NACCQ Systems Curricula Changes in the Systems Analysis and Design field

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The field of computing is changing at an astonishing pace. The question posed as a basis for this paper is whether the changes that have been made in computer education over a number of years have been just as rapid. In particular this paper examines the changes that have been made in the Systems Analysis and Design curricula of the National Diploma in Business Computing offered by the National Advisory Committee on Computing Qualifications from 1989 to the present day. This paper observes that some modules have had little or no change while others have changed a great deal.

1. INTRODUCTION

"Computing is an enormously vibrant field" and "continues to evolve at an astonishing pace". (ACM) The question is posed as to whether the changes that have been made in computer education over a number of years have been just as astonishing. One consideration when examining computer education is the prescription, syllabus or curriculum that needs to be taught. This looks at learning outcomes, objectives, aims and content and is the focus of this paper. Other considerations are the resources or technology such as the textbook or online references available to the lecturer, and how the curricula is conveyed to the students using the technology.

The examination is limited to the prescriptions as they are proposed by the National Advisory Committee on Computing Qualifications (NACCQ). The changes to the modules in the area of Systems Analysis and Design will be examined in detail.

The National Advisory Committee on Computing Qualifications was established in 1986 when various representatives from New Zealand polytechnics and from the New Zealand computer industry met to review to New Zealand Certificate in Data Processing. This led to the introduction of the Certificate in Business Computing in 1988 and by 1991, the National Diploma in Business Computing (a three year programme of study). (NACCQ Introduction)

These qualifications have been revised and updated since then by various working parties that meet on a regular basis. Today the revision is the responsibility of the Curriculum and Quality Working Group of NACCQ. Innovation in the prescription is necessary and the modules and qualifications are reviewed on a two-year basis. New modules can be added and many institutes choose to teach the new module as a "local" module before they are accepted by the working group.

Goldweber *et al (*1997) reflects on innovation in the curriculum and warns against adopting the current fad. It recommends "caution should have taken precedence to implementation" when considering the latest fad and that the pedagogic value of what is taught needs to be understood. We shall look at the modules outlined in table one, which are from the Systems Analysis and Design field in today's ninth edition of the NACCQ document.

The structure of the programme was different in the second edition (1989). The modules were grouped into Preliminary (MI), Intermediate (IN) and Advanced (AD) and had different credit values. In 1989 a credit corresponded to 1 hour of student learning and in 2002 corresponded to 10 hours of student learning. The correspondence between modules in the two editions is outlined in table two.

2. REVIEW OF MODULES

After examining the modules, they were grouped into three groups. Minor changes where there was changes to words or the addition/deletion of a main

Table 1: Modules under consideration

OO500 Object Oriented Techniques	DA600 Data Analysis	SA700 Systems Analysis
SO500 Systems Overview	IG600 Information Gathering	SD700 Systems Design
	IO600 Input Output Design	
	OO600 Object Oriented Analysis & Design	
	RA600 Requirements Analysis	
	SA600 Systems Analysis	
	SA61n Systems Analysis (Methodology)	
	SD600 Systems Design	

Table 2: Correlation between module titles

Modules (ninth edition)	Modules (second edition)
OO500 Object Oriented Techniques (7 credits)	(none)
SO500 Systems Overview (7 credits)	(none)
DA600 Data Analysis (7 credits)	IN400 System Design (Topic 1 - 40 of 120 credits)
IG600 Information Gathering (7 credits)	IN340 Systems Requirements Analysis (Topic 2 40 out of 120 credits)
IO600 Input Output Design (7 credits)	IN400 System Design (Topic 2 & 3 - 55 of 120 credits)
OO600 Object Oriented Analysis & Design (7 credits)	(none)
RA600 Requirements Analysis (7 credits)	IN340 Systems Requirements Analysis (Topics 3&4 - 50 out of 120 credits)
SA600 Systems Analysis (7 credits)	IN250 Structured Systems Analysis Tools (90 credits)
SA61n Systems Analysis (Methodology) (7 credits)	IN250 (part)
SD600 Systems Design (7 credits)	MI 400 Systems Design (60 credits)
SA700 Systems Analysis (7 credits)	AD380 Systems Analysis (90 credits)
SD700 Systems Design (7 credits)	AD400 Systems Design (60 credits)

content point; moderate where there were several changes and considerable where the content has been completely rewritten.

