and give purpose to the investigation.

Statistical procedures that were deployed to present and analyse the research results in this chapter included the comparison of means by way of ANOVA (analysis-of-variance) to identify the difference in the students' self-reported gains with respect to their background and personal characteristics. To identify the magnitude of the change of growth reported by a large cross-section of students in different years of study, effect sizes were calculated to display the differential amount of change of growth between years. The growth difference between the two surveys on the same groups of students was also captured by the effect size computed for the period with eight months apart. Correlational studies were mainly conducted to identify the relationship between the various university activity scales with students' self-reported gains on a number of dimensions, their perceptions of the university environment, and overall satisfaction with the university. To measure the differential effect of various potential factors on university outcome, stepwise multiple regression analysis was conducted to identify those important predictors that contribute to the variance in student outcomes of university.

Much has been said about multiple regression in the previous chapter when discussions were made about its strengths and weaknessess. As the report on findings in certain parts of this chapter was built largely on the ANOVA results, some elaboration on the appropriateness of this statistical procedure is therefore needed. 'The ANOVA *F* test evaluates whether the group means on the dependent variable differ significantly from each other' (Green et al, 1997:158). In the context of this thesis, the analysis-of-variance test was conducted to assess whether the students' self-reports of gains on a range of attributes are significantly different among various sub-groupings with respect to the students' background characteristics.

There are several assumptions underlying ANOVA. As summarised by Morgan and Griego (1998), ANOVA assumes that the dependent variable is approximately interval scale, normally distributed for each of the populations, and the variances of the groups are equal. Very often, these assumptions could be violated in one way or another and the test still yield reasonably robust results with moderate to large sample sizes (ibid). Rather than switching from ANOVA to t-test for groups varying from two to more than two for most cases, one-way ANOVA was used throughout in the report to compare two or more group means. If the overall ANOVA is significant and a factor has more than two levels, follow-up tests may be required. A post-hoc test such as the Tukey post-hoc test is to find out which specific means are different from which other ones. Detailed analyses using the ANOVA procedure will be reported in a number of sections of this chapter to display the difference among various group means on the numerous dimensions of students' self-reported gains.

Measuring the Change in Students

Students' self-reported gains

The first research question is about gains or progress reported by students as a result of their university experience. Table 4 provides a summary of the reported gains in various dimensions scored on a 4-point scale ranging from 4 = very much, 3 = much, 2 = some, and 1= very little.

Table 4 – Estimate of gains reported by the two samples of Lingnan University students

Vocational gains	*mean*	*sd*	*N 1st sample*	*mean*	*sd*	*N 2nd sample*
Acquiring knowledge and skills	2.11	.70	704	2.15	.68	963
Acquiring background in some professional or scholarly field	2.19	.70	704	2.21	.70	960
Gaining knowledge about different fields	2.33	.71	704	2.34	.70	964
Gaining information relevant to a career	2.34	.72	702	2.31	.71	959
Acquiring familiarity with the use of computers	2.50	.77	703	2.48	.77	946
Personal Development gains						
Developing independence and self-reliance	2.55	.77	702	2.56	.73	958
Developing values and ethical standards	2.41	.74	697	2.39	.74	965
Understanding self-abilities, interests, and personality	2.50	.74	697	2.48	.74	966
Understanding other people and ability to get along	2.54	.75	696	2.54	.73	965
Gaining a strong sense of social responsibility	2.35	.76	696	2.31	.74	965
Ability to function as a team member	2.44	.75	697	2.42	.74	965
General Educational gains						
Gaining an international outlook and a cross-cultural perspective	2.19	.75	703	2.19	.72	963
Writing clearly and effectively	2.31	.71	702	2.31	.72	962
Becoming aware of different philosophies, cultures, etc	2.30	.75	703	2.27	.76	941
Ability to adapt to change	2.54	.72	697	2.47	.71	962
Ability to communicate well in English	2.29	.78	695	2.21	.76	958
Ability to communicate well in Chinese	2.54	.81	696	2.50	.80	956
Intellectual gains						
Developing analytical and problem-solving skills	2.44	.72	703	2.42	.73	930
Ability to think critically	2.51	.75	693	2.50	.73	967
Ability to put ideas together, to see relations, similarities and differences	2.51	.74	698	2.45	.71	960
Ability to learn on your own, pursue ideas, and find information	2.61	.72	696	2.57	.73	965
Ability to accept diverse views and opinions	2.63	.77	697	2.57	.75	929

The following table (Table 5) presents the average scores of the various types of gains or progress estimated by the two groups of student respondents.

Table 5 – Average scores for the various categories of gains reported by the two samples of respondents

Scale	*Average scores*	*N 1st sample*	*Average scores*	*N 2nd sample*
Vocational gains (5 items)	2.29	702	2.30	929
Personal Development gains (6 items)	2.46	691	2.45	937
General Educational gains (6 items)	2.36	693	2.33	920
Intellectual gains (5 items)	2.54	692	2.50	888
Total gains (22 items)	2.41	682	2.39	840

As shown in Table 4, students reported considerable progress in various aspects. For the first sample, the lowest mean was recorded for the gain in acquiring knowledge and skills (mean = 2.11), while the highest mean was recorded for the ability to accept diverse views and opinions (mean = 2.63). Similar results were obtained from the second sample when the lowest mean (2.15) and the highest mean (2.57) of the reported gains were recorded for the same items. These modest means suggest some significant (but not very impressive) growth in students with respect to the numerous dimensions of university outcome. The average scores presented in Table 5 show the amount of self-reported gains in categories. Very similar results were recorded for both samples.

Estimate of gains by student characteristics

It is interesting to find out if the self-reported gains will differ for different student sub-groups with respect to their demographic or background characteristics. The following tables (Table 6 – 15) present the variation in gains for the different sub-groupings. *(Note: the second sample was used in all of the analyses below.)*

Table 6 – Estimate of gains by sex					
SEX		*Vocational*	*Personal development*	*General educational*	*Intellectual*
Male	Mean	11.74	14.61	14.03	12.57
	N	299	297	295	284
	Std. Deviation	2.71	3.48	3.29	3.12
Female	Mean	11.36	14.73	13.90	12.47
	N	623	633	618	597
	Std. Deviation	2.52	3.26	3.22	2.88
Total	Mean	11.49	14.69	13.95	12.51
	N	922	930	913	881
	Std. Deviation	2.59	3.33	3.24	2.95
	F-value	4.37	.26	.32	.21
	Sig.	.04	.61	.57	.65
	Eta squared	.01	.00	.00	.00

An ANOVA-test was run to examine if there is a significant difference among the various means of gains for the two sex groups. The results in Table 6 show that there was only a significant difference in the means of vocational gains between the male and female students ($F = 4.37$, $p = .04$). No significant differences among the other means were found.

The eta squared coefficient is a measure of association. It is the proportion of variance in the dependent variable that is explained by differences among groups (SPSS, 1999). Eta squared ranges from 0 to 1. A value of 0 indicates that there are no differences in the mean scores among groups. A value approaching 1 indicates that there are differences between at least two of the means on the dependent variable (Green et al, 1997).

As shown in Table 6, boys reported a higher mean in vocational gains than girls, which suggests that boys are perhaps more vocationally oriented than girls. There is no gender difference for other means of gains indicating that boys and girls do not differ significantly in the amount of progress reported for personal development, general education, and intellectual growth.

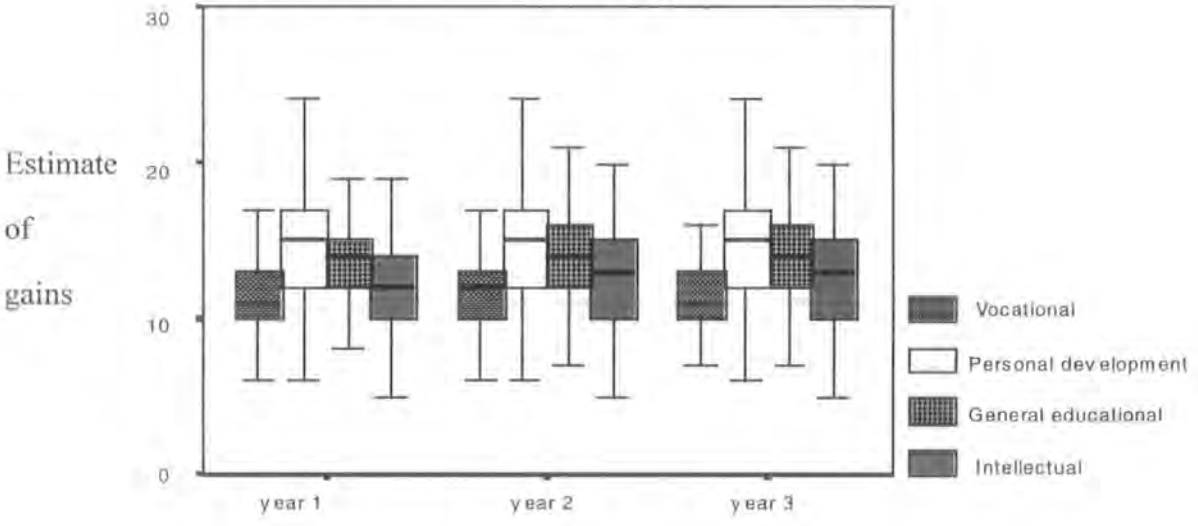
Table 7 – Estimate of gains by campus residence					
HOSTEL		*Vocational*	*Personal development*	*General educational*	*Intellectual*
Yes	Mean	11.52	14.82	13.93	12.48
	N	688	693	676	652
	Std. Deviation	2.53	3.27	3.16	2.89
No	Mean	11.33	14.24	13.96	12.53
	N	224	226	227	221
	Std. Deviation	2.74	3.39	3.39	3.10
Total	Mean	11.48	14.68	13.94	12.49
	N	912	919	903	873
	Std. Deviation	2.58	3.31	3.21	2.94
	F-value	.96	5.14	.02	.06
	Sig.	.33	.02	.90	.80
	Eta squared	.00	.01	.00	.00

Again, ANOVA was computed for any significant variation among the different means for the two student subgroups—campus vs. non-campus residents (Table 7). The result is that there was only a significant difference in the means of the personal development gains of the two groups (F= 5.14, p= .02), while no significant differences were recorded for other categories of gains. The results are rather logical which hostel residents are expected to have experienced greater progress in personal development than commuting students as the hostel environment is supposed to provide more opportunities for interpersonal interactions as well as self-understanding.

Table 8– Estimate of gains by year of study					
YEAR		*Vocational*	*Personal development*	*General educational*	*Intellectual*
1	Mean	11.40	14.59	13.71	12.20
	N	318	323	312	297
	Std. Deviation	2.63	3.29	3.09	2.86
2	Mean	11.57	14.64	14.04	12.59
	N	356	356	356	346
	Std. Deviation	2.68	3.29	3.35	3.00
3	Mean	11.50	14.88	14.16	12.84
	N	240	242	237	232
	Std. Deviation	2.27	3.33	3.15	2.91
Total	Mean	11.49	14.68	13.96	12.51
	N	920	927	911	880
	Std. Deviation	2.57	3.33	3.24	2.96
	F-value	.54	.45	1.02	2.72
	Sig.	.65	.72	.38	.04
	Eta squared	.00	.00	.00	.01

While there was a tendency for students in senior years (Table 8) to report greater gains in various domains, the only significant difference was found in the means of intellectual gains for the different year groups ($F = 2.72$, $p = .04$). Figure 1 below displays graphically the group differences on the four dimensions of reported gains.

Figure 1 - Estimate of gains by year of study



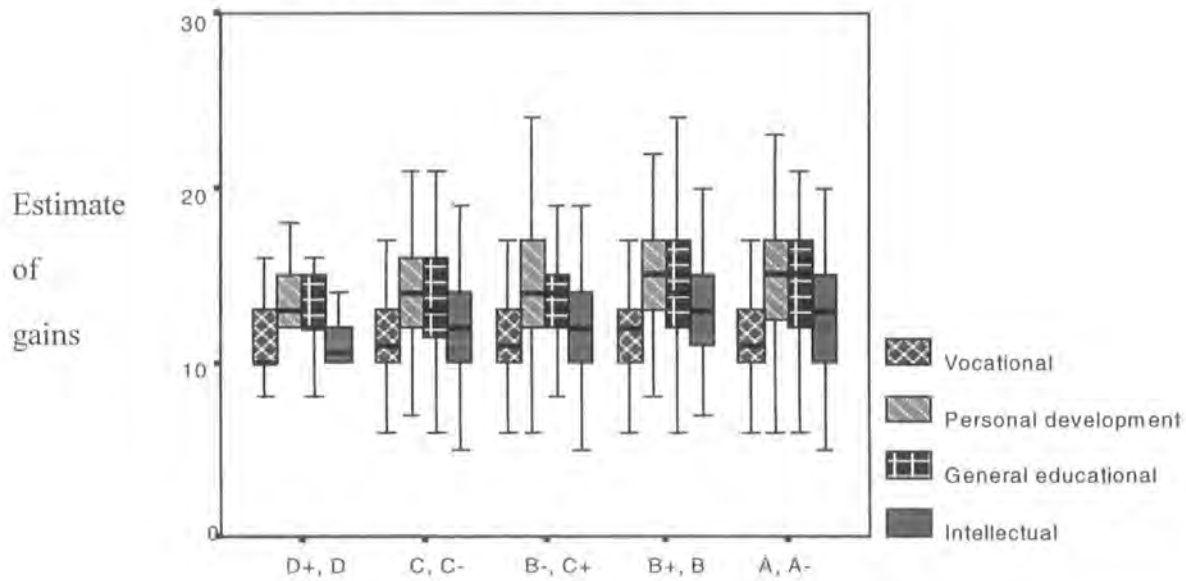
Year of study

Notes: These box plots have two whiskers at opposite ends. The box represents the middle 50 percent of the distribution, the line within the box designates the median, and the end of the whiskers are the largest or smallest values that are within 1.5 box length from the box (SPSS, 1999).

The results suggest that students of different years of study reported significant variations in the amount of growth in the intellectual domain but not significant for other categories of gains. Further analyses about the progress from first to final year of study with respect to the students' estimates of gains will be reported in a subsequent section of this chapter.