2.1 Minor changes

In RA600, there are minor rewording in the context such as "Cost Benefit Analysis" is now "Investment Analysis" and where the older prescription asks for "details" the newer one states "NPV, IRR, payback".

In IG600, the older prescription identifies Interviewing, Questionnaires, Research of documentation and data and, Observation as the techniques required. New changes "Research of documentation and data" to "Sampling of documentation and data" and adds Research as a separate technique indicating one should do "a literature search via li-

brary catalogues, CD-ROM databases, an Internet-based search and site visits".

Other modules that have similar minor changes are IO600 and SD600. SD700 has no changes at all.

A major revision of the structure of the qualifications was made in 1991 edition when a new format was established. When this was revised in edition 4th (1993) two new modules were introduced SO100 and OO100. Only OO100 has changed and that is an improvement in the wording not in the concepts.

2.2 Moderate changes

In DA600 that focuses on data modelling and normalisation, there has been a minor change to the data modelling with the addition of the words "attributes of entity types". The relational data analysis

moves the student from unnormalised data to data in third normal form with the addition of "define further normal forms". The addition of these words is important especially since both DB500 Database Management Systems (DBMS) and DB600 Database Management Systems (DBMS) still only require "normalisation to 3rd normal form".

A section on consolidation of entities and comparing the data model with the 3NF relations has also been added.

2.3 Considerable changes

The old prescription of SA600 gave an overview of many different techniques and tools. It required the student to "develop a data flow diagram using a top down approach" and also a structure chart and a data dictionary. The data flow diagram had to be then transformed into program modules and structured English used to describe procedures.

Other diagrams the student had to be able to draw were data structure diagrams, Document flow diagrams, Warnier/Orr diagrams, Nassi Schneidermann charts, HIPO diagrams and a Systems I/O flowchart. Also be able to create a decision table and decision tree

Today the student needs to be able to draw an Entity Relationship Diagram (15%) that previously was only in data modelling. Data Flow diagrams, data dictionaries are still present (30%) and other techniques (15%) although the techniques are not specified nor how many. Documentation of each phase has increased to 30% and a recommendation to be a case tool. In the old prescription an explanation of a CASE was adequate.

In its partner module, SA61n, the student had to describe recognised structured approach methodology such as Jackson in the old prescription. Today this is worded "It may be a further application of structured systems analysis methodology or any recognised methodology (e.g. OOA, Jackson)". It is good to see the introduction of OO but maybe it is time to remove Jackson.

There is only minor changes in SA700 up to 2002 edition. Section 1 "Selecting a target area" and section 2 "Existing system" of the old prescription have been removed. The other five sections are the same except for some minor wording difference. This module was updated in the last revision of the prescription and now identifies that the student must

produce a feasibility report and a requirements specification. The types of things to be included in each report are specified but not in the same detail as previously. The types of models are not specified and include a range of models: data model, process model, domain model, use case model.

3. CHANGES IN SYSTEMS ANALYSIS AND DESIGN FIELD

In order to see what changes there were in Systems Analysis and Design field during those years, I selected to do a review of textbooks.

In the Information Gathering area, besides the "traditional methods" (Hoffer (1996)) that are mentioned in the IG600 module, Whitten (2001), Hoffer (1996) and Satzinger (2002) add Discovery prototyping, Joint Requirements Planning (JRP) or joint Application Design (JAD). It would appear that this prescription is now out of date and should include joint application design and discovery prototyping as well as the present content.

The introduction of Object Oriented Analysis and Design was gradual. Leading textbooks in Systems Analysis and Design started introducing a chapter on OOAD. For example Hoffer (1996) has a chapter in the appendix, Kendall (1999) at the back of the book and Whitten (2001) also at the back.

In the prescriptions OO100 Object Oriented Techniques was introduced in 1993, OO300 Object Oriented Programming which included 25% on OOAD was introduced in 1996 although it could have been taught earlier under a Programming module. OO600 Object Oriented Analysis and Design first appeared in the 9th edition.

4. CONCLUSION

Disregarding the module introduced in the present edition of the prescription, the majority (7) of modules under consideration has had minor changes, one moderate changes and three major changes. Object Analysis and Design has been cautiously introduced over a number of years and has proven that it is not just another fad but here to stay. Some modules can be completed by using structured or object oriented analysis and design and did not need to be reworded.

Future research needs to be done on prescriptions in the other fields of computing or looking at other national qualifications or advisory documents such as those from ACM or IEEE. Also the pedagogical considerations need to be investigated to show how computer education has changed through time.

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