Table 9– Estimate of gains by grades so far					
Grades		*Vocational*	*Personal development*	*General educational*	*Intellectual*
F	Mean	5.00	6.00	6.00	5.00
	N	1	1	1	1
	Std. Deviation	.	.	.	.
D+, D	Mean	11.04	13.15	12.85	11.27
	N	26	26	27	26
	Std. Deviation	2.36	2.41	2.78	2.65
C, C-	Mean	11.17	13.85	13.46	11.87
	N	120	119	120	115
	Std. Deviation	2.81	3.30	3.58	3.13
B-, C+	Mean	11.46	14.73	13.76	12.38
	N	370	368	360	350
	Std. Deviation	2.41	3.21	2.94	2.75
B+, B	Mean	11.80	15.11	14.37	12.96
	N	280	292	283	272
	Std. Deviation	2.50	3.16	3.20	2.79
A, A-	Mean	11.28	14.56	14.29	12.76
	N	79	78	77	74
	Std. Deviation	2.59	3.71	3.47	3.53
Total	Mean	11.50	14.66	13.93	12.49
	N	876	884	868	838
	Std. Deviation	2.53	3.27	3.19	2.92
	F-value	2.89	5.21	3.95	4.98
	Sig.	.01	.00	.00	.00
	Eta Squared	.02	.03	.02	.03

Figure 2 - Estimate of gains by grades so far



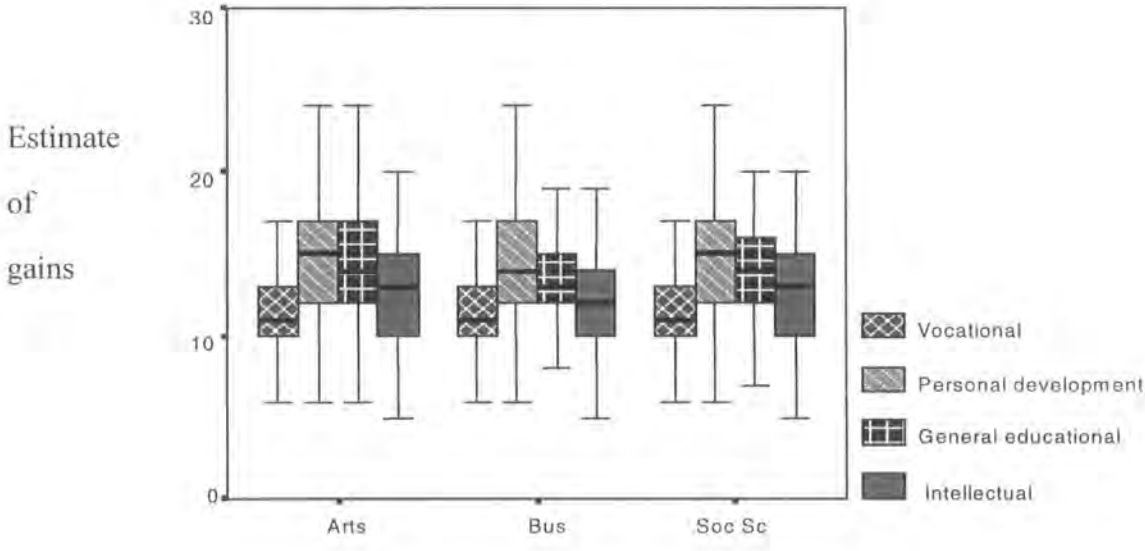
For Table 9, a computation of ANOVAs for the various categories of gains reveals that there were significant differences among the various groups of students who reported differently on what most of their grades have been up to now. As shown in Table 9 and Figure 2, when students reported higher grades, there was a tendency for them to also report greater gains in various dimensions of university outcome, except for the A, A- group who reported less gains than the B+, B group. The results suggest that self-reported grades are positively related to the student's estimate of gains in all categories. An exception was discerned for the A, A- group with reasons unclear. Perhaps it might be due to the high-achievers' greater expectations of themselves who therefore were more conservative about their estimate of gains, or that could be because they concentrated on their studies by themselves.

Table 10 – Estimate of gains by study major

MAJOR		*Vocational*	*Personal development*	*General educational*	*Intellectual*
Arts	Mean	11.45	14.86	14.49	12.83
	N	259	266	258	251
	Std. Deviation	2.73	3.39	3.56	3.14
Business	Mean	11.56	14.40	13.58	12.17
	N	392	388	383	373
	Std. Deviation	2.47	3.31	3.07	2.83
Social Sciences	Mean	11.40	15.04	14.06	12.86
	N	225	227	227	213
	Std. Deviation	2.59	3.28	3.04	2.95
Others	Mean	11.80	14.47	14.14	12.50
	N	15	15	14	14
	Std. Deviation	1.74	2.03	2.68	1.70
Undecided	Mean	11.34	14.51	13.34	11.73
	N	38	41	38	37
	Std. Deviation	2.94	3.47	3.43	2.77
Total	Mean	11.48	14.69	13.95	12.51
	N	929	937	920	888
	Std. Deviation	2.58	3.32	3.23	2.95
	F-value	.25	1.59	3.52	3.43
	Sig.	.91	.17	.01	.01
	Eta. squared	.00	.01	.02	.02

In Table 10, the ANOVAs computed for the different study major groups reveal that there were significant differences in the means of general educational gains and intellectual gains ($F = 3.52$, $p = .01$ for general education, and $F = 3.43$, $p = .01$ for intellectual development). The mean differences in the two other categories, vocational and personal development, were not significant for the major sub-groupings. The findings in Table 10 indicate that Business majors reported a higher mean in vocational gains than the Social Science and Arts majors, while Social Science and Arts majors estimated more gains than the Business majors in personal development, general education, as well as intellectual growth. See Figure 3 below for the graphical results.

Figure 3 - Estimate of gains by study major



In order to pinpoint where the significant differences lie, the Tukey post-hoc test (Table 11) was conducted to follow up on the ANOVA results for the three major groups with respect to the general educational and intellectual dimensions in particular.

Table 11 – Tukey post-hoc test for study major					
Dependent Variable	(I) major	(J) major	Mean Difference (I-J)	Std. Error	Sig.
General educational gains	Arts	Bus	.91*	.26	.00
		Soc Sc	.43	.29	.58
	Bus	Arts	-.91*	.26	.00
		Soc Sc	-.48	.27	.38
	Soc Sc	Arts	-.43	.29	.58
		Bus	.48	.27	.38
Intellectual gains	Arts	Bus	.66*	.24	.05
		Soc Sc	-.312E-02	.27	1.00
	Bus	Arts	-.66*	.24	.05
		Soc Sc	-.69*	.25	.05
	Soc Sc	Arts	.312E-02	.27	1.00
		Bus	.69*	.25	.05

**The mean difference is significant at the .05 level.*

As shown in the post-hoc test, there were significant mean differences between the Arts and Business group on the general educational dimension and the intellectual dimension. In addition, the Social Science group also differed significantly from the Business major on the intellectual aspect. However, there were no significant differences between the Arts and Social Science groups on any dimension of gains.

Table 12 – Estimate of gains by aspirations to enrol for a more advanced degree					
Enrol for a more advanced degree		*Vocational*	*Personal development*	*General educational*	*Intellectual*
Yes	Mean	11.66	14.97	14.28	12.80
	N	582	587	584	558
	Std. Deviation	2.60	3.27	3.23	2.94
No	Mean	11.23	14.28	13.41	12.03
	N	333	335	322	317
	Std. Deviation	2.51	3.34	3.17	2.87
Total	Mean	11.50	14.72	13.97	12.52
	N	915	922	906	875
	Std. Deviation	2.58	3.31	3.23	2.94
	F-value	6.08	9.21	15.25	14.21
	Sig.	.01	.00	.00	.00
	Eta. squared	.01	.01	.02	.02

As indicated in Table 12, students' aspirations in terms of further study were found to be related to their self-reports of gains. The ANOVAs computed for the two student sub-groups show a significant difference in all dimensions of student growth and development.

The results suggest that students who aspire to do a higher degree after graduation tend to have estimated greater gains in various dimensions of university outcome.

Table 13 – Estimate of gains by study hours per week

Study Hours per week		*Vocational*	*Personal development*	*General educational*	*Intellectual*
5 hours or less	Mean	10.85	14.08	13.23	11.85
	N	129	132	129	130
	Std. Deviation	2.95	3.50	3.54	3.22
10 hours	Mean	11.30	14.42	13.73	12.29
	N	299	305	298	286
	Std. Deviation	2.61	3.12	3.12	2.89
20 hours	Mean	11.64	14.75	14.05	12.61
	N	298	297	295	285
	Std. Deviation	2.41	3.21	3.01	2.69
30 hours	Mean	11.90	15.52	14.61	13.31
	N	156	157	151	143
	Std. Deviation	2.31	3.39	3.08	2.80
40 hours or more	Mean	12.16	15.21	14.95	13.03
	N	38	39	38	37
	Std. Deviation	3.09	4.27	4.71	4.12
Total	Mean	11.48	14.70	13.96	12.52
	N	920	930	911	881
	Std. Deviation	2.59	3.33	3.25	2.95
	F-value	4.23	4.35	4.51	5.13
	Sig.	.00	.00	.00	.00
	Eta squared	.02	.02	.02	.02

The findings in Table 13 and its ANOVA results support that there were significant mean differences in the various categories of gains for students grouped by the number of hours they spent in a week on their course work and study. It is apparent from the findings that the more hours students spent on their study, the greater gains were reported for the different dimensions of student learning and development. This seems to imply that study hours are significantly related to university outcomes and the relationship is a positive one. However, it is worth noting that the reported 'personal development' and 'intellectual' gains were actually lower for the '40 hours or more' group than the 30-hour group.

Table 14 – Estimate of gains by hours of part-time work					
Hours of part-time work per week		*Vocational*	*Personal development*	*General educational*	*Intellectual*
None	Mean	11.34	14.47	13.64	12.34
	N	485	486	473	460
	Std. Deviation	2.50	3.35	3.09	2.87
10 hours or less	Mean	11.69	15.11	14.17	12.78
	N	277	279	276	267
	Std. Deviation	2.66	3.28	3.45	3.12
15 hours	Mean	11.73	14.97	14.49	12.82
	N	83	87	83	79
	Std. Deviation	2.71	3.30	2.92	2.63
20 hours	Mean	12.05	15.58	15.13	13.06
	N	37	36	38	33
	Std. Deviation	2.13	2.55	2.71	2.66
more than 20 hours	Mean	10.82	13.00	13.46	11.49
	N	34	36	37	37
	Std. Deviation	3.21	3.66	4.11	3.53
Total	Mean	11.49	14.69	13.94	12.51
	N	916	924	907	876
	Std. Deviation	2.59	3.33	3.24	2.96
	F-value	2.02	4.83	3.45	2.58
	Sig.	.09	.00	.01	.04
	Eta squared	.01	.02	.02	.01

Table 14 shows that there were significant differences in the means reported for the different categories of gains among the various sub-groups of students on account of their hours spent on a part-time job each week. The mean differences were more pronounced for the gains in personal development, general education, and intellectual growth, but less for the vocational domain. As the findings in Table 14 show, the number of hours on part-time work does not indicate a negative relationship with the amount of reported gains, except when the hours of part-time work exceed 20 hours a week. A significant drop (in statistical sense) in gains reported in all categories was recorded for students who worked more than 20 hours a week on a part-time job.

Table 15 – Estimate of gains by the amount of university expenses paid by parents or family

Expenses Paid by Family		*Vocational*	*Personal development*	*General educational*	*Intellectual*
None or very little	Mean	11.82	15.14	14.31	13.09
	N	146	146	143	137
	Std. Deviation	2.79	3.43	3.37	3.12
Less than half	Mean	11.45	15.04	14.49	13.13
	N	129	130	130	126
	Std. Deviation	2.50	3.31	3.36	3.05
More than half	Mean	11.54	14.95	14.06	12.50
	N	185	186	181	176
	Std. Deviation	2.45	3.23	3.13	2.63
All or nearly all	Mean	11.36	14.33	13.62	12.16
	N	458	464	455	441
	Std. Deviation	2.59	3.32	3.19	2.96
Total	Mean	11.48	14.68	13.94	12.51
	N	918	926	909	880
	Std. Deviation	2.58	3.33	3.24	2.96
	F-value	1.18	3.56	3.45	5.67
	Sig.	.32	.01	.02	.00
	Eta squared	.00	.01	.01	.02

The mean differences in various categories of gains were significant for groups defined by the amount of university expenses paid by parents or family, except for the vocational category. The findings in Table 15 show a general tendency for students whose university expenses were fully paid by family to report a less amount of gains in all categories of student learning and development. The explanation for this phenomenon is not clear unless students' background variables like their prior achievement have been controlled. Here, the findings simply suggest that students depending less on family support for university expenses tend to report greater gains in learning and student development during their university years.

The comparison of means and ANOVA tests were also conducted for students who attached a different degree of importance to the various reasons for them to engage in university education. Summary tables and detailed ANOVA analyses for each of the 11 reasons for university were provided at Appendix B. It was generally found that reasons related to career preparation, acquiring knowledge, and becoming a more cultured person

all have a significant positive relationship with the students' self-reports of gains. However, those reasons that imply a lack of purpose (such as, my parents wanted me to go; there was nothing better to do) do not exhibit the above relationship with gains.

As regards students' prior academic aptitude, separate ANOVAs were computed for the Advanced level and Certificate level examinations. (See Appendix C for the results.) The findings generally display that there was no variance in the different dimensions of reported gains as they related to the different A-level examination results achieved by students. However, the Certificate-level examination results were found significantly related to the variation in gains, especially for the subjects of English and Chinese, but not for Mathematics. The lack of relationship for Mathematics is perhaps due to the kind of university outcomes identified for the liberal arts institution in which the study was based. As none of the university outcomes are related to quantitative studies, it is not surprising to detect no relationship between mathematics results and the qualitative aspect of liberal arts education.

In addition to the significant findings reported above regarding how students' estimate of university outcomes were related to various student characteristics with respect to their background and status in university, there were also findings that showed a lack of relationship between self-reported gains and a number of other student characteristics, including age, parents' education and whether the students' study major is their first choice in priority. Comparisons of means and ANOVAs were computed for these variables, but no significant variance in the students' self-reported gains was observed as a result. (Relevant tables and detailed ANOVA analyses can be found at Appendix D.)

Up to now, a series of one-way analysis of variance was conducted to identify the different group means on the various dimensions of students' estimate of gains. It would be

interesting if interactions between factors could be captured by means of two-way or three-way ANOVA. However, the unequal distribution of cases within cells has made the analyses become much more complex and difficult to interpret than the simple ANOVA test for the main effect of a particular factor on the dependent variable. Two-way ANOVA had actually been conducted on an exploratory basis for the interaction of at least two factors on the four university outcome measures — vocational, personal development, general educational and intellectual gains. As there was a greater number of cells with unequal distribution of cases in each of them, the difference in various group means was found to be not robust when the assumption of normal distribution underlying the ANOVA test was further violated. Interpretation was also made difficult when the effect of a particular factor on the dependent variable was masked in a web of possible interactions among factors. As a result, only the one-way ANOVA results were reported and used to shed light on the effect of some of those significant factors on university outcome.

Change of growth from first year to final year

As shown in Table 8, students of different years of university study reported that they had made substantive gains on a variety of different dimensions of learning and cognition. One of the assumptions of the first research question which is about change is that students will not just experience change or progress during their university career but will grow or develop each year as they are exposed to the university environment. It is therefore interesting to measure the magnitude of the change in students' reported gains as they progressed from one year of study to another. The following table (Table 16) shows the magnitude of perceived changes of growth that occurred from the first year to final year of university study with respect to the various dimensions of university outcome.

Table 16 – Magnitude of estimated first-year-to-final-year change of growth (N = 996)						
Outcome	*Estimated Magnitude of Change of growth*					
	Change between 1st & 2nd year	*Effect Size[a]*	*Change between 2nd & 3rd year*	*Effect Size[b]*	*Change between 1st & 3rd year*	*Effect Size[c]*
Vocational	.17	.07	-.08	-.03	.09	.04
Personal Development	.05	.02	.24	.07	.30	.09
General Educational	.33	.11	.11	.03	.45	.14
Intellectual	.40	.14	.24	.08	.64	.22

Effect size[a] = (second year mean minus first year mean) divided by first year standard deviation
Effect size[b] = (third year mean minus second year mean) divided by second year standard deviation
Effect size[c] = (third year mean minus first year mean) divided by first year standard deviation

All the effect sizes showing the self-reported changes of growth between years were not large enough to support the claim that students have achieved considerable growth on a growth scale as they progressed from entry to graduation. However, the effect sizes, albeit small, do show relatively more change of growth for some university outcomes than for the others. For example, the reported gains of gains in the intellectual domain has the highest magnitude recorded between the first year and final year of study (effect size = .22). The growth difference is also not negligible on the intellectual dimension for the first-to-second-year progression (effect size = .14).

Another significant aspect of change of growth was recorded for the general educational dimension when the effect size was not too low for the gains of gains reported from first to final year of university education (effect size = .14). Some growth difference was also reported between first and second year on the same dimension (effect size = .11). When compared to the intellectual and general educational dimensions, the vocational and personal development aspects however showed a relatively less magnitude of change of growth between years of study.

As shown in Table 16, the rate of change in students' reported gains or development was found not constant over a 3-year period. The progress or growth difference recorded a negative downturn in the second year for all dimensions except personal development.

This was especially pronounced for vocational gains when the effect size was negative (-.03) for the second-to-third-year progression. As for personal development, growth was however reported as steady and obvious from year to year when students advanced in university.

Change of growth reported by same students on two separate occasions

As part of the research design, there was a group of students who had completed the CSEQ twice with a lapse of about eight months between the two administrations. Although the period in between should not be long enough to have caused much significant growth in the same students, it would be interesting to find out if students did experience change in the perceptions about their progress between the two points of time.

Table 17 – Magnitude of change of growth between first and second administration of LSEQ (N = 217)

Outcome	*Aggregate Mean score 1*	*sd*	*Aggregate Mean score 2*	*sd*	*Difference*	*Effect size **
Vocational	11.49	2.35	11.81	2.14	.32	.14
Personal Development	14.93	2.99	15.04	3.05	.11	.04
General Educational	14.08	3.05	14.53	2.86	.45	.15
Intellectual	12.71	2.73	13.25	2.70	.54	.20

**Effect size = (mean score 2 minus mean score 1) divided by mean score 1 standard deviation.*

As the results in Table 17 show, again, all the effect sizes were not large enough to suggest a substantive difference in the change of students' reported gains between the two times of LSEQ completion. However, the effect sizes do show a positive difference against the reported changes on the various dimensions of university outcome since the first administration of the questionnaire. A relatively larger effect size was recorded for the intellectual dimension (effect size = .20), then followed by the general educational (.15), vocational (.14) and lastly personal development (.04).

The results seem to suggest that students thought that they have grown more intellectually as they experienced university more. However, the change of growth in other aspects was less obvious, especially for personal development despite a longer period of exposure to the opportunities provided by university education.

Analyses so far for the first research question indicated that students perceived that they have changed and developed during their university career as they reported growth on a variety of different dimensions of university outcome. Further, students did not just report change but they also estimated change differently with respect to their background characteristics as well as some university environmental factors, such as campus residence, year of study, study major, study hours and part-time work and so forth.

Evidence about the change of growth in university years was obtained by computing effect sizes for the reported changes from one year of study to another. However, the perceived changes were found not consistent among the various dimensions of learning and cognition when some university outcomes have recorded a greater magnitude of change of growth than others. Furthermore, the rate of change of growth was not constant over a 3-year period when the difference was more pronounced for the first-to-final-year progression, and from first to second year.

When the reported changes of growth by the same students who had filled out the LSEQ twice were scrutinised, the results also support the claim that students have experienced change on a wide range of cognitive and affective attributes as a result of their longer stay in university, although the change of growth reported was more on the intellectual dimension than on the others.

Students' Experiences in University

The second research question is about students' university experiences. How much time do they spend on academic activities and use the facilities available on campus? To what extent are they really engaged? To what extent is the amount, scope, and quality of their effort related to what they get out of university, their perceptions of the university environment, and their overall satisfaction with the university they attended.

University activities and students' involvement

There are seven aspects of university experience that were measured in the LSEQ, namely, Library, Course Learning, Lecturers, Clubs and Organisations, Computers, Conversations, Campus Residence. Each of the seven aspects forms an integrative scale ranging from activities requiring little effort to ones requiring much more effort and initiative. An aggregate score derived from each scale forms an index of quality effort or experience related to that particular aspect of university activity.

In addition to the seven activity scales, there is an overall 'Quality Involvement' scale, which is unique to this research and was created by selecting items from the various university activity scales to form a composite scale of students' quality involvement in university experiences.

The following table (Table 18) reports the frequency and amount of students' involvement in the various university activity scales, about which students responded by checking 'Very often', 'Often', 'Occasionally', and 'Never' on a 4-point scale for every item in each of the activity scales.

Table 18 – Students' involvement in various university activity scales						
Activity scale	*Aggregate Score*	*sd*	*N 1st sample*	*Aggregate Score*	*sd*	*N 2nd sample*
Library (10 items)	21.79	5.11	700	20.98	4.99	940
Course Learning (10 items)	25.67	4.58	701	26.55	4.58	920
Lecturers (10 items)	19.09	5.35	699	18.14	4.88	841
Clubs and Organisations (10 items)	21.94	6.37	697	21.66	6.48	911
Computers (10 items)	27.83	5.41	694	27.41	4.79	897
Campus Residence (10 items)	23.84	5.46	596	22.71	5.91	783
Conversations (14 items)	34.32	6.58	686	33.76	6.43	919
Quality Involvement (10 items)	23.01	4.23	688	22.72	4.31	891

Notes: The range for the above aggregate scores is 10 –40 for all scales except the Conversations scale which is from 14-56.

Similar aggregate scores were resulted for the two samples, displaying a rather consistent pattern of students' engagement in various university activities. For most of the activities, students indicated on average an occasional type of involvement which was far from 'often' or 'very often'. Among these various dimensions of university experience, students were relatively more active about the use of computers, and about course learning. However, the interaction with lecturers was not frequent which has recorded the lowest aggregate score in both samples among all the activity scales. The overall index of quality involvement was at 23.01 for the first sample and 22.72 for the second sample. However, it is not very meaningful to examine these figures in isolation unless they are related to other variables of interest, such as how these aggregate scores for each of the activity scales vary for students of either sex, different study major, different year, campus or off-campus residence and whether they have a part-time job or not, and so forth.

ANOVA-tests and comparison of means were conducted on the larger sample to check for differences in students' involvement in various university activities with respect to their background characteristics and other variables of interest. It was identified that students' engagement in university activities did vary for different student sub-groups on account of their year of study, study major, campus residence, grades achieved so far, study hours,

aspiration for advanced study, and the various reasons for attending university.

As far as the year of study is concerned, the findings show that there was a greater involvement of senior year students in activities like using the library, interacting with lecturers, engaging in conversations with peers exhibiting an overall higher level of quality involvement in university experiences. Study major has an effect too. It seems to transpire from the findings that Arts and Social Science majors were generally more actively involved than Business majors in university activities such as Library, Course Learning, Lecturers, Clubs and Organisations, Conversations and the overall Quality Involvement dimension.

Interestingly, students living in hostels reported a higher level of involvement in the use of the library, in clubs and organisations, and of course, in campus activities and experiences. The grades achieved so far reported by students were also related to their university experiences, especially for those aspects that concern university study including Library, Course Learning, Lecturers, Computers, and Conversations. There was a general pattern for students who reported higher grades to engage more actively in the above university activities, resulting in a higher level of overall quality involvement in university experiences.

The aspiration of whether to enrol for a more advanced degree has an effect too on university involvement. It was identified that students who intended to further study were engaging more actively in almost all dimensions of university experience, except for campus residence. In a similar vein, students who spent more time on their studies reported a higher level of involvement in university activities like Library, Course Learning, Lecturers, Conversations, thus resulting in an overall higher quality experience in university.

The reasons for attending University were found also related to students' experiences. The more important students considered about reasons that were related to study, to people relationships and to career preparation, the more involved they became in university activities. However, the lack of any purpose for university did not show any relationship with students' involvement.

ANOVAs and comparison of means were also run for other background variables including prior academic aptitude, parents' education, sex, age, part-time job, university finance and whether the study major was the students' first priority. The academic aptitude (in terms of Advanced level and Certificate level examination results) was found to have some but not a very strong relationship with university experiences. While there was a tendency for students who were more academically prepared to exhibit a higher level of involvement in university, the relationship was not always there especially for those non-academic university activities such as Clubs and Organisations, Campus Residence, etc.

As for sex there was some indication of boys to be more involved in less academic activities such as Clubs and Organisations, while girls were more engaged in their studies. ANOVAs computed for the other students' sub-groups with respect to their age, parents' education, priority of major, part-time job and university finance all showed a lack of relationship between these background characteristics with university experiences.

Analyses so far provide findings about the students' involvement in university activities of various kinds, and how involvement was related to their background characteristics and some university environmental factors such as year, study major, grades so far, study hours, campus residence, etc. The observation at this juncture is that university environmental factors, rather than students' demographics (such as age, sex), are more related to students' active engagement in university experiences.

University experiences and reported gains

The second research question intends to further investigate if students' university experiences are related to what students get out of university. Correlational analysis was therefore conducted to examine the relationship. Table 19 has the results.

Table 19 – Correlation between various activity scales and students' self-reported gains (N = 996)

Activity	*Gains*			
	Vocational	*Personal Development*	*General Educational*	*Intellectual*
Library	.29	.21	.35	.28
Course Learning	.37	.38	.43	.41
Lecturers	.30	.28	.39	.28
Clubs and Organisations	.25	.33	.26	.26
Computers	.34	.35	.33	.35
Campus Residence	.33	.38	.36	.33
Conversations	.43	.46	.48	.46
Quality Involvement	.45	.45	.53	.48

All correlations are significant at the .01 level (2-tailed).

As shown in Table 19, all correlation coefficients were significant displaying a modest relationship between students' self-reported gains and their involvement in various university activities. A particularly significant relationship was recorded for the overall Quality Involvement scale when items included in the scale were considered to be university experiences of a higher intensity and quality. Further, the relationship between the Student Conversations scale and the various dimensions of gains was also significant. Apparently, students' involvement in campus residential activities was positively related to the personal development gains as reported by the students. Course learning experiences were also found related to the various dimensions of gains, particularly for general educational and intellectual gains.

Despite the fact that all correlations are significant, a relatively less significant relationship was observed for the Lecturers scale and the various categories of gains except for general

educational development. Similarly, students' involvement in clubs and organisations did not show a very strong relationship with all dimensions of gains, except for personal development.

University experiences and satisfaction with university

Students' involvement in university should be connected with how much they are satisfied with the university they attended. It can be argued that the more they are involved, the more they will be satisfied, but of course the argument is also true the other way around. To measure students' satisfaction, there are two parts in the questionnaire that tap students' attitude towards the university. The first part concerns their opinions about university which students were required to indicate how much they like it and would they go to the same university if they could start over again. The responses to these two questions form a composite 'likescore' to indicate to a certain extent students' overall satisfaction with the university that they are part of.

The second part about students' satisfaction consists of a list of five statements for each of which students were asked to indicate the extent of their satisfaction. The five statements are about teaching in general, course quality, course structure and organisation, choice of subjects, assessment and workload.

Using these two indices of student satisfaction, correlational tests were run to testify the relationship between satisfaction and students' involvement in university experiences (Table 20).

Table 20 – Correlation between various activity scales and students' satisfaction (N = 996)

	Satisfaction					
Activity	*Likescore*	*Teaching*	*Course quality*	*Course structure*	*Choice of subjects*	*Assessment and workload*
Library	.17	.19	.17	.16	.09	.13
Course Learning	.19	.31	.27	.26	.13	.19
Lecturers	.23	.15	.15	.13	.10	.06#
Clubs and Organisations	.29	.06#	.08*	.14	.07*	.08*
Computers	.16	.15	.10	.15	.07*	.13
Campus Residence	.27	.10	.10	.16	.07#	.13
Conversations	.22	.15	.10	.16	.08*	.14
Quality Involvement	.27	.20	.19	.22	.13	.15

#Correlation is not significant at the .05 level (2-tailed).
**Correlation is significant at the .05 level (2-tailed).*
All other correlations are significant at the .01 level (2-tailed).

The very modest correlations between the 'likescore' and the various aspects of university experience generally support the proposition that satisfaction is related to students' involvement. However, a closer examination of the correlations between students' involvement and their satisfaction with particular aspects of the university identified a rather weak relationship especially for the satisfaction with choice of subjects and assessment and workload.

University experiences and the institutional environment

The university environment was measured in the context of this research as the perceptions of students about the various emphases on student development in the university. There were eight aspects for students to respond by indicating to what extent they felt each of them was emphasised. These aspects include the development of academic, scholarly, and intellectual qualities; the development of artistic, expressive, and creative qualities; emphasis on being critical, evaluative, and analytical; the development of vocational and occupational competence; the personal relevance and practical values of courses; emphasis on developing language abilities; developing skills in IT and computing; and providing good teaching.

Correlational analysis was also run for these environmental emphases with students' involvement to identify if there was an association between students' perceptions of the environment and their involvement in university activities (see Table 21).

Table 21 – Correlation between various activity scales with the university environment (N= 996)

Activity	*Emphasis*							
	Academic	*Artistic*	*Critical*	*Vocational*	*Practical*	*Language*	*IT*	*Teaching*
Library	.10	.17	.15	.04#	.09	.06#	.04#	.13
Course Learning	.18	.20	.21	.10	.19	.15	.08*	.19
Lecturers	.07*	.13	.10	-.02#	.09	.03	-.05#	.07#
Clubs and Organisations	.05#	.13	.08*	.06#	.07*	.01#	.03#	.07*
Computers	.13	.14	.13	.14	.18	.17	.20	.17
Campus Residence	.13	.15	.12	.11	.14	.03#	.09*	.09
Conversations	.11	.17	.19	.12	.20	.11	.12	.14
Quality Involvement	.14	.23	.22	.08	.16	.11	.09	.16

#Correlation is not significant at the .05 level (2-tailed).
**Correlation is significant at the .05 level (2-tailed).*
All other correlations are significant at the .01 level (2-tailed).

The above correlations revealed that the relationship between students' involvement in university was rather weak with their perceptions of the various emphases in the university environment. Among the eight emphases, only a few of them were relatively more related to involvement, which included the emphasis on artistic and critical development.

Another measurement of the university environment was in terms of its people relationships. Students were asked to rate the relationships among people at the university from very positive to very negative. These people relationships included the relationship among students, with teaching staff members, and with administrative personnel. Again, correlational tests were conducted on these relationships with students' involvement in university activities (Table 22).

Table 22 – Correlation between various activity scales with the people relationships (N=996)			
	Relationships with		
Activity	*other students*	*teachers*	*administrators*
Library	.00#	.24	.16
Course Learning	.20	.35	.19
Lecturers	.03#	.27	.13
Clubs and Organisations	.18	.14	.14
Computers	.24	.22	.10
Campus Residence	.26	.18	.12
Conversations	.19	.21	.12
Quality Involvement	.14	.31	.20

 # Correlation is not significant at the .05 level (2-tailed).
All other correlations are significant at the .01 level (2-tailed).

It is interesting to note from the correlations that the relationship with teachers has a relatively strong connection with Course Learning involvement. Further, the overall Quality Involvement scale also exhibits a relatively robust correlation with the student-teacher relationship. Not surprisingly, the association is significant between campus residence and the relationship among students themselves.

Having assessed the associations between students' involvement in university activities and their self-reported gains, the environmental emphases, people relationships, as well as their satisfaction with the university, the analyses so far for the second research question have shed light on how students have been actively engaged in university, and to what extent their engagement was related to the students' self-reports of gains, their perceptions of the university environment and their overall satisfaction with the university they attended. One possible interpretation of the interactions among these variables could be simply due to the fact that when students were positive about the environment and university, they might tend to say that they were involved in university more and also rated the benefits from university more positively. Further discussion and interpretation of the interactions among student involvement, the university environment and their perceptions of gains will be provided later in this chapter.

Effect of University Experiences on University Outcomes

The third research question intends to measure the effects of the university experiences on learning outcomes and development. As previous analyses showed, there were associations among students' background characteristics with outcomes, students' quality involvement with outcomes. There were also associations between students' involvement and their perceptions of the environment, people relationships, and overall satisfaction with the university. Given all these elements that may directly or indirectly affect outcomes, what best predicts the students' achievement in university?

Stepwise multiple regressions were deployed here as the statistical procedure to control for a number of variables in order to estimate more accurately the effects of those relevant factors on outcomes. Outcomes were defined in the context of this research as the estimate of gains reported by students, their overall satisfaction with the university, as well as their predicted end-of-year cumulative GPAs.

In this connection, an aggregate gain score was computed by adding those self-reported gains on different dimensions of university outcome. This aggregate score was then used as the major criterion measure in the stepwise regression analysis for the assessment of the relative contribution that each predictor made in accounting for its variance.

Another outcome measure is the students' satisfaction with the university. A composite score was derived from adding the scores of the two items that tap students' enthusiasm about the university and their intention of attending the same university if they were given the choice again. This composite satisfaction score was used as the dependent measure for assessing the relative effect of each predictor on students' satisfaction with university.

The third criterion measure is the students' predicted end-of-year grade point average (GPA). Again, regression analysis was conducted using their predicted GPAs as the dependent measure for assessing the influence of each predictor on students' reported academic achievement. Separate regression analyses were carried out for each of these three criterion measures to result in a host of factors that were identified to have a significant impact on university outcomes.

Before being entered into the regression analyses, those dichotomous student background characteristics were recoded as dummy variables and were entered into the equation following a particular sequence. The sequence was to enter the background characteristics first, followed by the environment and people measures, then finally the university experience variables. The purpose of this sequence is to determine whether university outcomes are related to students' university experiences after controlling for their background characteristics and those environmental factors.

The selection of variables to be included in the regression analyses was based on the potential influence of certain variables on outcomes. Previous analyses of the relationships between background characteristics and student outcomes have shown an association between certain characteristics with outcomes. As a consequence, it is more meaningful to include only those potential variables into the regression equations to be controlled as biasing factors or confounding variables for a more accurate measurement of the effect of university experiences on outcomes.

As students' perceptions and satisfaction with the university environment and its people relationships were found to be correlated with self-reported gains, these measures were included in the regression analyses as intermediate variables to be assessed also for their potential effect on outcomes.

By carefully selecting variables to be included in the regression equations and following a predetermined sequence for entering sets of variables separately, it helps to avoid the problem of over-fitting when too many variables were assessed for their effect on outcomes. But by omitting some variables, there is the danger of not taking into account the potential effect of those omitting influences on the criterion measure. However, there is no perfect way of measuring most accurately the relative contribution of each potential predictor. What multiple regressions offer is a means of getting closer to explaining the contribution of certain variables to outcomes by partialling out the influence of those potentially confounding factors in the equations.

As a result, student background characteristics like year of study, campus residence or not, aspiration to further study after graduation, study major, prior academic aptitude in terms of A-level and Cert-level results, and grades so far reported by students were entered first into the stepwise multiple regression analyses. Being entered next were the environmental, people and satisfaction measures that were believed to have a potential effect on the criterion variable. Finally, the university experience measures were included in the analyses to assess for their actual effects on university outcomes after controlling for the students' background and environmental characteristics.

As shown in Table 23, significant changes in R^2 were recorded after the university environmental and satisfaction measures, and the various university experience measures were entered into the prediction. The changes in R^2 show the relative contribution of each set of predictors on university gains by partialling out the effect of previous variables on the criterion measure.

Table 23 Stepwise regression analysis for predictors of students' reported gains/progress in university (N=996)				
Predictors	*Variables excluded*	*Multiple R*	R^2	*Change in* R^2
Step 1: Background characteristics				
Study hours per week		.16[a]	.03	.03
Grades so far		.20[b]	.04	.01
Advanced degree		.22[c]	.05	.01
Step 2: Environment and satisfaction		.51[d]	.26	.21
Environmental score				
Likescore				
People score				
Satisfaction score				
Step 3: University experiences		.65[e]	.42	.17
Library				
Course Learning				
Lecturers				
Clubs and Organisations				
Computers				
Campus Residence				
Conversations				
	Year 1 Year 2 Year 3 Hostel (yes) Arts Business Social AL+Cert results			

Dependent variable: The composite total gain scores

a. *Predictors: (Constant), Study hours per week*

b. *Predictors: (Constant), Study hours per week, Grades so far*

c. *Predictors: (Constant), Study hours per week, Grades so far, Advanced degree*

d. *Predictors: (Constant), Study hours per week, Grades so far, Advanced degree, Environmental score, Likescore, People score, Satisfaction score*

e. *Predictors: (Constant), Study hours per week, Grades so far, Advanced degree, Environmental score, Likescore, People score, Satisfaction score, Library, Course Learning, Lecturers, Clubs and Organisations, Computers, Campus Residence, Conversations*

Another regression analysis was run using a different criterion measure this time (Table 24). The dependent variable was the students' predicted end-of-year cumulative grade point average (GPA). Instead of defining university outcome in terms of a variety of dimensions

of cognitive growth and personal development, this analysis used a single measure of academic achievement as the criterion variable for the identification of predictors by way of stepwise multiple regression.

Table 24
Stepwise regression analysis for predictors of students' expected end-of-year cumulative GPA (N=996)

Predictors	*Variables excluded*	*Multiple R*	R^2	*Change In* R^2
Step 1: Background characteristics				
Grades so far		.44[a]	.19	.19
AL+Cert results		.47[b]	.22	.03
Year 2		.50[c]	.25	.03
Advanced degree		.51[d]	.26	.01
Step 2: Environment and satisfaction		.53[e]	.29	.03
Satisfaction score				
Environmental score				
People score				
Likescore				
Step 3: University experiences		.55[f]	.30	.02
Library				
Course Learning				
Lecturers				
Clubs and Organisations				
Computers				
Campus Residence				
Conversations				
	Year 1 Year 3 Hostel (yes) Arts Business Social Study hours per week			

Dependent variable: Students' predicted end-of-year cumulative GPA.

a. Predictors: (Constant), Grades so far

b. Predictors: (Constant), Grades so far, AL+Cert results,

c. Predictors: (Constant), Grades so far, AL+Cert results, Year 2,

d. Predictors: (Constant), Grades so far, AL+Cert results, Year 2, Advanced degree

e. Predictors: (Constant), Grades so far, AL+Cert results, Year 2, Advanced degree, Satisfaction score, Environmental score, People score, Likescore,

f. Predictors: (Constant), Grades so far, AL+Cert results, Year 2, Advanced degree, Satisfaction score, Environmental score, People score, Likescore, Library, Course Learning, Lecturers, Clubs and Organisations, Computers, Campus Residence, Conversations

As shown in Table 24, not surprisingly, the students' self-report of grades attained so far was the greatest predictor of their expected end-of-year GPA. Two of the other predictors were also related to the students' academic achievement in university, which included their prior academic aptitude in terms of A-level and Certificate examination results, and their intention of enrolling in an advanced degree after graduation.

In this regression analysis, the university environmental variables were found to be important predictors of students' expected end-of-year GPAs. Furthermore, the students' satisfaction with the university and those university involvement measures were also confirmed as predictive.

In addition to the two criterion measures which were both related to students' reported success in university, a third criterion variable representing a different dimension of university success was used in the next stepwise multiple regression (Table 25). The dependent variable this time was the students' overall satisfaction with the university in terms of how much they liked university and would they attend the same university if they could start all over again (the 'likescore').

Table 25
Stepwise regression analysis for predictors of students' satisfaction with university (N=996)

Predictors	*Variables excluded*	*Multiple R*	R^2	*Change In* R^2
Step 1: Background characteristics				
Hostel (yes)		.16[a]	.03	.03
Grades so far		.21[b]	.04	.02
Social (major)		.23[c]	.06	.01
AL+Cert results		.26[d]	.07	.01
Step 2: Environment and satisfaction		.49[e]	.24	.17
Environmental score				
People score				
Satisfaction score				
Step 3: University experiences		.58[f]	.34	.11
Library				
Course Learning				
Lecturers				
Clubs and Organisations				
Computers				
Campus Residence				
Conversations				
	Year 1 Year 2 Year 3 Advanced degree Arts Business Study hours per week			

Dependent variable: Likescore (Students' overall satisfaction with university)

a. Predictors: (Constant), Hostel (yes)

b. Predictors: (Constant), Hostel (yes), Grades so far,

c. Predictors: (Constant), Hostel (yes), Grades so far, Social (major), AL+Cert results,

d. Predictors: (Constant), Hostel (yes), Grades so far, Social (major), AL+Cert results,,

e. Predictors: (Constant), Hostel (yes), Grades so far, Social (major), AL+Cert results, Environmental score, People score, Satisfaction score

f. Predictors: (Constant), Hostel (yes), Grades so far, Social (major), AL+Cert results, Environmental score, People score, Satisfaction score, Library, Course Learning, Lecturers, Clubs and Organisations, Computers, Campus Residence, Conversations

It is quite interesting to note from Table 25 that hostel residence was one of the predictors of students' satisfaction. Among the three major study areas offered by the university in which the research was based, only the Social Science discipline was found to be predictive of students' satisfaction with univeristy. The few environmental measures were discerned to have contributed substantively to the variance in the criterion variable, displaying an apparent change in R^2 once they were added to the stepwise regression. Consistent with

earlier regression analyses, the various university experience measures were confirmed to be useful predictors of students' satisfaction with university.

Analyses and findings reported up to this juncture identified that student experiences have a considerable impact on university outcomes measured on a variety of dimensions of cognition and development. Further, student experiences in university were also found to be important predictors of their academic achievement in terms of self-reported GPAs and their general satisfaction with the university. The impact of students' experiences in university on these three criterion measures was confirmed by performing the stepwise multiple regressions to control for confounding variables or biasing factors including students' background characteristics and their perceptions about the university environment and its people relationships.

Providing Feedback for Improvement

The fourth research question aims to crystallise the results from earlier analyses for the first three research questions to address the concerns of university administrators and teachers about how to promote better student learning for university success. For example, what features of the university lead to changes and development in students? What experiences or university activities make a difference in student outcomes?

Campus residence and student outcomes

Analyses for the first research question showed that students did change in university as they reported about their gains and progress made in various aspects of university outcome. Further analyses revealed that there were certain features in the university environment that were related to student growth and development. One of these features is campus residence which the univeristy provides for its students with hostels or dormitories for on-campus

living. The comparison study generally found that hostel-living students have reported more personal development gains than commuters.

Further, students living in hostels reported a higher level of involvement in a range of university activities including the use of the library, in clubs and organisations, and of course, in activities organised by or for hostel residents. Multiple regressions also revealed that campus residence was an important predictor of students' general satisfaction with the university they attended. And students' engagement in residential activities was also one of the university activities that contributed to the variance in the estimated gains and end-of-year GPAs reported by students.

These findings about campus residence are interesting to university administrators when they may need to further capitalise on this university feature to turn hostels into places for learning and living where students can interact and grow with each other to benefit from what campus residence has to offer. However, any resultant changes concerning campus residence should be evaluated continuously to inform future policy and practice.

Year of study and university outcomes

The length of period in university also makes a difference in students' development and progress. As shown in earlier analyses, students reported significant growth on a growth scale especially in the intellectual domain, which was apparent between first and second year, and between first and final year of university study. Change of growth was also evident, but to a lesser degree, in the general educational aspect between first and final year, and also from first to second year of study. However, a negative downturn in students' self-reported gains was recorded between the second and third year in almost all dimensions of growth except for personal development.

In the multiple regressions performed for the prediction of self-reported gains, cumulative end-of-year GPAs, and satisfaction with the university, the year of study was not found to be an important predictor, except for Year 2 students in relation to their expected end-of-year GPAs. This gives evidence to the phenomenon that significant change of growth was perceived by students between their first and second year of study, especially in the intellectual domain that is related to their academic achievement in terms of GPAs.

These analysis results provide university managers with information on how students progress in university on the various dimensions of cognition and learning, and the need to focus attention on what to do to promote greater student growth between years of study, especially for the progression from second year to third year of university study.

Prior academic aptitude and grades

Students' academic performance both in terms of their entry scores (by simply summing their AL and Certificate examination results) as well as their grades attained so far was found to have an association with students' reported gains and progress in univeristy. ANOVA studies revealed that the Certificate examination results rather than the A-level results have a relationship with the students' self-reports of gains. Moreover, the combined pre-entry scores were found to be an important predictor of students' reported end-of-year GPAs, as well as their overall satisfaction with the university.

The grades reported by students attained so far were also found to be positively related to the students' estimate of gains on all dimensions. This variable was repeatedly identified as one of the predictors of all three criterion measures in terms of students' reported gains, end-of-year GPAs and univeristy satisfaction.

These findings have implications for the university on student admissions as well as on student grades. When admitting students, it is obvious that the university should also consider students' Certificate level examinations and a significant weighting be given to these earlier examination results when calculating the pre-entry scores for university admission. As regards the grades achieved during university study, it was evidenced that higher grades were related to greater gains reported and a higher level of satisfaction with university.

Major field of study and outcomes

Some differences, albeit small, were found in students of different major areas of study with respect to their reported gains. Comparison studies revealed that students in different disciplines (Arts, Business, Social Sciences) reported differently the kinds of gains they think they get out of university. Business majors were found to report greater gains on the vocational dimension than the Social Science and Arts majors, while the Social Science and Arts students have reported more gains in personal development, general education, as well as intellectual gains.

As far as involvement in university experiences goes, the research findings displayed that Arts and Social Science majors were generally more engaged than Business major in university activities including Library, Course Learning, Lecturers, Clubs and Organisations, Conversations, and the overall Quality Involvement. Further regression analyses did not find study major a predictor of university outcomes in terms of both self-reported gains and expected cumulative GPAs. However, the Social Science major was identified to have contributed to the variance in students' satisfaction with university in the regression analysis using the 'likescore' as the criterion measure.

Although the research findings are far from conclusive about the effect of study major on university outcome, it is interesting for university managers to interrogate the difference in students' outcomes and involvement in university experiences as it relates to the choice of their major field of study. Investigations into the teaching methods, culture of the academic programmes and departments, teacher-student interactions, assessment methods deployed by each major discipline area may help to provide answers to the differential outcomes resulted.

Aspirations and reasons for university

On a more personal level, the aspirations of students to enrol for a more advanced degree after graduation and the kinds of reasons they have for univeristy attendance affected to some extent students' self-reported outcomes and their engagement in university activities. The research findings supported that students who aspired to continue with postgraduate studies tend to have reported greater gains in all dimensions of univeristy outcome. Further, these students were found to have engaged actively in university activities of various kinds, except for campus residence. Regression analyses further confirmed that such student aspiration was a predictor of students' reported gains and end-of-year GPAs.

When the various reasons for university attendance were compared, the research identified that reasons related to acquiring knowledge, career preparation and becoming a cultured person all have a significant positive relationship with students' reported gains. Reasons that suggested a lack of purpose did not show this relationship. In a similar vein, the various reasons and students' involvement in university were also related. Again, students who did not have a specific purpose for university displayed a weak participation in university activities.

Study hours and hours on part-time work

The research findings are congruent with the expectation that the more time students spent on their studies, the greater gains or progress they would have made in university. This positive relationship was discerned in all aspects of student learning and development which the study time was critical to the success of university. Further, study time was found also significantly related to students' involvement in university experiences. Students who spent more time on their studies reported a higher level of engagement in activities related to the Library, Course Learning, Lecturers and Conversations. Hence, not surprising at all, the number of study hours per week was confirmed as an important predictor of students' self-reported gains or progress made as a result of university attendance. However, the study time was found not predictive of students' estimated cumulative GPAs and their general satisfaction with the university.

Quite contrary to the situation with study hours, the number of hours students spent on part-time work has a weak but negative relationship with university outcomes. The negative association was not very pronounced for just a few hours of part-time work but was becoming more a problem when students spent more than 20 hours a week on a part-time job. However, the hours working part-time did not show an association, neither positive nor negative, with the amount and frequency of students' engagement in univeristy activities.

In the light of these research findings, it is commendable for university managers to find ways of engaging students more in their studies or in activities that are conducive to more effective learning, such that students would be able to benefit more from the educational opportunities provided. As regards part-time work, individual counselling or financial aid can be some of the ways of helping students to reduce their amount of outside work,

especially for those who work more than 20 hours a week part-time. However, the findings also indicated that many students could manage to work part-time while playing an active part in university and did not seem to report less progress or gains from university. This is consonant with the findings of Tymms and Fitz-Gibbon (1992) which reported that there was little relationship between the amount of part-time work which A-level students reported and their subsequent A-level results. A few hours of part-time work therefore may not have an adverse effect on students' learning outcomes as well as their personal development in university.

Other variables and univeristy outcomes

Significant relationships with univeristy gains or progress reported by students were not found for variables including students' age, sex, their parents' education, source of finance for univeristy expenses, and whether their major field of study was their first choice in priority. When these variables were related to students' involvement in univeristy activities, again, almost all of them did not show any significant associations, except that boys were found more involved than girls in less academic activities such as clubs and organisations.

It seems to transpire from the research findings and reports so far that those variables that were significantly related to university gains and experiences were characteristics more associated with the students' status in university, such as their year of study, campus residence, grades so far, study major, study time, and time on part-time work, etc. Strictly speaking, these are university factors that are inherent in the institutional environment which can be manipulatable and amenable to the intervention by the university. On the other hand, those student demographic variables were found not significantly associated with university gains and experiences, thereby suggesting that it is less important to find

out who the students were before university, but more important to know what they do and how they interact with the environment while they are in the university.

University experiences and reported gains

Correlational analyses supported that students' involvement in university activities were positively and significantly related to students' self-reports of gains. The associations were significant, particularly for the overall Quality Involvement scale when items in it represent engagement of a higher level of intensity and quality. Student conversations were also positively related to all dimensions of gains or progress, which suggest that peer interaction is a critical factor for student development and growth in university.

Very logically, students' participation in hostel activities was related to personal development gains, while course learning experiences were more associated with the intellectual and general educational gains. Comparatively speaking, the students' interaction with lecturers and engagement in clubs and organisations showed a less intense association with university outcomes.

Despite these variations, all aspects of university experiences were found predictive of all three measures of university outcome — the students' self-reported gains or progress, their expected end-of-year cummulative GPAs, and their overall satisfaction with university. The effect of the university experiences on outcomes was profound when stepwise multiple regressions were performed to account for the influence caused by a number of student background characteristics and environmental factors. Very apparent changes in R^2 were recorded in all regression analyses to give proof to the impact of students' involvement in university activities on university learning outcomes and development.

Interpretation needs to be careful here because of the inherent ambiguity of causal inferences. Although university experiences have a positive impact on outcomes, it cannot be sure if the influences have been the result of students' achievement in university which has motivated them to play an active part in university education. Anyhow, the significant relationship between outcomes and experiences was evidenced, suggesting the need for universities to find ways of engaging their students further in order to help them derive greater benefits from the educational opportunities provided.

University experiences, outcomes, and satisfaction with university

By the same token, students' overall satisfaction with university was found significantly associated with students' engagement in various aspects of univeristy education. Satisfaction is one of the outcomes of university. The univeristy may fail to achieve its purpose if students do not like it and do not feel part of the university by playing an active part in its activities and taking responsibility for their own learning.

As a consequence, students' university experiences and their satisfaction with university are interrelated where the relationship is reciprocal and the effects are mutual. It can be argued both ways that students who are engaging actively in university experiences will find univeristy education more satisfying, or students who are more satisfied with univeristy will find themselves more involved in the institutional environment and its activities.

Results from the stepwise multiple regressions confirmed that student satisfaction was a very important predictor of students' learning outcomes reported on a variety of dimensions, and their predicted end-of-year cumulative GPAs. Being a university outcome itself, students' satisfaction with university also contributed to the prediction of students' self-reported gains and academic achievement in terms of their GPAs.

Notwithstanding the difficulty in explaining the causal effect among satisfaction, outcomes and experiences, the analysis results are useful for university administrators and teachers to think about ways of engaging students more in university, so that students will become more affiliated with the university they attend and may like the university more, resulting in a greater effort and stronger motivation to do well in their studies to achieve outcomes for university success.

University experiences, outcomes, and the univeristy environment

Correlational analyses revealed that students' perceptions of the university environment were modestly associated with university experiences of various aspects. Among the various emphases students felt about in the university environment, the emphases on the development of 'artistic, expressive, and creative qualities', and on 'being critical, evaluative and analytical' showed a relatively stronger correlation with the overall Quality Involvement scale.

When students perceived a positive relationship with teachers, they tend to report a higher quality involvement in univeristy experiences overall, as well as in course learning activities. Positive relationships with other students showed an association with campus residence, which suggests that hostels are places for student interaction and for building interpersonal relationships.

Further analyses using multiple regressions displayed that both the people relationship score and the environmental score were important predictors of students' self-reports of gains, GPAs and their satisfaction with university.

The message is crystal clear to university managers that it is important to let students know of the university emphases, so that students are aware of what is stressed as the important university goals for them to identify with. Moreover, it is also important for universities to foster positive people relationships, especially between students and teachers, and among students themselves. The positive relationships will help to build a collegial learning community where members are interacting closely and are supporting each other.

The need for feedback

All these analysis data informing the interrelationships among university outcomes, environment and student experiences, provide very useful feedback for institutional managers to assess the connection between their efforts and the student outcomes.

The rich database generated by research of this kind will help to focus discussions about the institution and student learning among academics, administrators, and students. By knowing what facilitates or inhibits students' educational growth and development, university practitioners are in a better position to develop effective short- and long-term strategies for their university and students, and to receive feedback about the events of their practices.

The connection between students' experiences and university outcomes provides insight into what students do in university and how their involvement in various activities affect what they think they get out of university. University managers need information about the higher education experience and the outcome of it for effective policy development as well as continuous improvement of institutional practices. Educational institutions are complex systems. As Fitz-Gibbon (1996) in her book about monitoring education by way of quality indicators attests, 'complex, evolving systems such as educational institutions need to use

good local information, specific to their own local context, to locate problems and test solutions to these problems, in ongoing efforts for improvement' (1996:51). An information system that contains useful feedback data for managers is therefore necessary for the constant search for improvement and the monitoring of institutional performance. Tymms (1999) alludes this to the feedback loop necessary for helping managers to move through a thick and swirling fog in order to see the way forward clearly. Feedback is always needed about all parts of a complex system which requires monitoring structures for both accountability and continuous professional improvement.

In summary, assessment research of this kind on students in university have provided information about students' change and development, not only an isolated snapshot of student competencies at a single time, but an assessment of university outcomes by students on a variety of dimensions of cognitive learning and personal development. The analysis also includes information about students' university experiences so that effects of these experiences were assessed for their impact on outcomes and growth reported by students. Most importantly, the analysis results and findings provide useful feedback for university teachers and administrators about what to do to maximise the intellectual and personal development of its students.

Chapter 5 Conclusions and Implications

This is the final chapter of the thesis which aims to draw conclusions about quality in higher education based on the analyses in the preceding chapter about the effect of university on students. First, comparisons of the research findings with those of other studies in the literature will be undertaken to provide conclusions about the impact of university education on students, in particular, the effect of the university experience on learning outcomes and development. Second, implications are drawn to confirm what defines quality and university success by relating it to the outcomes defined on a range of cognitive and affective attributes, and the experience of being a university student. Third, further implications will be provided for higher education in Hong Kong about an alternative approach of assessing institutional performance in teaching and learning with an aim to encourage self-examination and provide feedback for institutional improvement of policy and practice. Finally, this chapter ends with a few suggestions for future research and comments on methods of inquiry that may help to advance the study of the impact of university education.

Major Conclusions from the Research

Quality involvement and student responsibility for learning

The research findings reported in Chapter Four are consonant with those explicit theories about how universities can promote student learning and development offered by Tinto, Pascarella, Astin, and Pace. Despite the different approaches used to assess the effect of university on students, these four theorists concur that 'the effects of initial group differences on university outcomes are relatively slight and largely mediated by the manner in which the student engages the university experience' (Davis and Murrell,

1993:iv).

The findings on Lingnan students confirmed that students' involvement in the university experience and interaction with the institutional environment were by far the two most important predictors of student outcomes on a range of cognitive and affective attributes. However, student demographics in terms of those fixed attributes such as sex, age, and prior academic ability were contributing less to the prediction of university outcome. The analysis results clearly indicated that the quality of involvement of students in the university experience and its activities was one of the most important determinants in university outcomes.

In considering the work of Tinto, Pascarella, Astin, and Pace, it was discovered that each of the theorists has used a different term to describe the interaction of the students with their university experience. Tinto uses the term 'integration', while Pascarella describes it as the 'student effort'. Astin espouses the 'theory of involvement', and Pace stresses the importance of 'student responsibility' in university learning. The research conducted at Lingnan University also confirmed the important role that students played in shaping university outcomes. The 'Quality Involvement' scale used in the research was identified to have an association with university outcomes reported by students on a variety of dimensions of cognitive learning and personal development.

Learning in university is a joint proposition where both students and the institution are responsible. Students are responsible for involving themselves in their studies, taking advantage of the opportunities and resources provided by the university. Universities are responsible too. They are responsible for providing an environment that is conducive to quality learning and teaching and are also responsible for designing curriculum that is up-to-date and relevant. On the relationship between the students and the university

environment in which they find themselves, the research at Lingnan demonstrated that when students valued the emphases of the university on student development and quality teaching, they tend to like university more and reported greater gains on a range of cognitive and affective attributes.

The research findings support the central role the campus environment plays in shaping student effort and involvement. A university should therefore be accountable for fostering a climate that enables students to involve themselves responsibly in university life. A university where students are investing a high quality of effort with respect to many aspects of university life — both academic and non-academic — is most likely a lively and effective environment for student learning and development.

In the light of the research findings, it is useful for universities to work to create an environment that encourages student effort and involvement in academic and extra-curricular activities. Student involvement in the university experience is the key to effective learning and development. Consistent with the composite findings of other studies in the literature, the research at Lingnan University has demonstrated that university outcomes are tied to the effort that students put into their work and the degree to which they are involved with their studies and campus life.

The role of socialising agents in university learning

Previous research has mentioned a great deal about the important role played by socialising agents in university on student learning and development. These agents include everyone in the institution, but mainly the teachers and student peers. The interaction with these significant others in the university environment, the character of the learning environments they create, and the nature and strength of the stimulation their

interactions provide for student learning and growth of various kinds are one of the most recurrent themes in the research literature on the effects of university.

For example, Pascarella and Terenzini (1991:620) report that the influence of interpersonal interaction with both teachers and fellow students is manifest in intellectual outcomes as well as in changes in attitudes, values, aspirations and a number of psychological characteristics. Endo and Harpel (1982) found that frequency of informal contact with teachers had statistically significant positive associations with senior students' self-reports of adequacy of general knowledge and adequacy of mathematics skills. In terms of the influence of student-teacher interaction on self-reports of progress in academic and intellectual skill development, similar results have been reported in the longitudinal investigations of Terenzini, Theophilides, and Lorang (1984) and Terenzini and Wright (1987).

The potency of the student-teacher interaction on university outcome was also confirmed in this study conducted on Lingnan University students. Although not being the strongest factor associated with the various dimensions of students' self-reported gains, the experience with lecturers was found significantly related to all aspects of gains especially for general educational development. Moreover, the interaction with lecturers formed one of the aspects of the student's university experience that largely predicted university outcome on a range of cognitive and affective attributes. Further analysis of the university environment revealed that when students perceived a positive relationship with teachers, they tend to report a higher quality involvement in university experiences overall, especially in course learning activities.

The research evidence points to the importance of the interaction between teachers and students, both formal and informal, and the critical role it plays in shaping students'

growth and development as a result of university attendance. While there are many ways to promote better teacher-student interaction in universities, for most campuses such arrangements may require modification of priorities, funds, and energies.

The implication for institutions is to make conscious and systematic efforts to create environments that engage students in both intellectual and interpersonal learning and that support meaningful teacher-student interaction. In the university system, there should exist established traditions and rewards that encourage a closer teacher-student relationship to contribute to the development of competence, independence, critical reasoning, and integrity in students.

In addition to the teacher-student relationship, evidence from previous research also suggests that the interaction with peers is critically associated with a wide array of university outcomes. Students' involvement in social and personal experiences in university was found related to student learning and the development of intellectual and affective skills (for example, Pace, 1987; Pascarella, 1985; Pascarella and Terenzini, 1980; Stage, 1987).

Findings from the study on Lingnan University students are consistent with what previous research has said about the student-peer interaction. When various university activity scales were compared with students' self-reported gains, a particularly positive relationship was recorded between the Student Conversations scale and the various dimensions of gains. Apparently, students' involvement in campus residential activities was significantly related to the personal development of gains as reported by students. The comparison between the residential group and the non-residential group generally found that hostel-living students reported more personal development gains than commuters. Further, the hostel-living students also reported a higher level of

involvement in numerous university activities including the use of the library, in clubs and organizations, and of course, in residential events and functions. Campus residence was also identified as an important predictor of students' satisfaction with the university they attended. Among the various university activities, students' involvement in hostel life was also found predictive of university outcomes in terms of students' self-reports of gains and their expected end-of-year cumulative GPA.

It is obvious that students who live in hostels have more time and opportunity to get involved in all aspects of university life, thereby making it more possible for residential students to develop a strong identification with and attachment to the university than commuter students. Campus life is more related to the personal, interpersonal aspect of university experience than to the abstract, intellectual and scholarly aspects. It is therefore not surprising to find that living on campus tends to promote somewhat greater increases in personal autonomy and independence, and the development of more mature interpersonal relationships. While interaction with teachers has a greater influence in intellectual areas, the interaction with peers affects mainly students' personal and social development.

Development is fostered when students feel part of a community where members engage in meaningful interactions with each other. The challenge for institutions is to create communities if they do not already exist. Institutions such as Lingnan University with residence halls on campus stand a better chance to wield the greatest influence. But institutions where most students live off campus or commute should work to foster student friendships and communities to support relationship-building activities both inside and outside the classroom.

The research findings and conclusions drawn from the Lingnan study shed light on those major factors in the university environment that significantly affect learning outcomes and student development. As it turned out, almost all significant factors were related to the students' university experience. Factors which were found positively related to university outcome were ones that directly or indirectly increased student involvement in the undergraduate experience. While there were many sub-environments or factors in the university experience that were identified to facilitate student learning and development, the most important and pervasive was the part played by those socialising agents in the university environment. Interaction with teachers and peers was confirmed positively related to the students' self-reports of progress, in either the intellectual or affective domain.

There were of course other salient sub-environments in the university experience with which students interacted to exert a unique influence on learning outcomes and development. These sub-environments included students' major area of study, the amount of time they spent on study, number of hours on part-time work, grades they have attained so far, aspirations for an advanced degree, and reasons for university attendance. Most of these factors were related to the university environment and experience in which students chose to engage themselves and in a manner that resulted in a differential effect on their learning and development.

Other background factors that were found minimally or least related to the university outcome were those factors associated with students' demographic characteristics and personal attributes. They included sex, age, parents' education, and even the students' prior academic aptitude which did not show a significant connection with a broad range of cognitive learning and affective outcomes.

In summary, the major implication of these conclusions for universities and their managers and teachers is to shape the educational and interpersonal experiences and settings of their campus in ways that will promote learning, to induce students to become involved in their university experience and activities to exploit the various university settings and opportunities to their fullest. It is important that institutional policies and practices are oriented towards developing a climate in which students' responsibility and active participation in their own university experience are promoted.

Implications for Defining and Assessing Quality in Higher Education

Consistent with earlier research syntheses about the effect of university on students, the analysis of the students' experience in Lingnan University provides evidence to indicate that the university years are a time of student change on a broad front. Students did not just report significant gains in subject knowledge and in a range of general cognitive and intellectual skills, but also change or development on a broad array of value, attitudinal, psychosocial, and moral dimensions. Based on the students' self-reports of gains or progress made in university, change of growth was also evidenced as students progressed from one year to another during their university career. A greater magnitude of change of growth was particularly observed between the first and second year of study, and between the first and final year before graduation.

Quality as change and growth in students

As a result of their time and experience on campus, students have undergone changes and development, and have their lives enriched not just through intellectual stimulation but also socially, emotionally and culturally. The transformation that students have experienced in university may have been caused by the impact of higher education, which has implications for defining excellence and university success in terms of the

institution's ability to cause the positive change in the knowledge, capacities, skills and attitudes of students between entrance and graduation.

One of the important goals of higher education is to provide education for students. It is the contribution to student learning and development that characterises the institutional effectiveness in fulfilling this important function of educating students in a holistic manner. Any institution is therefore considered 'excellent' if it can deploy its resources wisely and effectively to facilitate the intellectual and personal development of its students.

Arthur Chickering (1983) has made a similar point about institutional excellence by defining a quality institution as one that enables, provokes, and encourages significant learning for students. He argues that

> The principal justification for the existence of a college or university does not rest on its capacity simply to provide credentials, but on its capacity to create educational environments, teaching practices, and evaluative procedures that result in solid learning for the students to be served.
>
> Chickering, 1983:11

A high-quality institution is one that facilitates maximum growth among its students and is committed to the educational and personal development of its students.

Assessing quality in terms of students' university experience

Quality in higher education is further ascertained by identifying factors in the students' university experience or institutional environment that facilitates or inhibits student growth and development. With a concern for quality of its policy and practice that may affect university outcome, the institution seeks to answer fundamental questions such as:

Who are the students attending this university? What happens to them while they are with the university? How are they being affected by their experiences?

To answer these questions, the institution is not only interested in knowing how students change from entry to exit, but also in knowing why some students change differently from others and how the different programmes and experiences to which they are exposed contribute to these changes. By systematically examining the effects of the university environment and experience on learning outcomes and development, institutional quality or effectiveness is measured for the connections between the university efforts and student outcomes.

A high-quality institution knows what is happening to its students educationally and is concerned about the impact of its actions on learning outcomes. In this light, excellence in higher education is equivalent to a continuing process of critical self-examination focusing on the institution's contribution to the students' intellectual and personal development. Underlying this approach of quality assessment in higher education is the notion that an effective institution can positively modify and influence students' involvement and experience in university to result in a higher level of learning and development on a range of cognitive and affective attributes.

A substantive amount of research data from both this study and other previous studies has confirmed the significant effects of the university experience and students' interactions with the environment on student learning and development. It is therefore important for the assessment of quality in higher education to examine how students have actively involved in university activities of various kinds and how they have benefited from the educational opportunities that the university has to offer.

Because of the centrality of the students' experience in influencing university outcome, one possible approach to define and measure excellence in higher education is to gauge the change or development in students as it relates to the students' experience in university. Research has demonstrated that the amount and frequency of students' involvement in the university experience are associated with learning outcomes and development. The more students are actively involved in the university experience and take advantage of the educational opportunities provided, the greater are the learning results. As a consequence, the quality of students' involvement in the university experience can be used as one of the indicators of the university success in meeting its educational goal of providing an intellectually stimulating and a culturally enriched environment for students to grow and develop during their university career and even for life afterwards. Afterall, true quality in higher education resides in the institution's commitment to and interest in the educational and personal development of its students.

Implications for Quality Assessment in Higher Education in Hong Kong

A basic thrust from the research on university impact is that increased student involvement in the university experience is an important ingredient in determining student performance. For this reason, exploring the effects of different university experiences and the student's involvement in them as policy levers for evaluating and improving performance of universities presents one possible way of assessing quality in higher education.

Higher educational institutions all over the world including those in Hong Kong are under public pressures to study themselves, to learn what influences they exert on their students, and to document evidence of their effectiveness on student learning and development. In fact, for quality evaluation to provide feedback for improvement of institutional

programmes, policy and practice, it requires knowledge of the university's effects on students and those factors with which students interact in the university environment to result in differential outcomes of learning and development.

Quality assessment in Hong Kong is very much institutional-based where quality reviews are mostly driven and initiated by an external body for public accountability. All quality assessment exercises (including the teaching and learning quality process reviews, management reviews, institutional and programme accreditation, research performance reviews) are oriented towards overt institutional performance with an underlying political motive of providing accountability data of how well universities are performing.

None of these major critiques of Hong Kong higher education are based on any systematically obtained knowledge about what students do in university and what they think they have achieved. It is, after all, the students themselves who are engaged in the process of higher education and whose experience should be valuable to provide institutions with useful feedback on what programmes, policy and practice will facilitate or impede their learning and development.

The investigation of university outcomes as it relates to students' experience in university therefore presents an alternative perspective for quality assessment in higher education in Hong Kong. By investigating the quality of students' undergraduate experience and education, this alternative approach to the evaluation of university success will make a special contribution to the value of the quality assessment process to provide data that can stimulate lively and productive discussions within the university, leading, one might hope, to more effective and distinguished undergraduate education for students.

Improving an institution's awareness of its effect on the cognitive and affective development of its students, the quality of students' experiences in university, and the manner in which potential changes in policy and practice might lead to a different impact will result in more critical self-examination for effective institutional planning and decision making. This approach to quality assessment in higher education requires an increased commitment to monitoring student progress and to an ongoing data collection effort oriented around student development.

One possible spin-off from quality assessment of this sort is a 'student-based management information system' (Astin and Scherrei, 1980) to be developed at each institution to be used for institutional self-evaluation, resources allocation, and planning. The ultimate aim of any quality assessment is to provide feedback for university teachers and staff to assist them in becoming more effective practitioners. That an institution creates and maintains such a comprehensive database thus constitutes concrete evidence of the institution's commitment to critical self-study and to enhancing its impact on student development.

What should the database contain? Literally, it can be anything that might be worth knowing about the conditions of the student at the point of entry, the student's involvement in experiences of various kinds while in university, and how the student has developed during the university years. Having such an integrated student database containing information about the student's input, experience and outcome, it becomes possible for institutions to capture the wholeness of the student's educational experience with a better understanding of how students have progressed as a result of their participation in higher education.

The student database can be created by way of a questionnaire as the one used in the research conducted at Lingnan University. The questionnaire provides data about what students do with the university resources and what they get out of them. The university environment and experience are of particular importance in the data collection because they include those aspects of institutional quality that can be directly controlled by programmatic interventions or modifications of university policy and practice.

As more institutions engage in the survey of the quality of students' university experience and education, they do not only get feedback about the effectiveness of their own actions, but also can learn from each others' successes and failures in promoting quality involvement in students that impacts on university outcome. As a result, quality assessment becomes a self-examination as well as a co-operative process, where institutions can share and exchange information about what works and does not work, and to adopt those practices and approaches that are most likely to yield maximal learning and development in students.

The Hong Kong University Grants Committee (UGC) has in recent decades undertaken numerous ambitious programmes of assessing quality in higher education in Hong Kong, with the principal objective of encouraging government-funded institutions to become more accountable to the public. Under the perspective and concern for student learning and the experience of students in university, accountability in quality assessment will become a means to the end of more effective education rather than an end in itself. Simply put, it should be more important for the UGC to use quality assessment to assist institutions in achieving their primary mission of providing quality education for students, rather than to seek to make institutions more accountable for the public investment of money and faith.

Implications for Future Research

By way of a study conducted at a particular university in Hong Kong, this thesis has taken a close and careful look at the progress and activities of two groups of students in local higher education. With the findings and conclusions resulted from the study, how does this thesis contribute to the understanding of the effect of higher education? And what is unique about this study to add to the vast literature on university impact and outcome?

Uniqueness of the study

A rich base of data collected for the study provides an advantage over other earlier investigations. By administering the LSEQ twice on two separate occasions with a lapse of eight months apart, both longitudinal and cross-sectional data on students' growth and experience in the same university were obtained for a more interesting analysis of the experience of students at a particular point of time against the longitudinal development data obtained from students who have taken part in the survey twice. The richness of the data adds to the validity and credibility of the study which helps to eliminate some of the limitations of previous studies which used either a cross-sectional or longitudinal research design.

The dual conceptual framework of the thesis to combine the measurement of the impact of university on students with the larger context of quality assessment in higher education has offered a perspective of what constitutes quality in higher education and how to operationalise the assessment of quality in terms of student learning and development as students interact with the university environment and experiences. Using the dual conceptual framework, the thesis has successfully linked quality with the purpose of higher education and the assessment of its quality in terms of the primary mission of universities to promote better learning and student development.

This approach of measuring quality in higher education, though not new, is not the premise underlying the current philosophy and practice of quality assessment of institutional effectiveness in Hong Kong. Instead of focusing on institutional performance, the thesis advocates an alternative approach that focuses on the aspects of student life and experience that relates to university outcome. This approach on the one hand measures the amount of growth and development in students as they experience university education to satisfy the need for universities to be answerable for the influence they have made on students, and on the other hand, provides improvement data for university administrators and practitioners to shed light on policy and practice that make up the institutional environment.

Unique to the research conducted at Lingnan University is a new construct termed 'Quality Involvement' which is an integrative measure of a student's level of involvement in the university experience. The composite score represents the extent of a student's university effort or involvement across a range of university activity scales in the LSEQ. The higher the score the more effort is expended by the student to take advantage of the educational opportunities provided.

The 'Quality Involvement' index captures the spirit of the university experience perhaps better than any other single aggregate measure for a particular university activity. The index represents an overall quality of the student's involvement in the university environment that covers activities including Course Learning, Library, Lecturers, Clubs and Organisations, Student Conversations and Computers. In analysing the relationship between 'Quality Involvement' and students' self-reported gains, a significant positive association was identified between the two, suggesting that the 'Quality Involvement' index is a good measure of university success in promoting student learning.

Another analysis compared students' satisfaction with the index of 'Quality Involvement'. The result confirmed again a highly significant positive relationship between the two constructs. The greater the student's involvement in the university experience, the more satisfied students were with the university in general. These results point to the usefulness of the 'Quality Involvement' index as a measure of the quality of the educational process, which is evidence of the institution's success in stimulating high-level efforts by its students.

Need for future study

Clearly, the research conducted at Lingnan University is limited by the fact that it was done at a single institution. A replication of the study at a different institution or on a different sample would substantially increase the validity of the findings. Besides, the results of the study suggest the enormous complexity of the university-related growth process. This research had shed light on only some of the dimensions of that process, and future research in different institutional settings with different samples of students will certainly add to the understanding and to the significance of investigation of this kind. Many findings in the research are provocative and interesting, but can be particular or unique to the institution under study. Therefore, it requires verification of the research findings using future samples in different institutional settings.

While this research has identified a web of interrelated factors in the university environment that affects learning, it may have omitted some other influences on university outcomes such as institutional governance, culture, and context. There is a need for future research to account for such variables like campus culture, governance arrangements, leadership style, teaching methods and assessment schemes when assessing more fully the impact of university on student outcomes and development.

There are other methods which can build on and augment the quantitative paradigm that underpins the rational and empirical model of assessing the institutional effect on student development. In addition to possible intervention studies that require the setting up of experiments, there are other methods such as the narrative-based approaches that can give more detailed portrayals of what actually happens to students in university and how the individual student changes and responds to the stimuli provided in the university experience and environment. It is likely that the quantitative and qualitative methodologies will complement each other to give a more complete and accurate picture of the complex process of growth of students as they progress from entry to graduation. The interplay of quantitative and qualitative studies should enrich the understanding of the impact of university education and provide insights into the intricacies of what affects student learning and development.

For example, the qualitative approach can be used to examine in depth the experiences of students who have changed significantly as revealed in an earlier quantitative study. By means of open-ended interviews, it is possible to identify factors that are common to students who have evidenced a significant amount of change in a particular area. A small sample or groups of students in specific programme areas will suffice for in-depth research of this kind. As a result, individual differences and their interactions with specific programme elements can be captured to complement what is lacking in most large group quantitative analyses of university effects on students.

As one of the objectives of quality assessment is to build a comprehensive integrated student database for institutions to know what has happened to their students, it is commendable to use multiple research methods to collect a rich font of data for critical self-examination and discussion among practitioners in higher education for a better

understanding of what causes changes in students and what conditions in the university environment will facilitate or inhibit student growth and development.

With these future directions for further research on the effects of university on student outcomes, university impact studies could be significantly advanced to contribute to the understanding of defining and evaluating excellence and effective performance in higher education.

— End of Thesis —

Appendices

Appendix A - The Lingnan Student Experiences Questionnaire (LSEQ)

Appendix B - Estimate of gains by various reasons for university

Appendix C - Estimate of gains by A-level and Certificate-level examination results

Appendix D - Estimate of gains by other student factors

Lingnan University

TEACHING & LEARNING CENTRE

Lingnan Student Experiences Questionnaire

The main purpose of this inquiry is to learn about how Lingnan University students spend their time — in course work, in the library, in contacts with faculty, in extracurricular activities, in various social activities, and in using other facilities and opportunities that exist in the university setting.

The information obtained from you will provide new insight to administrators, teaching staff members, and others who provide the resources and shape the programmes that are meant to be of benefit for student learning and development within the university experience.

This questionnaire can be answered quite easily in less than ***30 minutes***. We do not ask you to write your name anywhere in this questionnaire; but ***we do need to know where the reports come from, and that is why we need your student ID number***.

This allows us to conduct follow-ups with the information you provide and to correlate university learning outcomes with your experiences and background variables. Your background information would help us learn how experiences might be related to age, sex, current year of study, major field, whether one lives on the campus, whether one has a job etc. ***Please be assured that your response will be held in the strictest professional confidence.***

The ultimate benefits in this survey depend on the thoughtful responses and willing participation from those who are asked to help. Your willingness to participate is important and very much appreciated. Thank you.

Lingnan Student Experiences Questionnaire

This research study is supported by an internal Teaching Development Grant and is intended to assess the impact of university experiences on student learning and development.

Should you have any questions or need further information, please feel free to contact the Teaching & Learning Centre on 2616 7577 (tel) or 2572 5706 (fax).

Permission was obtained from the Center for Postsecondary Research and Planning at Indiana University to adapt and use the 'College Student Experiences Questionnaire (CSEQ)' by Professor C. Robert Pace (2nd revised edition, 1983).

March 2000

BACKGROUND INFORMATION

DIRECTIONS: Indicate your response by ticking ⓥ the appropriate space under each question.

Age
○ 22 or younger
○ 23 – 27
○ 28 or above

Sex
○ male
○ female

What was your grade for the following AS level and Cert level subjects?
AS English _____
AS Chinese _____
Cert English _____
Cert Chinese _____
Cert Maths _____

What year are you in currently?
○ 1st year undergraduate
○ 2nd year undergraduate
○ 3rd year undergraduate
○ other

Have you lived in a student hostel while attending this university?
○ yes
○ no

At this university, up to now, what have most of your grades been?
○ A, A-
○ B+, B
○ B-, C+
○ C, C-
○ D+, D
○ F

Which of the following comes closest to describing your major field of study (or your expected major)? ***(Please choose one answer only.)***

○ *Chinese* (Literary Studies)
○ (Professional Writing)

○ *English* (Contemporary Literary Studies)
○ (Applied Linguistics Studies)

○ *Cultural Studies* (Social & Political Studies)
○ (Literary Studies)
○ (Cultural and Intellectual History)

○ *Translation*

○ *Business Administration* (Accounting)
○ (Finance)
○ (Information Systems)
○ (Human Resources Management)
○ (Marketing)
○ (Risk and Insurance Management)

○ *Social Sciences* (China and Asian Pacific Affairs)
○ (International Political and Economic Affairs)
○ (Public Policy and Resource Allocation)
○ (Contemporary Social Issues and Policy)

○ *Other: What?* _____

○ *Undecided*

Is this area of study your first choice in priority?
○ yes
○ no

Did either of your parents graduate from university?
○ yes, both parents
○ yes, father only
○ yes, mother only
○ no

After you graduate from university, do you expect to enroll for a more advanced degree?
○ yes
○ no

During the term time, about how many hours a <u>week</u> do you usually spend on your course work and study? ***This does not include time spent in lectures and tutorials.***
○ about 40 hours a week or more
○ about 30 hours a week
○ about 20 hours a week
○ about 10 hours a week
○ about 5 hours a week or less

During the term time, about how many hours a <u>week</u> (on an average) do you usually spend working on a job?
○ none. I am not employed during the term
○ about 10 hours or less
○ about 15 hours
○ about 20 hours
○ more than 20 hours

About how much of your university expenses this year is paid by your parents or family?
○ all or nearly all
○ more than half
○ less than half
○ none or very little

In deciding to go to university, how important to you was each of the following reasons? ***(Mark one answer for each reason.)***

Very important	*Somewhat important*	*Not important*	**Reasons**
○	○	○	my parents wanted me to go
○	○	○	to be able to contribute more to society
○	○	○	to be able to get a better job
○	○	○	to gain a general education and appreciation of ideas
○	○	○	to improve my reading and study skills
○	○	○	there was nothing better to do
○	○	○	to make me a more cultured person
○	○	○	to be able to make more money
○	○	○	to learn more about things that interest me
○	○	○	to meet new and interesting people
○	○	○	to prepare myself for graduate or professional school

UNIVERSITY ACTIVITIES

DIRECTIONS: In your experience at this university *during the current academic year*, about how often have you done each of the following? Indicate your response by ticking ⓥ one of the spaces to the left of each statement.

Very often
Often
Occasionally
Never

Library Experiences

○ ○ ○ ○ Used the library as a quiet place to read or study materials you brought with you.

○ ○ ○ ○ Used the card or on-line catalogue to find what materials there were on some topic.

○ ○ ○ ○ Asked the librarian for help in finding materials on some topic.

○ ○ ○ ○ Read something in the reserve reading room or reference section.

○ ○ ○ ○ Used indexes or CDRoms to find journal articles.

○ ○ ○ ○ Developed a reading list or set of references for an assignment or other course projects.

○ ○ ○ ○ Found some interesting materials to read just by looking through the shelves.

○ ○ ○ ○ Looked for references that were cited in your readings.

○ ○ ○ ○ Gone back to read a basic reference or document that other authors had often referred to.

○ ○ ○ ○ Borrowed non-print materials (e.g. video and audio tapes, CDRoms, etc.)

Very often
Often
Occasionally
Never

Experiences with Lecturers

○ ○ ○ ○ Talk with a lecturer.

○ ○ ○ ○ Ask your lecturer for information related to a course you were taking (grades, make-up work, assignments, etc.).

○ ○ ○ ○ Visited informally and briefly with a lecturer after class.

○ ○ ○ ○ Made an appointment to meet with a lecturer in his/her office.

○ ○ ○ ○ Discussed ideas for an assignment or other class project with a lecturer.

○ ○ ○ ○ Discussed your career plans and ambitions with a lecturer.

○ ○ ○ ○ Asked your lecturer for comments and criticisms about your work.

○ ○ ○ ○ Had lunch/tea/coffee with a lecturer.

○ ○ ○ ○ Worked with a lecturer on a research project.

○ ○ ○ ○ Discussed personal problems or concerns with a lecturer.

Very often
Often
Occasionally
Never

Course Learning

○ ○ ○ ○ Took detailed notes in class.

○ ○ ○ ○ Listened attentively in class.

○ ○ ○ ○ Participated in class discussions.

○ ○ ○ ○ Underlined major points in the readings.

○ ○ ○ ○ Tried to see how different facts and ideas fit together.

○ ○ ○ ○ Thought about practical applications of the material.

○ ○ ○ ○ Worked on a paper or project where you had to integrate ideas from various sources.

○ ○ ○ ○ Summarized major points and information in your readings or notes.

○ ○ ○ ○ Tried to explain the material to another student or friend.

○ ○ ○ ○ Did additional readings on topics that were introduced and discussed in class.

Very often
Often
Occasionally
Never

Clubs and Organizations

○ ○ ○ ○ Read notices about campus events and student organizations.

○ ○ ○ ○ Attended a programme or event organized by a student group.

○ ○ ○ ○ Read or asked about a club, organization, or student union activity.

○ ○ ○ ○ Attended a club, organization, or student union meeting.

○ ○ ○ ○ Voted in a student election.

○ ○ ○ ○ Discussed policies and issues related to campus activities and student union.

○ ○ ○ ○ Worked in some student organization or special project (publications, student union, social event, etc.).

○ ○ ○ ○ Discussed reasons for the success or lack of success of student club meetings, activities, or events.

○ ○ ○ ○ Worked on a committee.

○ ○ ○ ○ Met with a lecturer or administrator to discuss the activities of a student organization.

DIRECTIONS: In your experience at this university *during the current academic year*, about how often have you done each of the following? Indicate your response by ticking ✓ one of the spaces to the left of each statement.

Very often
Often
Occasionally
Never

Experiences with Computers

○ ○ ○ ○ Took a course / workshop offered by the Information Technology Services Centre.

○ ○ ○ ○ Used a computer on university campus.

○ ○ ○ ○ Used a computer at home / hostel.

○ ○ ○ ○ Used a computer for word-processing purposes.

○ ○ ○ ○ Used a computer for communication purposes (e.g. e-mail, ICQ).

○ ○ ○ ○ Used a computer for programming purposes.

○ ○ ○ ○ Used a computer for Web-based learning.

○ ○ ○ ○ Used a computer for graphics.

○ ○ ○ ○ Used the Internet to search information.

○ ○ ○ ○ Used the computer for games and entertainment.

CONVERSATIONS

DIRECTIONS: In conversations with other students at this university *during the current academic year*, about how often have you talked about each of the following?

Very often
Often
Occasionally
Never

Topics of Conversation

○ ○ ○ ○ Job prospects, money, careers.

○ ○ ○ ○ Movies and popular music.

○ ○ ○ ○ Social events, parties.

○ ○ ○ ○ Boyfriends, girlfriends.

○ ○ ○ ○ Current events in the news.

○ ○ ○ ○ Major social issues such as peace, human rights, equality, justice.

○ ○ ○ ○ Different life styles and customs.

○ ○ ○ ○ The ideas and views of other people such as writers, philosophers, historians.

○ ○ ○ ○ Computers and other technologies.

○ ○ ○ ○ The economy – employment, wealth, poverty, debt, trade, etc.

○ ○ ○ ○ International relations / politics.

○ ○ ○ ○ University administration and policy.

○ ○ ○ ○ Course learning and subject discipline.

○ ○ ○ ○ Problems in studies.

DIRECTIONS: If you are now living in a university student hostel, about how often have you done each of the following in the hostel *during the current academic year*? Indicate your response by ticking ✓ one of the spaces to the left of each statement.

***If you do not live in a hostel, omit these items* and go to the next sectio**

Very often
Often
Occasionally
Never

Campus Residence

○ ○ ○ ○ Had lively conversations about various topics during dinner in the student canteen or restaurant.

○ ○ ○ ○ Gone out with other students for late night snacks.

○ ○ ○ ○ Offered to help other students (with course work, advice, etc.) who needed some assistance.

○ ○ ○ ○ Participated in discussions that lasted late into the night.

○ ○ ○ ○ Asked others for assistance in something you were doing.

○ ○ ○ ○ Borrowed things (clothes, records, posters, books, etc.) from others in the student hostel.

○ ○ ○ ○ Attended social events organized by the student hostel.

○ ○ ○ ○ Studied with other students in the student hostel.

○ ○ ○ ○ Helped plan or organize an event in the student hostel.

○ ○ ○ ○ Worked on some community service or fund raising project with other students in the student hostel.

OPINIONS ABOUT UNIVERSITY

How well do you like university?

○ I am enthusiastic about it.

○ I like it.

○ I am more or less neutral about it.

○ I don't like it.

If you could start over again, would you go to Lingnan University that your are now attending?

○ Yes, definitely

○ Probably yes

○ Probably no

○ No, definitely

THE UNIVERSITY ENVIRONMENT

Universities differ from one another in the extent to which they emphasize or stress various aspects of students' development. *Thinking of your own experience at this university*, to what extent do you feel that each of the following is *emphasized*? The responses are numbered from 7 to 1, with the highest and lowest points described. Please tick ⓥ the number that best indicates your impression on this seven-point rating scale.

Emphasis on the development of academic, scholarly, and intellectual qualities

Strong emphasis	⑦	⑥	⑤	④	③	②	①	Weak emphasis

Emphasis on the development of artistic, expressive, and creative qualities

Strong emphasis	⑦	⑥	⑤	④	③	②	①	Weak emphasis

Emphasis on being critical, evaluative, and analytical

Strong emphasis	⑦	⑥	⑤	④	③	②	①	Weak emphasis

Emphasis on the development of vocational and occupational competence

Strong emphasis	⑦	⑥	⑤	④	③	②	①	Weak emphasis

Emphasis on the personal relevance and practical values of your courses

Strong emphasis	⑦	⑥	⑤	④	③	②	①	Weak emphasis

Emphasis on developing language abilities

Strong emphasis	⑦	⑥	⑤	④	③	②	①	Weak emphasis

Emphasis on developing skills in IT and computing

Strong emphasis	⑦	⑥	⑤	④	③	②	①	Weak emphasis

Emphasis on providing good teaching

Strong emphasis	⑦	⑥	⑤	④	③	②	①	Weak emphasis

The next three ratings refer to *relationships among people at the university*. Again, thinking of your own experience, how would you rate these relationships on the seven-point scales?

Relationship with other students, student groups, and activities

Friendly, Supportive, Sense of belonging	⑦	⑥	⑤	④	③	②	①	Competitive, Uninvolved, Sense of alienation

Relationship with teaching staff members

Approachable, Helpful, Understanding, Encouraging	⑦	⑥	⑤	④	③	②	①	Remote, Discouraging, Unsympathetic

Relationship with administrative personnel and offices

Helpful, Considerate, Flexible	⑦	⑥	⑤	④	③	②	①	Rigid, Impersonal, Bound by regulations

Thinking of your own experience at this university, to what extent are you *satisfied* with each of the following? Please indicate your response on the seven-point scale.

Teaching in general

Very satisfied ⑦ ⑥ ⑤ ④ ③ ② ① Very dissatisfied

Course quality in general

Very satisfied ⑦ ⑥ ⑤ ④ ③ ② ① Very dissatisfied

Course structure and organization

Very satisfied ⑦ ⑥ ⑤ ④ ③ ② ① Very dissatisfied

Choice of subjects

Very satisfied ⑦ ⑥ ⑤ ④ ③ ② ① Very dissatisfied

Assessment and workload

Very satisfied ⑦ ⑥ ⑤ ④ ③ ② ① Very dissatisfied

ESTIMATE OF GAINS

DIRECTIONS: *In thinking over your experiences in university up to now*, to what extent do you feel you have *gained* or *made progress* in each of the following respects? Indicate your response by ticking ✓ one of the spaces to the left of each statement.

Very much | *Much* | *Some* | *Very little*

○ ○ ○ ○ Vocational training – acquiring knowledge and skills applicable to a specific job or type of work.

○ ○ ○ ○ Acquiring background and specialization for further education in some professional, or scholarly field.

○ ○ ○ ○ Gaining a broad general education about different fields of knowledge.

○ ○ ○ ○ Gaining a range of information that may be relevant to a career.

○ ○ ○ ○ Gaining an international outlook and a cross-cultural perspective.

○ ○ ○ ○ Developing independence and self-reliance.

○ ○ ○ ○ Writing clearly and effectively.

○ ○ ○ ○ Acquiring familiarity with the use of computers.

○ ○ ○ ○ Becoming aware of different philosophies, cultures, and ways of life.

○ ○ ○ ○ Developing analytical and problem-solving skills.

Very much | *Much* | *Some* | *Very little*

○ ○ ○ ○ Developing your own values and ethical standards.

○ ○ ○ ○ Understanding yourself – your abilities, interests, and personality.

○ ○ ○ ○ Understanding other people and the ability to get along with different kinds of people.

○ ○ ○ ○ Gaining a strong sense of social responsibility.

○ ○ ○ ○ Ability to function as a team member.

○ ○ ○ ○ Ability to think critically.

○ ○ ○ ○ Ability to put ideas together, to see relations, similarities, and differences between ideas.

○ ○ ○ ○ Ability to learn on your own, pursue ideas, and find information you need.

○ ○ ○ ○ Ability to adapt to change with flexibility and judgement.

○ ○ ○ ○ Ability to communicate well in English.

○ ○ ○ ○ Ability to communicate well in Chinese.

○ ○ ○ ○ Ability to accept diverse views and different opinions of others.

PREDICTED GRADES

What will be your cumulative / final GPA by the end of this academic year?

○ 3.67 – 4.00 (A, A-)
○ 3.00 – 3.66 (B+, B)
○ 2.33 – 2.99 (B-, C+)
○ 1.67 – 2.32 (C, C-)
○ 1.00 – 1.66 (D+, D)
○ less than 1.00 (F)

What have been / will be your *average grades* (in A-F) for the following compulsory subjects?

General Education _____

English _____

Putonghua _____

***** Thank you for your participation *****

Permission to Access Your Student Record

It is part of the research design to ***link up your response in this survey with other follow-up data***. Therefore, it is important that we ***have your consent to our collecting some follow-up data*** (e.g. your end-of-year GPA) from your student records kept by the Registry of this university. Please be re-assured that your information will be used and reported only in group summaries for research purposes, and will NOT be identified with you individually. We should appreciate it if you could give us your consent by ***signing this form***. Thank you!

Your student ID number _____

Your signature _____

PLEASE SIGN HERE!

Appendix B

Estimate of gains by various reasons for university (N = 998)

Reason		Vocational	Personal development	General educational	Intellectual
my parents wanted me to go	Not important	11.47 *(N=356 sd=2.71)*	14.61 *(N=361 sd=3.39)*	13.95 *(N=354 sd=3.34)*	12.63 *(N=340 sd=3.12)*
	Somewhat important	11.41 *(N=415 sd=2.41)*	14.52 *(N=154 sd=2.67)*	13.76 *(N=408 sd=3.16)*	12.30 *(N=402 sd=2.80)*
	Very important	11.79 *(N=154 sd=2.67)*	15.41 *(N=155 sd=3.53)*	14.51 *(N=154 sd=3.11)*	12.88 *(N=142 sd=2.90)*
	F-value	1.30	4.28	3.06	2.42
	Sig.	.27	.01	.05	.09
	Eta squared	.00	.01	.01	.01
to be able to contribute more to society	Not important	10.90 *(N=219 sd=2.55)*	13.95 *(N=223 sd=3.53)*	13.35 *(N=218 sd=3.33)*	12.21 *(N=213 sd=3.13)*
	Somewhat important	11.60 *(N=515 sd=2.44)*	14.73 *(N=520 sd=3.08)*	13.99 *(N=508 sd=3.04)*	12.46 *(N=490 sd=2.75)*
	Very important	11.84 *(N=190 sd=2.85)*	15.52 *(N=189 sd=3.48)*	14.59 *(N=189 sd=3.49)*	13.06 *(N=180 sd=3.17)*
	F-value	8.05	11.89	7.59	4.35
	Sig.	.00	.00	.00	.01
	Eta squared	.02	.03	.02	.01
to be able to get a better job	Not important	10.00 *(N=36 sd=2.97)*	12.26 *(N=34 sd=4.08)*	12.94 *(N=35 sd=4.37)*	11.19 *(N=36 sd=3.99)*
	Somewhat important	11.30 *(N=233 sd=2.51)*	14.50 *(N=234 sd=3.10)*	13.79 *(N=231 sd=3.07)*	12.24 *(N=225 sd=2.87)*
	Very important	11.64 *(N=655 sd=2.55)*	14.90 *(N=664 sd=3.30)*	14.07 *(N=649 sd=3.21)*	12.70 *(N=622 sd=2.88)*
	F-value	7.84	11.06	2.47	5.82
	Sig.	.00	.00	.09	.00
	Eta squared	.02	.02	.01	.01
to gain a general education and appreciation of ideas	Not important	10.24 *(N=75 sd=3.13)*	12.53 *(N=73 sd=3.99)*	12.20 *(N=75 sd=3.96)*	10.64 *(N=73 sd=3.46)*
	Somewhat important	11.44 *(N=393 sd=2.37)*	14.54 *(N=389 sd=3.06)*	13.71 *(N=394 sd=2.88)*	12.25 *(N=378 sd=2.67)*
	Very important	11.70 *(N=455 sd=2.60)*	15.15 *(N=469 sd=3.29)*	14.44 *(N=446 sd=3.28)*	13.06 *(N=432 sd=2.95)*
	F-value	10.61	21.01	17.82	24.66
	Sig.	.00	.00	.00	.00
	Eta squared	.02	.04	.04	.05
to improve my reading and study skills	Not important	10.41 *(N=138 sd=2.71)*	13.51 *(N=139 sd=3.59)*	12.86 *(N=138 sd=3.59)*	11.63 *(N=131 sd=3.10)*
	Somewhat important	11.51 *(N=482 sd=2.49)*	14.63 *(N=482 sd=3.14)*	13.77 *(N=478 sd=2.92)*	12.37 *(N=465 sd=2.80)*
	Very important	11.93 *(N=301 sd=2.51)*	15.35 *(N=308 sd=3.31)*	14.76 *(N=297 sd=3.35)*	13.17 *(N=285 sd=2.98)*
	F-value	17.05	15.50	18.79	13.78
	Sig.	.00	.00	.00	.00
	Eta squared	.04	.03	.04	.03

Reason		Vocational	Personal development	General educational	Intellectual
⊖ there was nothing better to do	Not important	11.62 *(N=460 sd=2.55)*	14.99 *(N=462 sd=3.22)*	14.06 *(N=450 sd=3.19)*	12.85 *(N=437 sd=2.91)*
	Somewhat important	11.43 *(N=324 sd=2.47)*	14.43 *(N=325 sd=3.24)*	13.88 *(N=323 sd=3.12)*	12.13 *(N=311 sd=2.88)*
	Very important	11.12 *(N=136 sd=2.87)*	14.37 *(N=141 sd=3.75)*	13.81 *(N=139 sd=3.61)*	12.35 *(N=132 sd=3.15)*
	F-value	2.10	3.57	.49	5.87
	Sig.	.12	.03	.61	.00
	Eta squared	.01	.01	.00	.01
● to make me a more cultured person	Not important	10.61 *(N=126 sd=2.45)*	13.37 *(N=126 sd=3.27)*	13.01 *(N=126 sd=3.36)*	11.58 *(N=123 sd=3.06)*
	Somewhat important	11.51 *(N=465 sd=2.60)*	14.62 *(N=470 sd=3.27)*	13.74 *(N=459 sd=3.00)*	12.38 *(N=442 sd=2.78)*
	Very important	11.76 *(N=327 sd=2.52)*	15.30 *(N=330 sd=3.22)*	14.60 *(N=325 sd=3.34)*	13.09 *(N=313 sd=3.01)*
	F-value	9.37	16.35	13.26	12.98
	Sig.	.00	.00	.00	.00
	Eta squared	.02	.03	.03	.03
● to be able to make more money	Not important	11.12 *(N=78 sd=2.96)*	14.08 *(N=75 sd=3.84)*	13.52 *(N=75 sd=3.56)*	12.45 *(N=74 sd=3.45)*
	Somewhat important	11.37 *(N=405 sd=2.35)*	14.53 *(N=407 sd=3.08)*	13.89 *(N=403 sd=2.95)*	12.35 *(N=393 sd=2.74)*
	Very important	11.66 *(N=439 sd=2.69)*	14.96 *(N=448 sd=3.41)*	14.11 *(N=436 sd=3.41)*	12.70 *(N=415 sd=3.04)*
	F-value	2.16	3.26	1.24	1.49
	Sig.	.17	.04	.29	.23
	Eta squared	.01	.01	.00	.00
● to learn more about things that interest me	Not important	10.22 *(N=65 sd=2.56)*	12.83 *(N=64 sd=3.50)*	12.36 *(N=64 sd=3.32)*	11.17 *(N=65 sd=3.14)*
	Somewhat important	11.41 *(N=375 sd=2.40)*	14.38 *(N=378 sd=3.08)*	13.66 *(N=377 sd=2.91)*	12.15 *(N=359 sd=2.70)*
	Very important	11.71 *(N=482 sd=2.66)*	15.20 *(N=487 sd=3.36)*	14.40 *(N=472 sd=3.37)*	13.01 *(N=458 sd=3.01)*
	F-value	10.15	18.07	14.33	16.57
	Sig.	.00	.00	.00	.00
	Eta squared	.02	.04	.03	.04
● to meet new and interesting people	Not important	10.98 *(N=167 sd=2.63)*	13.83 *(N=167 sd=3.47)*	13.33 *(N=164 sd=3.25)*	12.21 *(N=165 sd=3.15)*
	Somewhat important	11.43 *(N=442 sd=2.39)*	14.48 *(N=447 sd=3.15)*	13.84 *(N=436 sd=3.04)*	12.20 *(N=421 sd=2.73)*
	Very important	11.85 *(N=308 sd=2.75)*	15.50 *(N=311 sd=3.33)*	14.48 *(N=309 sd=3.41)*	13.18 *(N=292 sd=3.03)*
	F-value	6.53	16.23	7.48	11.00
	Sig.	.00	.00	.00	.00
	Eta squared	.01	.03	.02	.03
● to prepare myself for graduate or professional school	Not important	10.29 *(N=76 sd=2.70)*	13.22 *(N=77 sd=3.70)*	12.73 *(N=73 sd=3.79)*	11.49 *(N=74 sd=3.48)*
	Somewhat important	11.18 *(N=348 sd=2.41)*	14.09 *(N=343 sd=2.95)*	13.52 *(N=341 sd=2.89)*	12.05 *(N=331 sd=2.74)*
	Very important	11.85 *(N=488 sd=2.58)*	15.31 *(N=500 sd=3.35)*	14.41 *(N=490 sd=3.28)*	12.99 *(N=468 sd=2.91)*
	F-value	16.11	22.88	13.59	15.29
	Sig.	.00	.00	.00	.00
	Eta squared	.03	.05	.03	.03

Appendix C

Estimate of gains by A-level and Certificate-level examination results

Estimate of gains by A-level English (N=998)				
Grades	Vocational	Personal development	General educational	Intellectual
F	9.50 *(N=4 sd=3.11)*	11.75 *(N=4 sd=4.03)*	11.00 *(N=4 sd=4.16)*	9.75 *(N=4 sd=3.69)*
E	11.63 *(N=537 sd=2.42)*	14.77 *(N=539 sd=3.21)*	13.92 *(N=531 sd=3.06)*	12.47 *(N=515 sd=2.83)*
D	11.18 *(N=298 sd=2.75)*	14.75 *(N=301 sd=3.37)*	14.01 *(N=293 sd=3.45)*	12.73 *(N=282 sd=3.03)*
C	11.48 *(N=48 sd=3.00)*	14.06 *(N=50 sd=3.79)*	13.62 *(N=50 sd=3.71)*	11.94 *(N=49 sd=3.37)*
B	11.56 *(N=9 sd=3.24)*	12.70 *(N=10 sd=3.92)*	14.67 *(N=9 sd=3.81)*	12.22 *(N=9 sd=3.27)*
A	12.12 *(N=33 sd=2.48)*	14.94 *(N=33 sd=3.54)*	14.67 *(N=33 sd=3.02)*	12.52 *(N=29 sd=3.23)*
F-value	2.07	1.83	1.22	1.43
Sig	.07	.11	.30	.21
Eta squared	.00	.01	.01	.01

Estimate of gains by A-level Chinese (N=998)				
Grades	Vocational	Personal development	General educational	Intellectual
F	12.20 *(N=5 sd=5.50)*	13.60 *(N=5 sd=4.93)*	13.20 *(N=5 sd=6.38)*	11.20 *(N=5 sd=4.55)*
E	11.62 *(N=255 sd=2.51)*	14.69 *(N=259 sd=3.19)*	13.98 *(N=250 sd=3.16)*	12.44 *(N=242 sd=2.93)*
D	11.31 *(N=448 sd=2.64)*	14.75 *(N=450 sd=3.39)*	13.93 *(N=444 sd=3.31)*	12.56 *(N=430 sd=2.97)*
C	11.57 *(N=131 sd=2.36)*	14.68 *(N=132 sd=3.00)*	13.95 *(N=133 sd=2.80)*	12.45 *(N=126 sd=2.56)*
B	11.38 *(N=50 sd=2.66)*	14.24 *(N=49 sd=3.81)*	13.15 *(N=47 sd=3.44)*	12.48 *(N=48 sd=3.43)*
A	12.28 *(N=40 sd=2.50)*	14.81 *(N=42 sd=3.68)*	15.07 *(N=41 sd=3.36)*	12.84 *(N=37 sd=3.27)*
F-value	1.41	.33	1.63	.35
Sig	.22	.90	.15	.89
Eta squared	.01	.00	.01	.00

Estimate of gains by Certificate-level English (N=998)				
Grades	Vocational	Personal development	General educational	Intellectual
F	8.50 *(N=2 sd=4.95)*	10.50 *(N=2 sd=6.36)*	8.00 *(N=2 sd=2.83)*	7.50 *(N=2 sd=3.54)*
E	11.71 *(N=245 sd=2.36)*	14.87 *(N=244 sd=2.92)*	13.93 *(N=238 sd=2.90)*	12.47 *(N=230 sd=2.79)*
D	11.26 *(N=518 sd=2.60)*	14.58 *(N=522 sd=3.31)*	13.84 *(N=514 sd=3.21)*	12.45 *(N=499 sd=2.87)*
C	11.86 *(N=100 sd=2.78)*	15.09 *(N=103 sd=3.85)*	14.57 *(N=102 sd=3.80)*	13.01 *(N=98 sd=3.38)*
B	11.38 *(N=29 sd=2.54)*	13.77 *(N=30 sd=3.64)*	13.55 *(N=29 sd=3.57)*	11.89 *(N=28 sd=3.27)*
A	12.40 *(N=35 sd=2.82)*	15.00 *(N=36 sd=3.85)*	14.66 *(N=35 sd=3.35)*	13.06 *(N=31 sd=3.35)*
F-value Sig	3.02 .01	1.72 .13	2.66 .02	2.24 .05
Eta squared	.02	.01	.01	.01

Estimate of gains by Certificate-level Chinese (N=998)				
Grades	Vocational	Personal development	General educational	Intellectual
F	10.33 *(N=3 sd=4.73)*	12.33 *(N=3 sd=5.51)*	8.00 *(N=2 sd=2.83)*	8.33 *(N=3 sd=2.89)*
E	11.59 *(N=101 sd=2.61)*	14.89 *(N=102 sd=3.29)*	13.94 *(N=96 sd=3.11)*	12.55 *(N=95 sd=2.96)*
D	11.55 *(N=365 sd=2.46)*	14.71 *(N=364 sd=3.14)*	14.02 *(N=360 sd=3.09)*	12.37 *(N=342 sd=2.84)*
C	11.29 *(N=269 sd=2.56)*	14.41 *(N=273 sd=3.35)*	13.60 *(N=270 sd=3.41)*	12.38 *(N=264 sd=2.97)*
B	11.38 *(N=131 sd=2.82)*	15.08 *(N=132 sd=3.49)*	14.23 *(N=128 sd=3.33)*	12.92 *(N=126 sd=2.97)*
A	12.05 *(N=60 sd=2.71)*	14.87 *(N=63 sd=3.76)*	14.70 *(N=64 sd=3.08)*	13.19 *(N=58 sd=3.24)*
F-value Sig	1.13 .34	1.17 .32	2.94 .01	2.58 .03
Eta squared	.01	.01	.02	.01

Estimate of gains by Certificate-level Mathematics (N=998)				
Grades	Vocational	Personal development	General educational	Intellectual
F	11.13 *(N=16 sd=2.63)*	14.31 *(N=16 sd=4.01)*	13.38 *(N=16 sd=3.81)*	12.43 *(N=16 sd=3.95)*
E	11.39 *(N=165 sd=2.52)*	14.70 *(N=162 sd=3.57)*	14.11 *(N=164 sd=3.38)*	12.32 *(N=159 sd=3.11)*
D	11.38 *(N=422 sd=2.60)*	14.64 *(N=429 sd=3.28)*	13.75 *(N=415 sd=3.15)*	12.50 *(N=408 sd=2.84)*
C	11.56 *(N=235 sd=2.62)*	14.84 *(N=236 sd=3.16)*	14.07 *(N=230 sd=3.17)*	12.70 *(N=220 sd=2.79)*
B	11.77 *(N=43 sd=2.42)*	14.49 *(N=45 sd=2.99)*	13.84 *(N=44 sd=3.13)*	12.15 *(N=40 sd=2.99)*
A	12.25 *(N=48 sd=2.60)*	14.73 *(N=49 sd=3.81)*	14.80 *(N=51 sd=3.62)*	12.76 *(N=45 sd=3.68)*
F-value Sig	1.23 .29	.19 .97	1.27 .27	.49 .79
Eta squared	.01	.00	.01	.00

Appendix D

Estimate of gains by other student factors

Estimate of gains by age (N=998)				
Age groups	Vocational	Personal development	General educational	Intellectual
22 or younger	11.49 *(N=838 sd=2.59)*	14.70 *(N=850 sd=3.28)*	13.92 *(N=834 sd=3.21)*	12.51 *(N=801 sd=2.89)*
23 – 27	11.64 *(N=73 sd=2.42)*	14.88 *(N=69 sd=3.83)*	14.24 *(N=68 sd=3.45)*	12.60 *(N=70 sd=3.47)*
28 or above	10.53 *(N=15 sd=2.75)*	13.60 *(N=15 sd=3.64)*	14.20 *(N=15 sd=3.51)*	12.07 *(N=14 sd=3.38)*
F-value	1.16	.93	.35	.19
Sig.	.32	.40	.71	.83
Eta Squared	.00	.00	.00	.00

Estimate of gains by parents' education (N=998)				
University education of parents	Vocational	Personal development	General educational	Intellectual
No	11.48 *(N=885 sd=2.59)*	14.70 *(N=893 sd=3.31)*	13.94 *(N=877 sd=3.24)*	12.52 *(N=846 sd=2.95)*
Yes, mother only	10.25 *(N=4 sd=1.89)*	14.75 *(N=4 sd=1.71)*	14.00 *(N=4 sd=2.45)*	12.50 *(N=4 sd=1.91)*
Yes, father only	11.85 *(N=20 sd=2.76)*	14.35 *(N=20 sd=3.59)*	14.42 *(N=19 sd=3.32)*	12.32 *(N=19 sd=3.06)*
Yes, both parents	11.43 *(N=14 sd=2.82)*	15.14 *(N=14 sd=4.55)*	14.14 *(N=14 sd=3.57)*	12.64 *(N=14 sd=3.69)*
F-value	.44	.16	.16	.04
Sig.	.73	.93	.93	.99
Eta Squared	.00	.00	.00	.00

Estimate of gains by area of study being first choice in priority (N=998)				
Priority	Vocational	Personal development	General educational	Intellectual
Yes	11.59 *(N=371 sd=2.59)*	14.69 *(N=368 sd=3.42)*	13.88 *(N=361 sd=3.29)*	12.64 *(N=352 sd=3.07)*
No	11.42 *(N=544 sd=2.60)*	14.74 *(N=556 sd=3.27)*	14.01 *(N=546 sd=3.22)*	12.46 *(N=524 sd=2.86)*
E-value	.91	.05	.34	.72
Sig.	.34	.83	.56	.40
Eta Squared	.00	.00	.00	.00

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